Metropolitan Road Improvement Alliance

Annual Condition Report

Wetlands Monitoring and Management

Plan Ministerial Statement 1008

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Document Approval

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EXECUTIVE SUMMARY

This annual report summarises the monitoring results collected as per the Wetlands Monitoring and Management Plan (WMMP) for the period 2 July 2017 to 1 July 2018. The objective of the WMMP is to monitor the condition of wetland water quality (groundwater and surface water) and determine through the use of defined triggers, if the Roe Highway Extension (the Project) is impacting on water quality.

Overall the Project has not had an impact on water quality, as outlined in the WMMP. There have been 'semi-frequent' fluctuations of results against the baseline and guideline triggers; however these were due to natural and seasonal variation of groundwater and surface water.

Groundwater Summary

1. pH was consistent throughout the 12 months of reporting, with the 12 month average for reference bores and impact bores both resulting a pH of 5.6, indicating overall neutral conditions. Further detail in section 3.2.2
2. TDS average, as derived from EC ranged from 271 mg/L (June 2018) to 539 mg/L (October 2017). The average EC and TDS values indicate freshwater conditions (section 3.2.3)
3. Total recoverable hydrocarbons (TRH) were detected on two occasions, both being the C16-C34 fraction, occurring at BH10 and GW-T3E-A, with results in natural variation (section 3.3.1)
4. Filtered arsenic, filtered lead and filtered nickel occasionally exceeded triggers however were concluded to be within natural variation (summarised section 3.3.2).
5. Filtered metals had semi-frequent exceedances for the metals aluminium, chromium, copper, iron, manganese and zinc. These were considered part of natural variation, with discussions and conclusions in section 3.3.2
6. Ammonia (as N), nitrate (as N), total Kjeldahl nitrogen, total nitrogen (as N) and total phosphorus results all semi-frequently exceeded the guideline triggers, however were considered to be part of natural variation and consistent with previous baseline data. Individual summaries are in section 3.3.3.

Surface Water Summary

1. pH results varied across the five wetlands, however were considered to be within seasonal and natural variance. Details in section 4.2.1
2. EC results were considered to be within seasonal variation of the wetlands. Details in section 4.2.2
3. TDS results exceeded the baseline trigger significantly at Bibra Lake, North Lake, Roe Drain and Roe Swamp. This was likely due to an error when determining TDS baseline trigger value. Further detail provided in section 4.2.2
4. Turbidity varied considerably over the reporting period, although this is consistent with previous data and considered part of natural variation. Further detail provided in section 4.2.3
5. TRH and BTEXN analytes were detected at surface water locations, due to the ephemeral nature of the wetland. Results were considered part of seasonal variation, with further detail in section 4.3.1
6. Filtered aluminium results semi-frequently exceeded triggers at North Lake and Roe Drain locations. Analysis of the long term data set shows the results are within natural variation. Further detail in section 4.3.2

7. Total nitrogen results semi-frequently exceeded guideline triggers at all wetland locations. However given exceedances were within close proximity to the baseline trigger and concentrations returned below trigger levels shortly after exceeding, results are considered within natural variation. See section 4.3.3.
8. Total phosphorous results at Roe Drain locations have been consistently higher than the baseline trigger, including pre-construction results dating from September 2015, well before construction commenced. As a result it is considered to be reflective of the natural conditions at this wetland. Further detail in 4.3.3
9. Ammonia results semi-frequently exceeded triggers at Bibra Lake, Frog Swamp and Roe Drain, including previous data from September 2015, prior to construction. These results are considered to be reflective of the natural conditions at this wetland. Further detail in 4.3.3.

Considering that construction activities have not been undertaken through the wetlands as planned and there have not been construction impacts, the results represent an extended baseline set of data. Any minor exceedances of the baseline triggers must be due to natural variations. Several of the existing guideline and baseline triggers were determined to be incorrect as data was always above the 'trigger' level, and these triggers require updating based on the existing data for use in further monitoring. These triggers are listed in recommendations in section 5.

1 INTRODUCTION

This Annual Report summarises the results and compliance of the Roe Highway Extension (the project) with the project's Wetlands Monitoring and Management Plan (WMMP). The report has been prepared with the purpose of meeting condition 9-10 in the Ministerial Statement 1008 (MS 1008).

This report addresses the 12 month reporting period from the 2 July 2017 to 1 July 2018, but also includes previous data to help characterise natural water conditions.

Main Roads Western Australia (MRWA) is generally compliant with Conditions 9-10 of MS 1008 for the period addressed in the annual report.

1.1 Objectives

The objectives of the program, as outlined in the WMMP (Strategen 2016) are to monitor the health and condition of Roe Swamp, North Lake and Bibra Lake, and identify management measures to be undertaken in the event that the Project impacts wetland health and/or water quality. The wetlands are all protected under the Environmental Protection (Swan Coastal Plain Lake) policy 1992 (Lakes EPP), and exist within the Beeliar Regional Park.

This report has been prepared to address the requirements under Condition 9 of MS 1008, dated 2 July 2015, summarised below in Table 1.

Table 1. Condition requirements under MS 1008 for Annual Condition Report

Condition	Requirement	Section
9-6	The proponent may review and revise the Wetlands Monitoring and Management Plan to the requirements of the CEO.	Section 55
9-7	The proponent shall review and revise the Wetlands Monitoring and Management Plan as and when directed by the CEO.	N/A
9-9	In the event that the monitoring indicates that the trigger criteria specified in the Wetlands Monitoring and Management Plan have been exceeded the proponent shall:	N/A
	1. Immediately implement the management and/or contingency actions specified in the Wetlands Monitoring and Management Plan and continue implementation of those actions until the trigger criteria are being met, or until the CEO has confirmed by notice in writing that it has been demonstrated that the outcome in condition 9-1 is being and will continue to be met and implementation of the management and/or contingency actions is no longer required;	N/A
	2. Investigate to determine the likely cause of the trigger criteria being exceeded and to identify any additional contingency actions required to prevent the trigger criteria being exceeded in the future	Sections 3, 4 and 5
	3. Provide a report to the CEO within seven days of an event, referred to in condition 9-9, occurring. The report shall include: a. details of management and/or contingency actions implemented; and b. the findings of the investigation required by condition 9-9(2).	N/A
9-10	The proponent shall submit the monitoring results required by condition 9-4, referenced against the environmental quality objective specified in condition 9-1 and the trigger levels specified in condition 9-4(4), to the CEO as part of the annual compliance reporting required by condition 4.	Appendices section 7

1.2 Background

1.2.1 Project History

MRWA established the 'Building Roe 8 Alliance' to complete Stage 8 of the Roe Highway Extension project, which had received approval by the Western Australian Minister for Environment in 2015 under the MS 1008. Following the election of the Labour Government on 11 March 2017, construction of Roe 8 was suspended. In response, the funds were re-allocated to several projects to improve road safety and reduce congestion. One of the projects is the Murdoch Drive Connection (MDC), which is being delivered by MRWA through the Metropolitan Road Improvement Alliance (MRIA). The MDC is being carried out under MS 1008.

The development area for the MDC no longer includes the area to the west of Bibra Drive, where the wetlands are located. The previous construction footprint to the west of Bibra Drive is now a rehabilitation zone (Figure 1-1).

1.2.2 Scope of Work

Prior to construction commencement Aurecon (2016) developed a baseline analysis report (BAR) using data collected for one year from September 2015 to August 2016. The BAR was used to identify localised trigger levels for water quality parameters and analytes of concern (AOC), which were then used to inform the WMMP (Strategen 2016).

The purpose of the monitoring is to determine, through comparison against triggers, if wetland water quality is being impacted by the Project. The WMMP requires water quality parameters to be monitored fortnightly and laboratory analysis of AOCs to be undertaken monthly. Parameters and AOCs to be monitored are as listed in Section 2.3 of the WMMP (Strategen 2016).

Condition 9-6 of MS 1008 states that MRWA may revise monitoring requirements as the Project progresses. Additionally, the WMMP (Strategen 2016) advises that ongoing data collected pre-construction may also be used to refine baseline trigger values and ranges.

1.2.3 Wetland Monitoring Sites

The monitoring locations were identified by Strategen in the WMMP, and were based on the previous project development envelope (Roe 8 Extension). The wetlands which were to be impacted by the previous alignment included Bibra Lake, Horse Paddock Swamp and Roe Swamp (including Lower Swamp, Melaleuca Swamp, and surrounding sumplands).

The monitoring sites for groundwater bores and surface water locations are shown in Figure 1-2 and Figure 1-3 respectively. Groundwater bores are classified as 'impact' or 'reference'; with reference locations considered to be outside potential impacts of the Project.

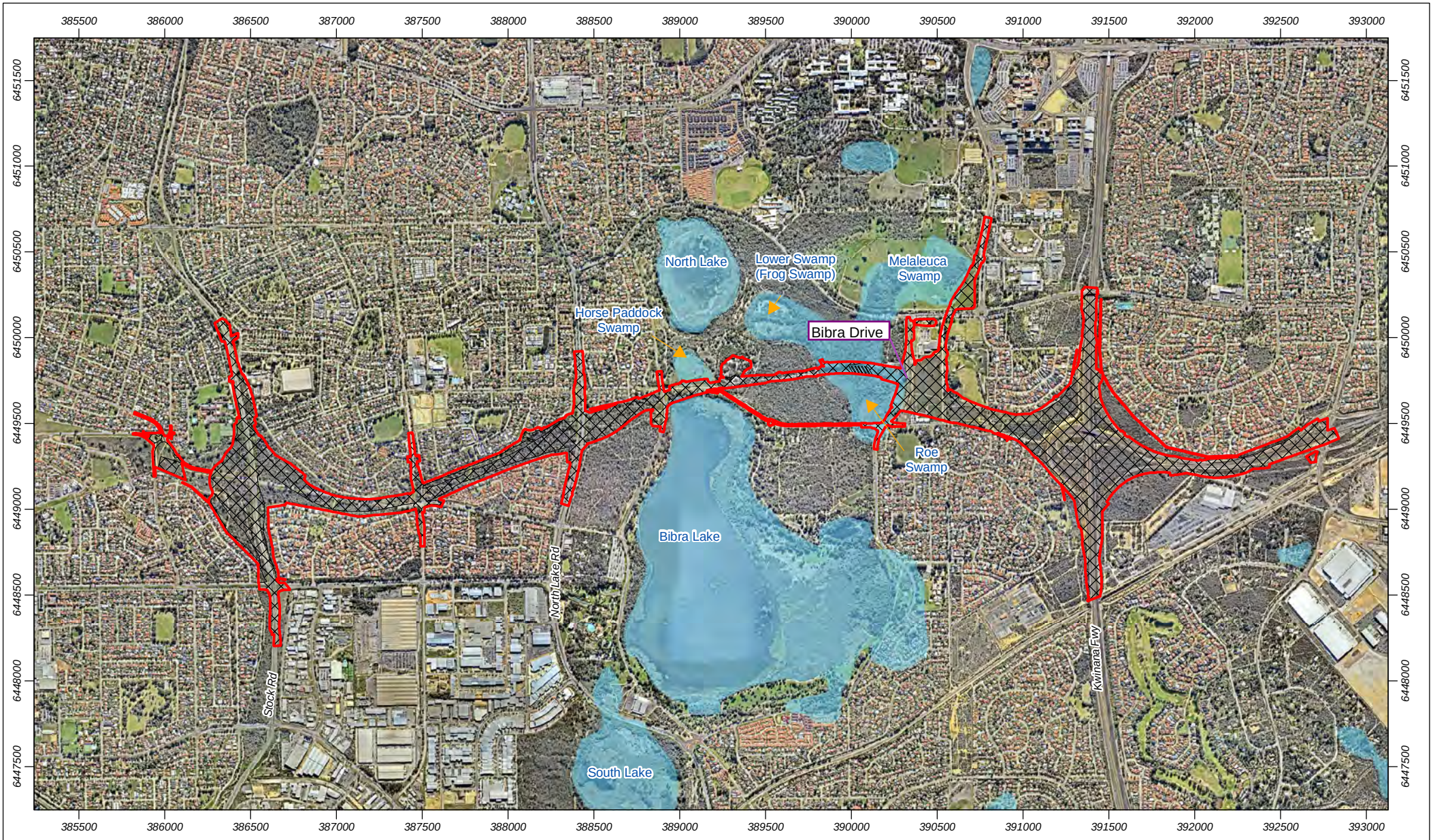

Figure 1-1 Project Development Envelope

Scale 1:30,000 at A4

0 200 400 600 800 1,000 Meters

Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 24/10/2016

Author: DWhite

Source: Aerial image: Nearmaps 2016; Wetlands: DPaW 2015; All other data: Client 2015.

Legend

- Development envelope
- Proposed construction footprint
- Wetlands

Figure 1-2 Groundwater monitoring locations

Scale 1:15,000 at A4

Meters 0 100 200 300 400

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 26/10/2016
Author: DWhite
Source: Aerial image: ESRI, approx. 2010; Development envelope: Client 2015; Wetlands: DPaW 2015.

Legend

- Impact groundwater bore
- Reference groundwater bore
- Project development envelope
- Zone of indirect impacts
- Wetlands

Figure 1 3 Surface water monitoring locations

Scale 1:13,500 at A4

Meters
0 100 200 300 400

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 27/10/2016
Author: DWhite
Source: Aerial image: Nearmaps 2016; Wetlands: DPaW 2015; Development envelope: Client 2015.

Legend

- Surface water sampling locations
- Sediment sampling locations
- Project development envelope
- Wetlands

1.2.4 Applied Guidelines

The results taken throughout the 12 month period were compared against the baseline trigger level and ranges as defined in the BAR (Aurecon 2016), and the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 water quality guidelines. 'Both guidelines' will be used to when referring to both the ANZECC guidelines and the baseline trigger levels defined in the BAR (Aurecon 2016). A list of documents/guidelines that will be referred to in this report is listed in Table 2.

Table 2. Relevant documents and guidelines

Reference	Document	Author
WMMP	Roe Highway Extension – Wetlands Monitoring and Management Plan	Strategen, 2016
BAR	Roe Highway Extension – 247607 Baseline Analysis Report	Aurecon, 2016
ANZECC	Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 freshwater water quality guidelines	ANZECC, 2000

In accordance with Condition 9-9 of the MS 1008, if monitoring indicates that the trigger criteria specified in the WMMP has been exceeded further action is required. In determining whether an exceedance is of potential concern, Aurecon (2016) define in the BAR how to interpret the monitoring results, and this is summarised below in Table 3. Inclusion of historical data in this report is used to characterise trends in natural and seasonal variation.

Table 3. Potential scenarios that may occur (Aurecon 2016)

Scenario	Definition
Natural Variation	Using the 80th and 20th percentiles, it is inevitable that small exceedances will be experiences on a semi-regular basis as part of 'natural variation'.
Sharp Rises or Falls	Sharp rises or falls in data points may be of concern. Measurements should be re-taken as soon as practicably possible to determine if there has been a contamination event.
Concerning Trends	Consistent rises or falls in water quality results over time may indicate a potential chronic contamination event. If such trends do occur (e.g. five consecutive points or more), then cause investigations should begin.
Seasonal Variation	Surface water bodies that are subject to periodical wetting and drying due to seasonal weather patterns are likely to be subject to oscillation in analyte concentrations due to the effects of changes in water body volume (i.e. periods of concentration and dilution).

1.3 Local Climate and Rainfall

The Project is located 14km south of Perth in the Swan Coastal Plain, within the southwest of Western Australia (WA). This region experiences a Mediterranean climate, characterised by warm to hot dry summers and mild to cool wet winters. Precipitation predominantly occurs during winter months, with the possibility of some summer storms.

The nearest Bureau of Meteorology (BoM) weather station is Jandakot Aero station 009172. Jandakot Aero station has recorded an average annual rainfall of 823.5 mm since 1972, with the majority of rainfall occurring between May and August (Figure 1-4 [BoM, 2018]). Within the reporting round (2 July 2017 to 1 July 2018) rainfall diverged from the mean during November 2017 to March 2018, with December and January both receiving higher than average rainfall, and November, February and March receiving much less than average.

The average maximum temperatures peak between December and February and correlate with low rainfall averages (BoM, 2018).

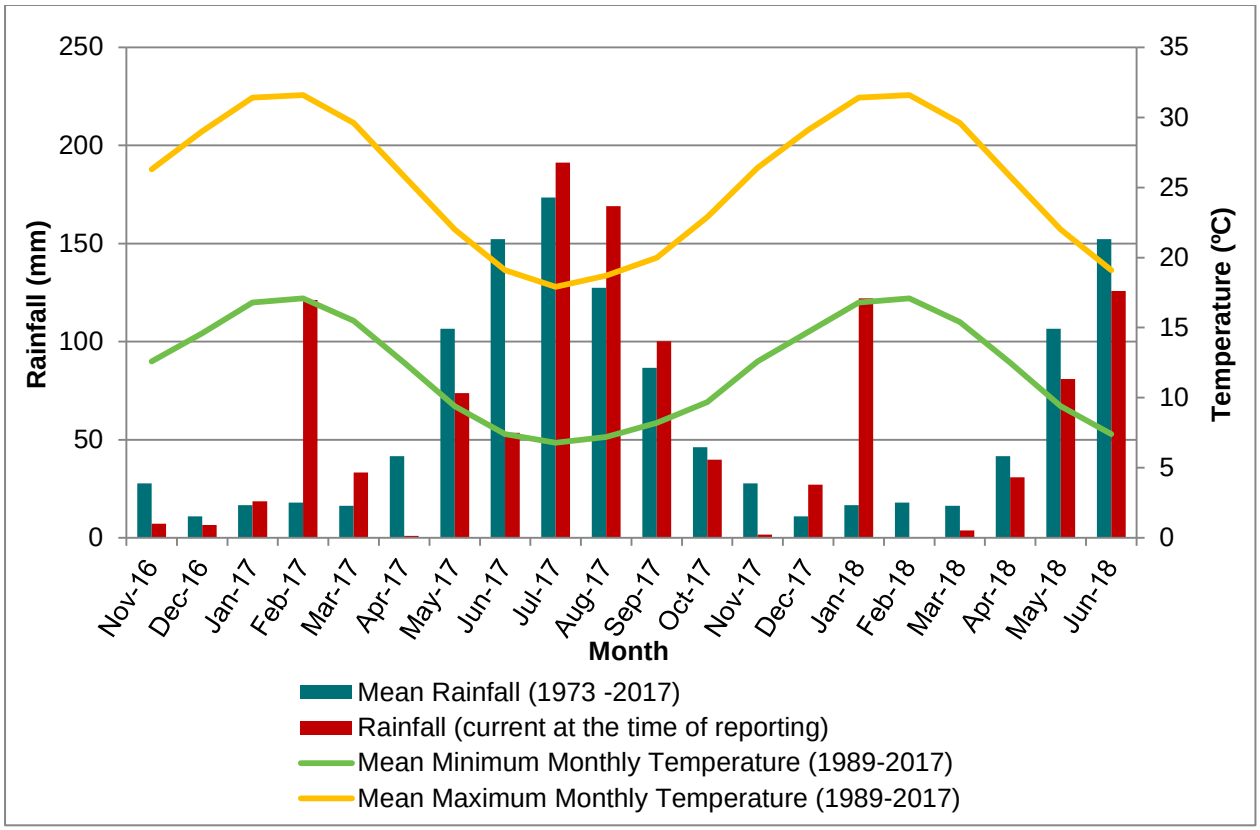

Figure 1-4. Jandakot Aero Station 009172 Climate Data (BoM 2018)

2 METHODOLOGY

2.1 Safety Planning

All works were completed in accordance with an approved Project Specific Health and Safety Plan, detailing the following:

- Site induction process;
- Environmental monitoring and management protocols;
- Safe Work methods;
- Contingency plans and procedures;
- Exclusion zones;
- Decontamination procedures;
- Pre-defined site routes and access points.

Water monitoring was conducted on site, with sampling of 13 groundwater bores and 14 surface water locations. The groundwater bores were all gauged, purged and sampled using low flow techniques.

2.2 Field work

2.2.1 Gauging and Sampling

Details of the sampling methodology employed in the field are summarised below:

Table 4. Field Methodology

Activity/Item	Details
Groundwater Bore - Gauging	All monitoring bores were gauged using an interface probe to determine the depth to groundwater prior to the commencement of sampling. Groundwater gauging recorded information is presented in Appendix A.
Groundwater Bore - Sampling Method	All bores were sampled using low-flow technique (peristaltic pump), with the exception of GW-D8 and BH12 which were sampled using micro-purging (bladder pump). According to the BAR the bladder pump is required for bores with a water level greater than 7 m below ground level (GW-D8 and BH12). The inlet of the pump was positioned with approximately at least 0.5-1 m of water above. Ex-situ measurements of water quality parameters were taken on site using a multi-parameter instrument (YSI Pro DSS) fitted with a flow-through-cell. The parameters included pH, dissolved oxygen (DO), redox potential, temperature and electrical conductivity (EC). Field parameters are presented in tabulated form Appendix A.
Surface Water - Sampling Method	The YSI Pro DSS was used to take in-situ measurements of water quality parameters, including those taken at groundwater bores and water turbidity. Where water level permitted, the measurements were profiled at different depths. Field parameters are presented in tabulated form in Appendix A.
Sample Analysis	Primary samples were analysed by ALS, a NATA accredited laboratory, using standard methods. Laboratory QA/QC measures included duplicate and rinstate samples. Duplicate samples were taken at one groundwater bore and one surface water location each round, and rinsates were taken at a frequency of one per day of sampling.
Field Documentation	All field records were logged on standardised field forms and included the date and time, location, field personnel, quality assurance / quality control (QA/QC) sample information and details of the sampling observations, provided in Appendix B.

Activity/Item	Details
Sample Preparation, Preservation and Transportation	Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were labelled in accordance with the monitoring location, field personnel and date, placed in eskies chilled with ice and forwarded to the laboratory under standard chain of custody (COC) procedures. Copies of the laboratory documentation are presented in Appendix C.
Decontamination Procedure	Decontamination of all non-disposable equipment was completed between sample locations. Disposable equipment such as bladders and gloves were replaced between each location.
Equipment Calibration	All field equipment was calibrated by field staff prior to use on-site. Calibration reports for all equipment are provided in Appendix D.

2.3 Data Assessment Methodology

The parameters total dissolved solids (TDS) and corrected redox (redox) were based on the field measurements taken for EC and redox potential. These parameters are included in the field results in Appendix A.

Data from field sheets were reviewed immediately to determine whether results exceeded the guideline parameters. Where potential exceedances were noted, contingency actions (re-sampling) were undertaken. The data was also reviewed and compared with previous results to determine if concerning trends were evident. If data was consistent with previous results or a one off spike returning to baseline data, it was not deemed an exceedance and was not reported further.

2.4 Variations

The program was generally compliant with Conditions 9-10 in the MS 1008 and requirements of the WMMP. Variations due to conditions outside of the project control/scope from the WMMP are listed in Table 5.

Table 5. Variations from WMMP

	Obligation	Variation
1	Secondary parameters taken annually in October – Total acidity, total alkalinity and major anions and cations	Was not completed in October 2017 for groundwater or surface water. It will be undertaken in October 2018.
2	Sampling not completed at all groundwater bores	Two groundwater bores are no longer in use; • GW-D7: limestone in bore, last sampled in Dec 17 • T2F: public vandalism, last sampled in May 2018 Bore T3C was temporarily unable to be gauged sampled from June 2018 onwards, due to being flooded under the wetland.
3	Surface water levels will be manually measured using a water level stake. Existing DoW water level stakes will be used where possible	The depth of the YSI DSS probe was taken at each recorded of field parameters, which was taken just above ground level.
4	Surface water locations unable to be sampled throughout the reporting period	Many of the surface water locations were dry between March – June 2018.
5	Sampling at A1E not completed/location varied	A1E surface water location was varied or not sampled due to health and safety considerations (located in centre of wetland)
6	BH12 as a reference bore	BH12 construction zone

3 GROUNDWATER

3.1 Groundwater Gauging

Groundwater gauging and rainfall (BoM data) is presented in Figure 3-1. Groundwater level is displayed inversely, in metres below top of casing (mBTOC), where an increase in water level is indicated by a result that is close to 0 m. Based on figure below, groundwater levels are relatively stable, with peaks and troughs correlating with rainfall events. These results indicate that groundwater in this region is influenced primarily by seasonal fluctuations.

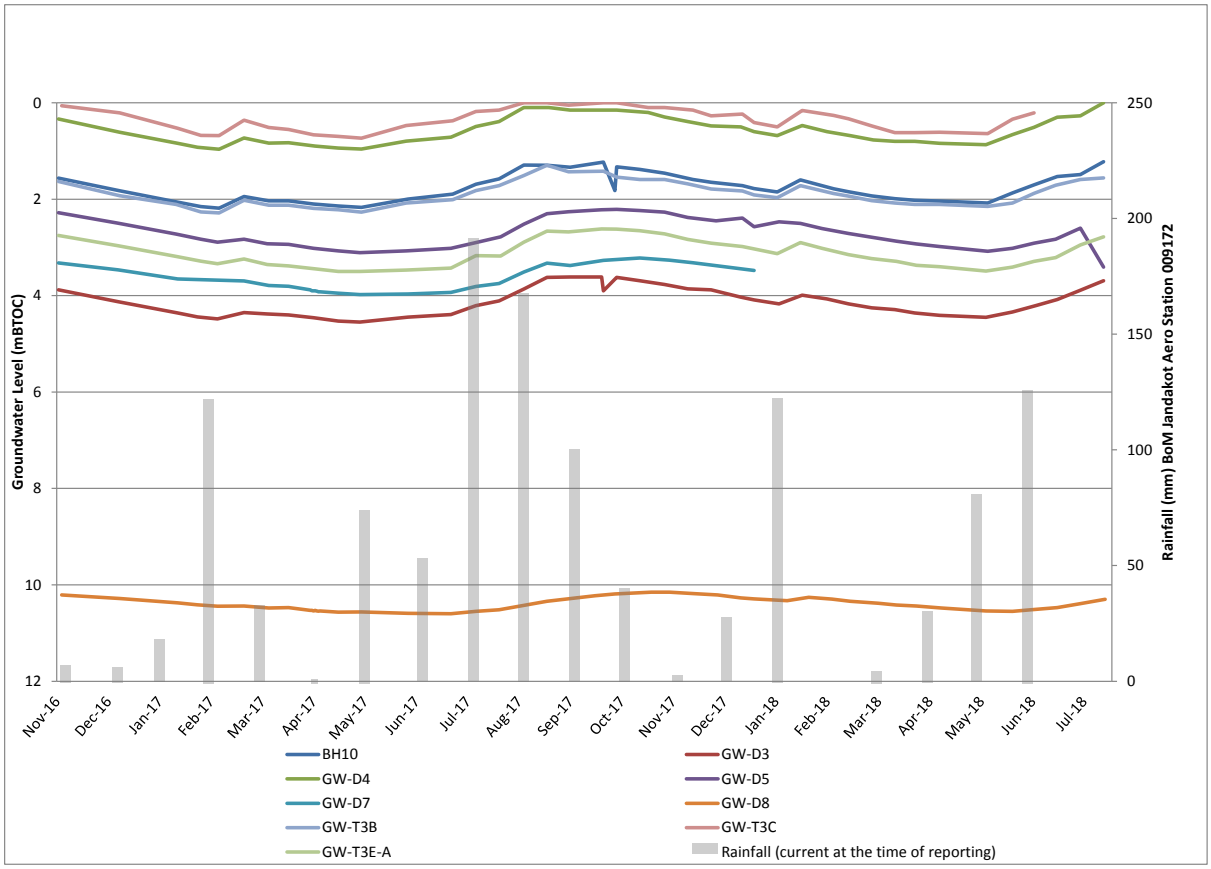

Figure 3-1. Impact Groundwater Levels and Rain Gauge Data (BoM 2018)

3.2 Water Quality Parameters

3.2.1 Summary of field results

Stabilised groundwater measurements were taken fortnightly, and are summarised below:

1. Water temperature was stable throughout the 12 months, with the lowest average in August 2017 at 18.4 ºC and highest average in April 2018 at 21.3 ºC
2. pH was consistent throughout the 12 months of reporting, with the 12 month average for reference bores and impact bores both resulting a pH of 5.6, indicating overall neutral and slightly acidic conditions
3. TDS average, as derived from EC, ranged from 271 mg/L (June 2018) to 539 mg/L (October 2017) for impact bores, and 329 mg/L (May 2018) to 682 mg/L (October 2017) for reference bores. The average TDS values indicate freshwater conditions, with impact bores slightly fresher than the reference bores

4. DO was consistent throughout all bores for the 12 months of reporting, with the lowest average in November 2017 at 1.14 mg/L and highest average in August 2017 at 2.05 mg/L.
5. Corrected redox (calculated) is based of redox potential (field measured), and is related to pH and DO. Corrected redox was consistent across all bores with the lowest average occurring in July at -71.69 mv, and the highest average in September 2017, with a value of 271 mV.

Water quality parameters that were compared to guideline triggers are pH, EC and TDS, and are discussed in in detail below in sections 3.2.2 and 3.2.3.

3.2.2 pH

The pH results were compared the baseline trigger and ANZECC guideline outlined in the WMMP. The trigger for both guidelines are defined by an acceptable pH range, with the baseline trigger range between 5.2 – 5.9 and ANZECC guidelines between 7- 8.5. This indicates that a result between the two guidelines (pH of 5.9 – 7), is in exceedance of both triggers, when it would be representing neutral conditions.

Figure 3-2, and at reference bores in Figure 3-3. The shaded areas represent results 'exceeding' triggers, with red indicating results in exceedance of both guidelines (less than 5.2 or greater than 8.5), and grey representing pH results in between the two guidelines.

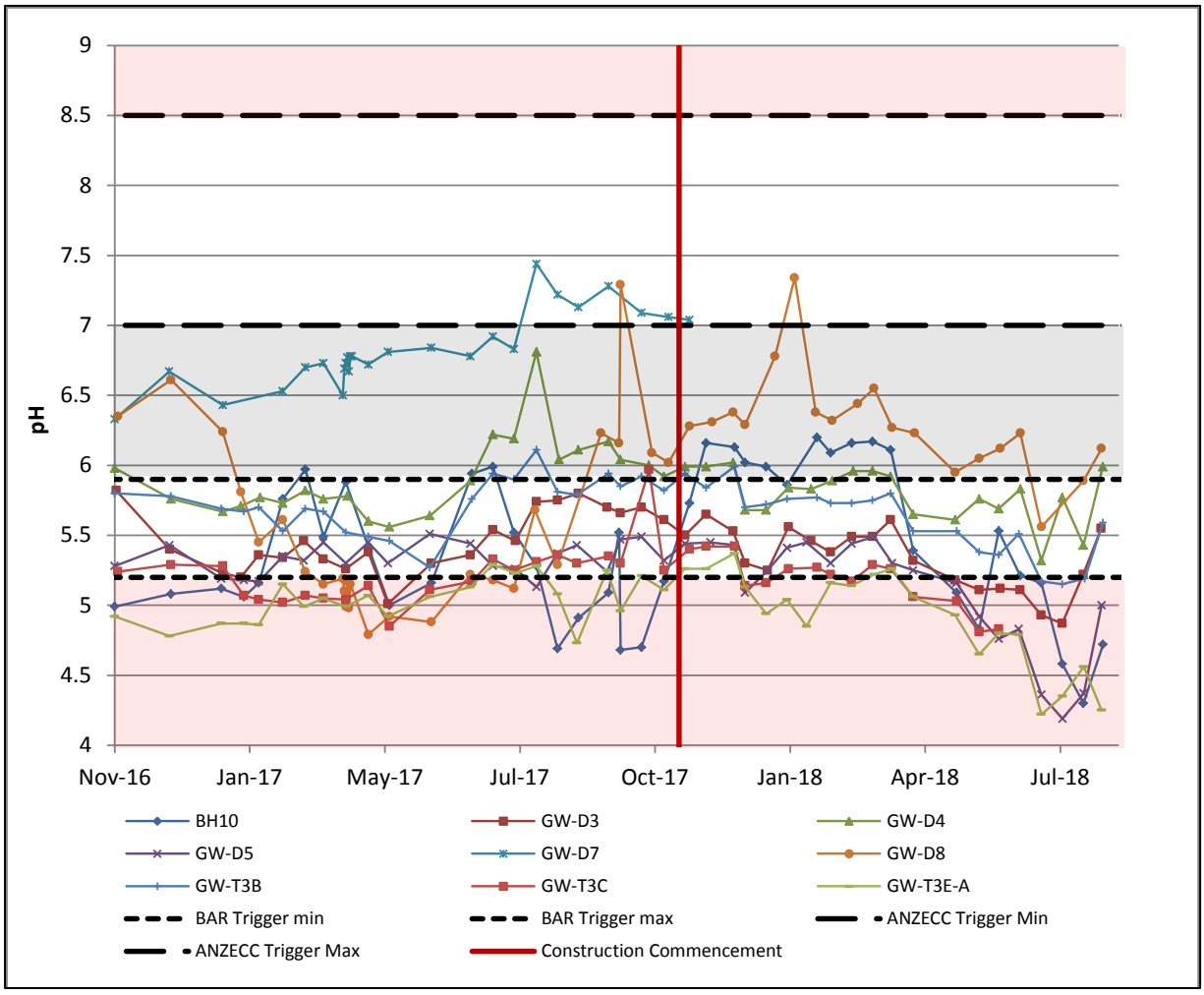

Figure 3-2. pH results at impact groundwater bores

As can be seen Figure 3-2, all bores, with the exception of GW-D7 semi-frequently exceed the baseline trigger range, both before and after the construction commencement, and as a result are considered to represent natural variation. There are no results above the ANZECC guideline (greater than 8.5). Exceedances below the baseline trigger (less than 5.2), are not concerning, as all results fluctuate between monitoring rounds, with no long-term trends.

The pH at GW-D7 has consistently been higher than the baseline trigger, with results from the current reporting period within the ANZECC guidelines. As these results are within neutral conditions, and consistent with previous data (shown in figure), it is likely to represent natural conditions. Further sampling at GW-D7 was not possible due to a blockage in the bore.

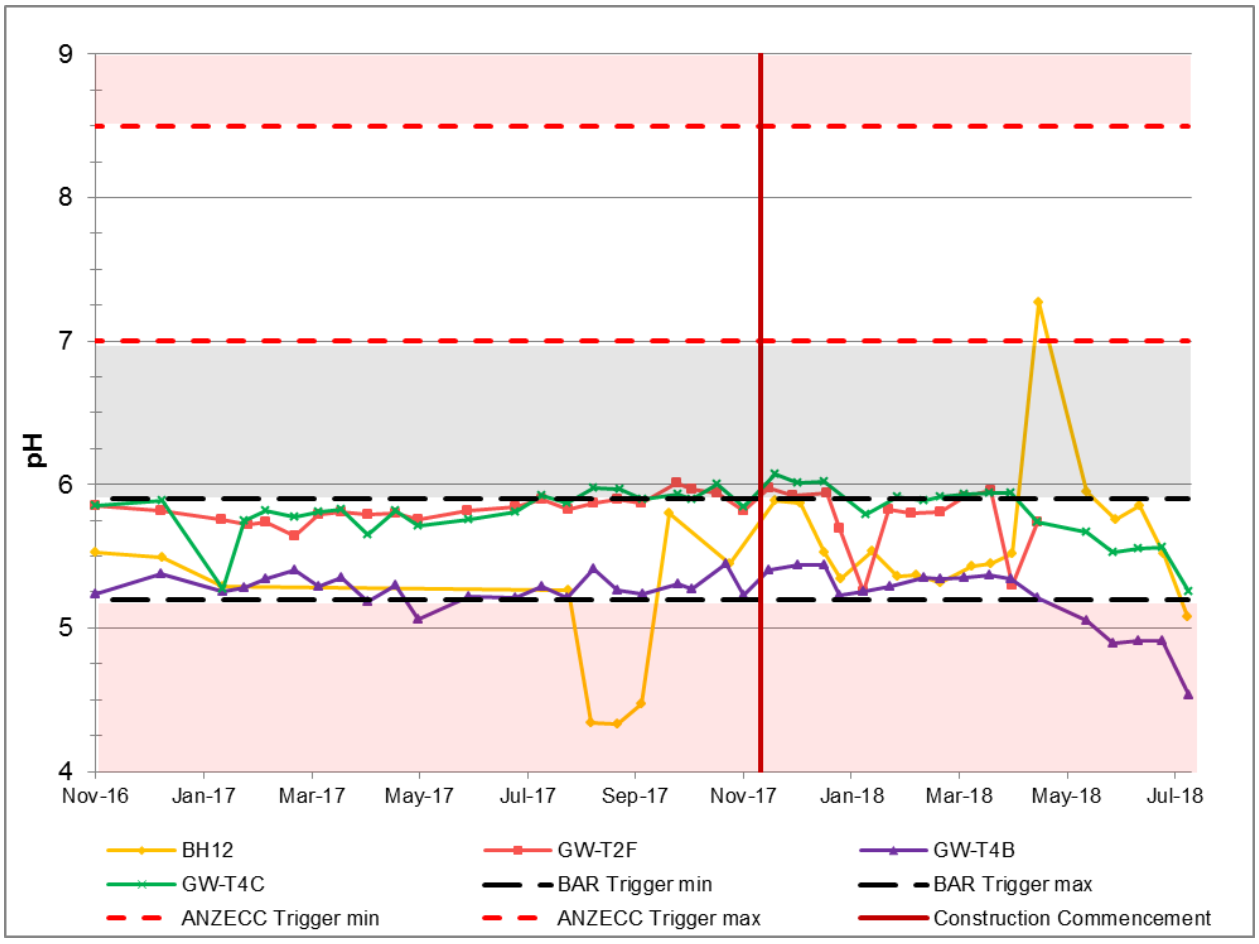

Figure 3-3. pH results at reference groundwater bores

Reference bore pH results (Figure 3-3), are clearly seen to sit within the baseline range or in the 'grey area' (in between the guidelines), representative of neutral conditions. BH12 shows two pH spikes from the graph; however results returns within the acceptable baseline range the following monitoring rounds.

The pH at all locations represents a neutral aquifer, and results are considered to be within natural variation. The trigger ranges should be updated to reflect the variation of pH, and to include results between the guidelines.

3.2.3 Electrical Conductivity and Total Dissolved Solids

EC (field measured) and TDS (based on EC) were only compared to the baseline triggers, which states an acceptable range for EC is between 274-1199 uS/cm and TDS between 178-780 mg/L. EC and TDS results below the baseline range indicate fresher water conditions, due to rainfall events, and are unlikely to be caused by construction activities. EC and TDS follow identical trends with the same exceeding results, hence only EC will be discussed in detail further. Figure 3-4 shows EC results at groundwater bores. The red shaded area indicates results exceeding the EC trigger range, whilst the grey section represents results that were below the range.

EC results occasionally exceeded the baseline trigger at all locations, with the exception of GW-D7, GW-D4, GW-T3B, BH10 and BH12. Clearly seen in Figure 3-4, EC results at GW-D7 have been consistently above the baseline range, throughout both the reporting period and pre-construction period. GW-D7 results are interpreted to be slightly more saline compared to the baseline trigger, however are considered to be natural groundwater variations, due to the consistency of pre-construction data. The EC results at GW-D4 and GW-T3B have consistently been recorded below the baseline trigger (grey area of Figure 3-4), indicating slightly fresher conditions at these monitoring bores. These lower ‘exceeding’ results are from rainfall replenishment, and are considered to be within natural water variation.

In the current reporting period, BH10 and BH12 both had a one-off spike in EC (March 2018), of which both immediately returned below the baseline trigger in the following round. The higher salinity at these locations is considered to be the result of a lower than average rainfall during February and March 2018 (BOM 2018), and are therefore within seasonal variation of EC. EC and TDS results are considered natural and seasonal water variation. The trigger ranges should be updated to reflect the variation of ED, and to include results below the guidelines.

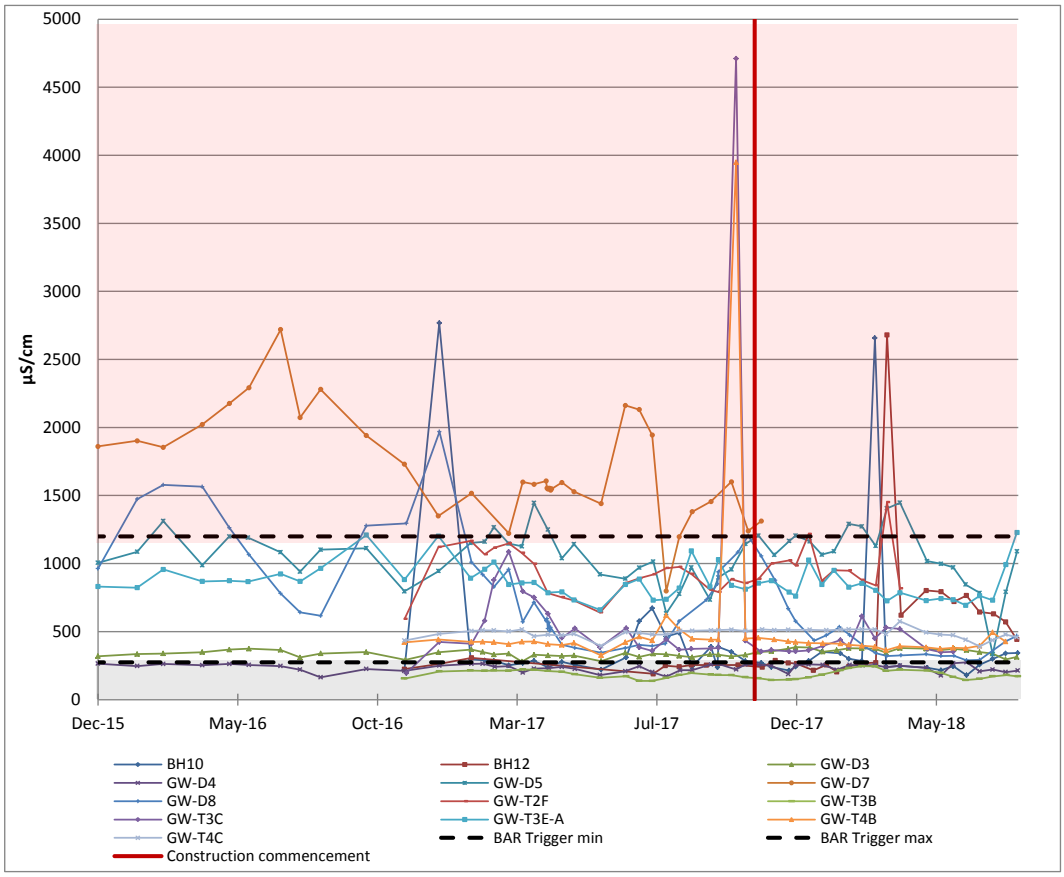

Figure 3-4. EC results at semi-frequently exceeding groundwater bores

3.3 Analytical Results

3.3.1 TRH/BTXN

1. Total recoverable hydrocarbons (TRH) were detected on two occasions, both being the C16-C34 fraction, occurring at BH10 and GW-T3E-A, and is discussed further below
2. BTEXN was not detected above the laboratory limit of reporting (LOR) across all results during the 12 month reporting period.

According to the WMMP the baseline trigger for C16-C34 TRH fraction is100 µg/L. The two detections at BH10 (January 2018) and GW-T3E-A (November 2017) exceeded this value, at 160 µg/L and 1210 µg/L respectively.

GW-T3E-A is located almost directly on a main track frequently used by the general public, local council rangers/officers and by Department of Parks and Wildlife officers.
The multi-purpose track is used by motor vehicles and motorbikes, which could be impacting the results of samples. It is also noted that no Project-related construction activities are currently occurring near this site, making it unlikely that the Project has contributed to the trigger exceedances. BH10 is located closer to construction activities, however the exceedances is relatively small, and all other results are below the LOR.

Due to the infrequency of these two exceedances and the return to baseline levels at the next monitoring event, they are considered to be an anomaly and unrelated to the assessment of groundwater quality.

3.3.2 Dissolved Metals

Groundwater was tested for dissolved metals (filtered and unfiltered), with full results in Appendix A. The metal AOCs that were compared with the baseline triggers and/or ANZECC guidelines are summarised below:

- Filtered arsenic results exceeded the 2 µg/L baseline trigger at BH10, GW-D5, GW-D7 and GW-T4C, with all other locations below the LOR. No exceedances of the 13 µg/L ANZECC guideline occurred. 'Exceeding' values were within 2 – 5 µg/L, hence results are considered within natural groundwater variation.
- Filtered lead had 19 total 'exceedances' of the baseline across 11 bore locations, between July to September 2017. The baseline trigger for filtered lead was 1 µg/L, and the highest exceedance was 2 µg/L. Additionally, the LOR for filtered lead is 1 µg/L, therefore any laboratory detections would be in exceedance of the baseline. No results had exceeded the ANZECC guidelines (3.4 µg/L). The results are representative of natural variation.
- Filtered nickel had total four exceedances of both the Guidelines (baseline = 10.4 µg/L, ANZECC = 11 µg/L). Three exceedances were at GW-D8 and one-off at BH12. No construction activities have occurred within close proximity to GW-D8, and all exceedances only occurred July to August 2017. BH12 is a reference bore, with one exceedance in August 2017. Given the bore location and type, it is unlikely that the project has impacted these bores, and results are considered within natural variation.
- Filtered cadmium and filtered selenium had no exceedances over the reporting period.
- Filtered metals with semi-frequent exceedances included aluminium, chromium, copper, iron, manganese and zinc. These are discussed in further detail below.

Filtered Aluminium

Over the reporting period (2 July 2017 to 1 July 2018) aluminium was detected at all groundwater locations, and semi-frequently exceeded at BH10, GW-D4, GW-D5, GW-T3B and GW-T3E-A (Figure 3-5). There was no defined ANZECC trigger value, hence aluminium only compared with the baseline. Over the 12 month reporting period all bores fluctuate to within the baseline range, and are likely to be indicative of natural conditions. GW-D4 had a sharp peak of 3550 µg/L in April 2018, however is not concerning as the concentration returns to below the baseline trigger level following further monitoring.

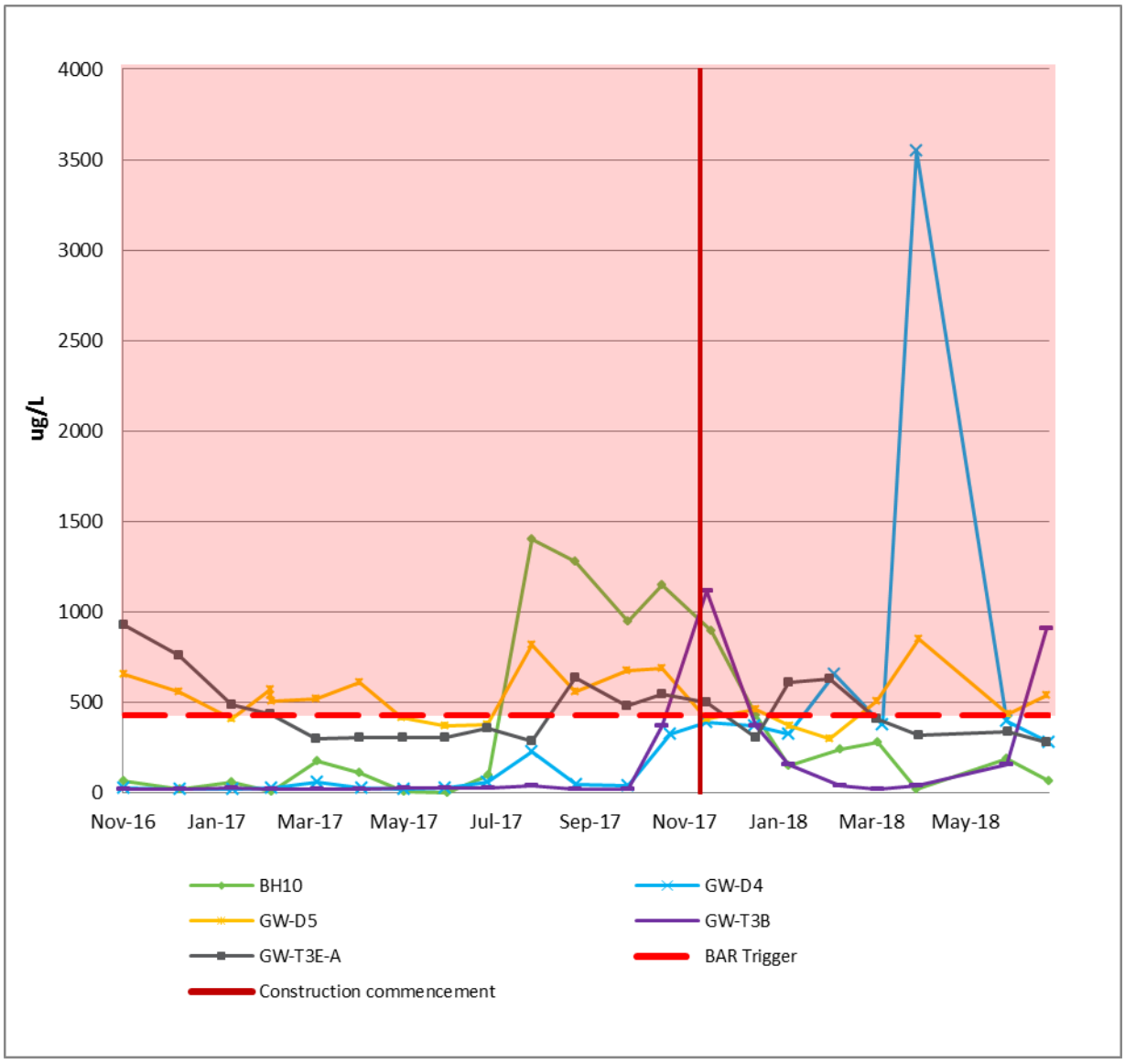

Figure 3-5. Filtered aluminium concentration at commonly exceeding groundwater bores

Filtered Chromium

Chromium was detected at seven bores (Figure 3-6), which all frequently exceeded the ANZECC guidelines of 1 µg/L, but not the BAR trigger levels at 10.8 µg/L. The LOR for filtered chromium is 1 µg/L, hence all detections exceed the ANZECC guideline value. As can be seen in the figure all values are within the baseline trigger, and would therefore be representative of localised natural water variations.

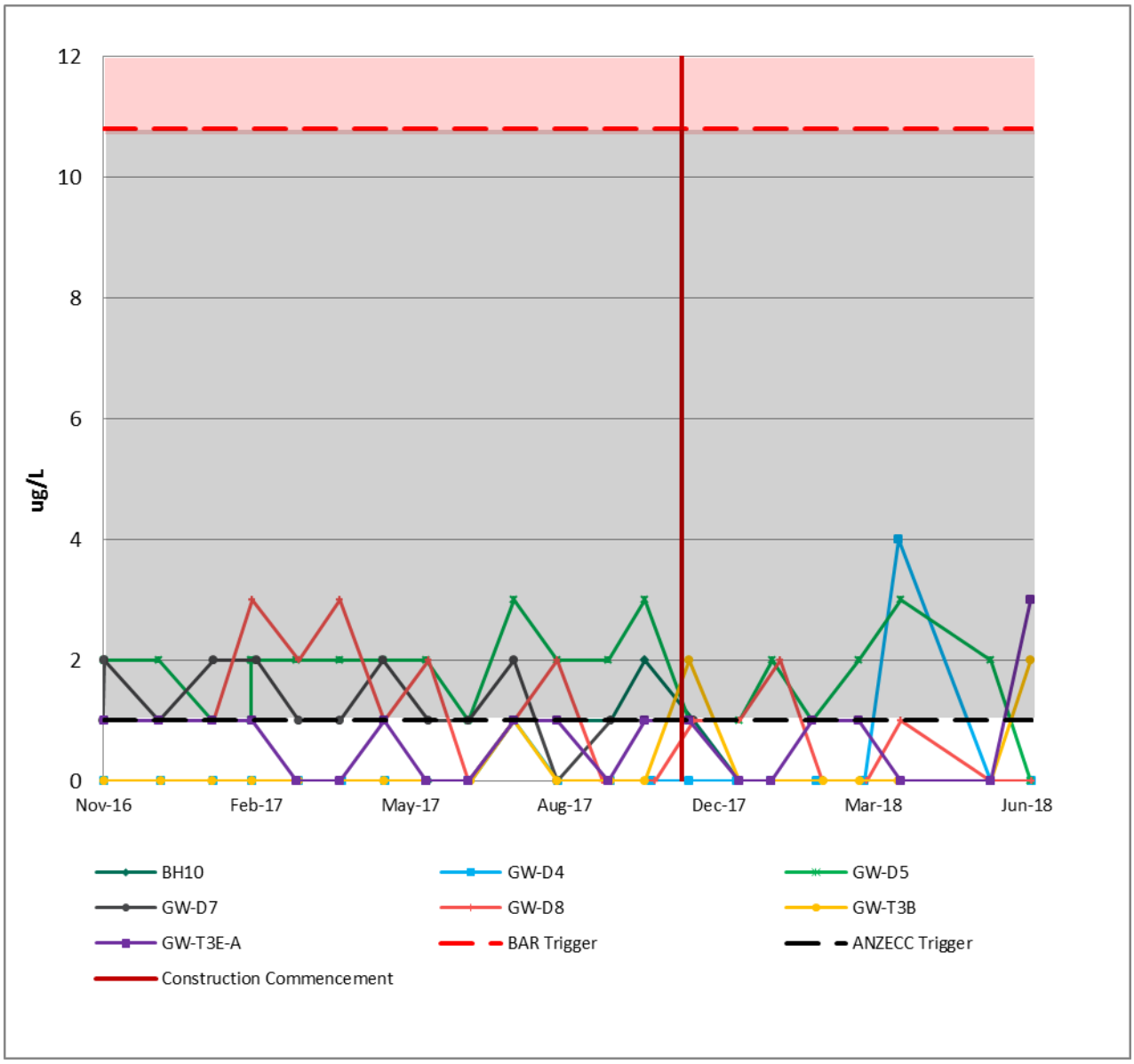

Figure 3-6. Filtered chromium concentration at commonly exceeding groundwater bores

Filtered Copper

Copper was detected only at the locations shown in Figure 3-7.The grey area represents results in exceedance of only the ANZECC guideline trigger (1.4 µg/L) and the red area indicates results exceeding both ANZECC and the baseline triggers (4 µg/L0). GW-T3E-A and GW-T4B exceeded only the ANZECC guideline whilst the remaining bores had exceedances of both Guidelines.

Prior to the construction start date, there were semi-frequent exceedances of copper, although these were not concerning as results fluctuated back below the trigger levels. From November 2017, there were no exceedances of filtered copper. Considering previous data from November 2016, there has been a large variance for filtered copper concentration prior to construction activities. Results from the current reporting period are considered to be within natural water variation.

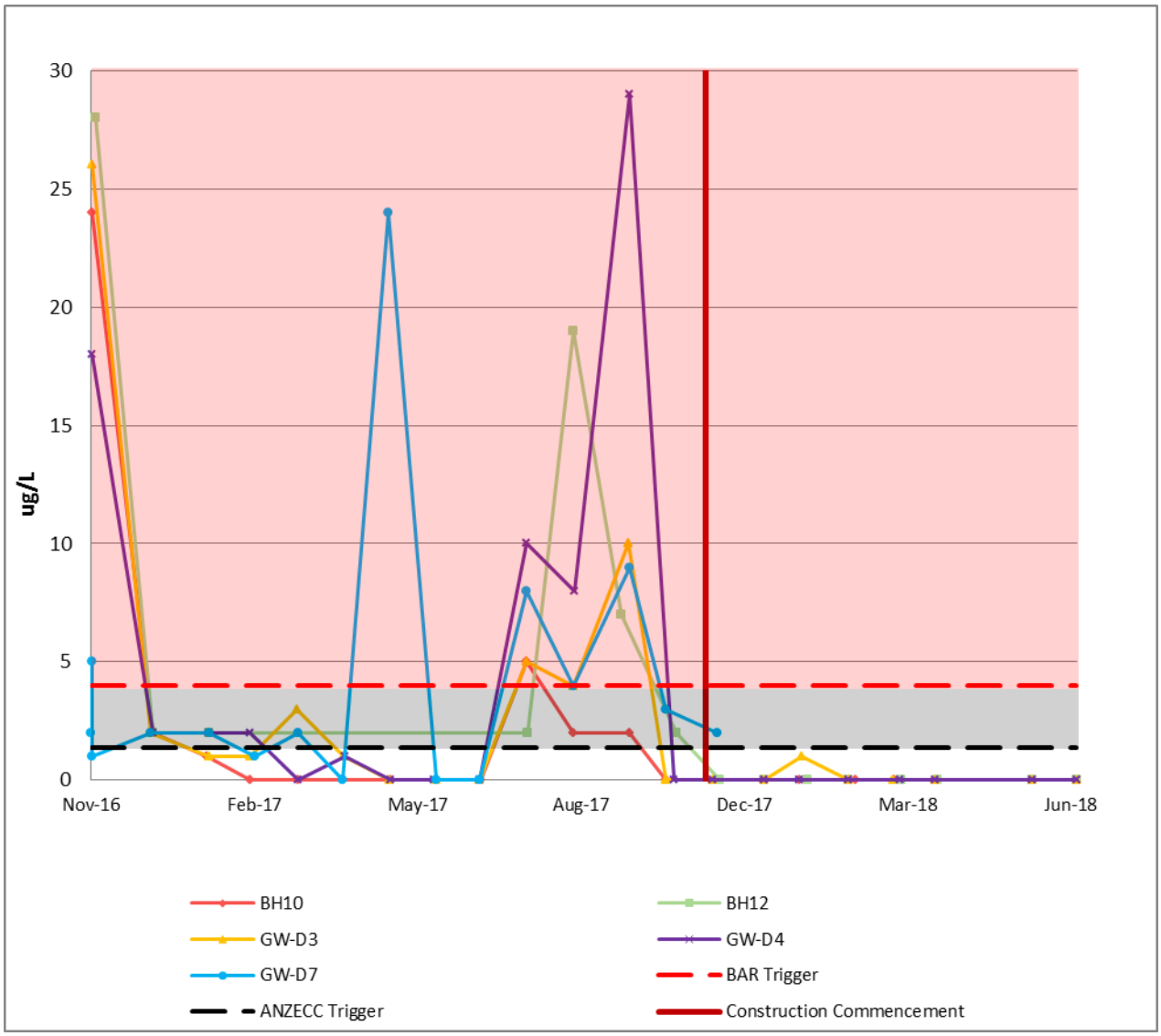

Figure 3-7. Filtered copper concentration detected in groundwater bores

Filtered Iron

Concentrations of filtered iron were detected at all locations, with the semi-frequently exceeding bores displayed in Figure 3-8. There is no ANZECC guideline trigger value for filtered iron, with concentrations compared to the baseline value of 2932 µg/L.

Reference bores GW-T4C, GW-T4B and GW-T2F all exceeded the baseline trigger. As reference locations, conditions at these bores are not impacted by project activities and represent natural variation of the area. GW-T4C results are consistently outside the baseline trigger (with one exception in April 2018) which is clearly seen to be consistent with pre-construction data. GW-T4B had a one-off exceedance in December 2017, however also as a reference bore this it is unlikely to be caused by the project, and is representative of natural variation.GW-T2F had two sharp peaks in January and April 2018, and had been identified in the BAR as consistently one order of magnitude above the baseline range (Aurecon 2016).

All other semi-frequent exceedances or sharp peaks at impact bores appear to be reflective of natural variation, as the results drop back below the trigger level following further monitoring.

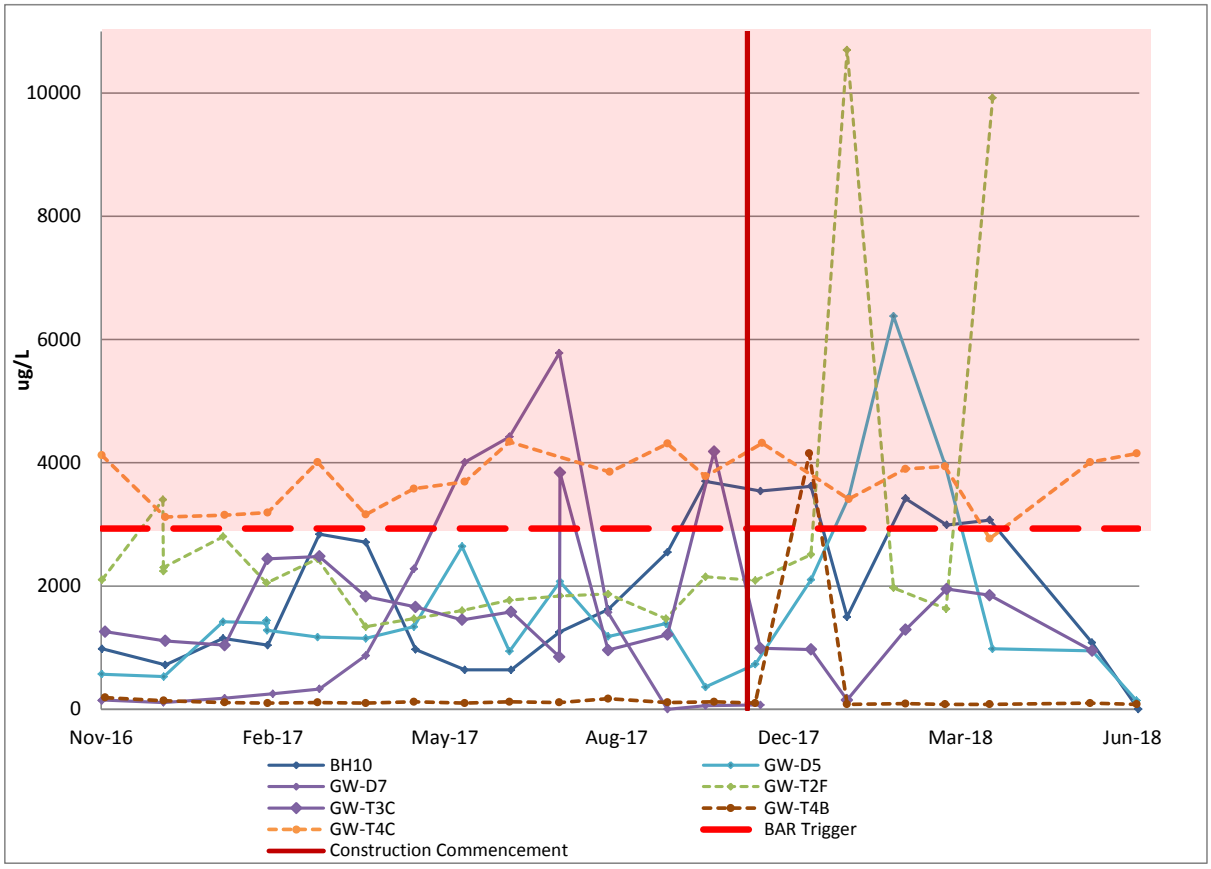

Figure 3-8. Filtered iron concentration at commonly exceeding groundwater bores

Filtered Manganese

All groundwater locations had detected filtered manganese. No exceedances of the ANZECC guidelines occurred, however there were exceedances of the baseline trigger (Aurecon 2016) shown in Figure 3-9 (grey area). The ANZECC guideline for filtered manganese was 1900 µg/L and baseline trigger 17.2 µg/L.

GW-T2F was identified in the BAR as consistently one order of magnitude above the baseline range during the baseline survey. GW-D7 had an increasing trend, however returned to below the baseline trigger in following sampling rounds. All other exceedances appear to be consistent with natural variation.

With the ANZECC guidelines set to 1900 µg/L, and the highest concentration of filtered manganese recorded being 98 µg/L (GW-D7, July 2017), the baseline does not seem appropriate for the Project WMMP. Additionally the baseline trigger does not account for T2F or the natural variation of filtered manganese.

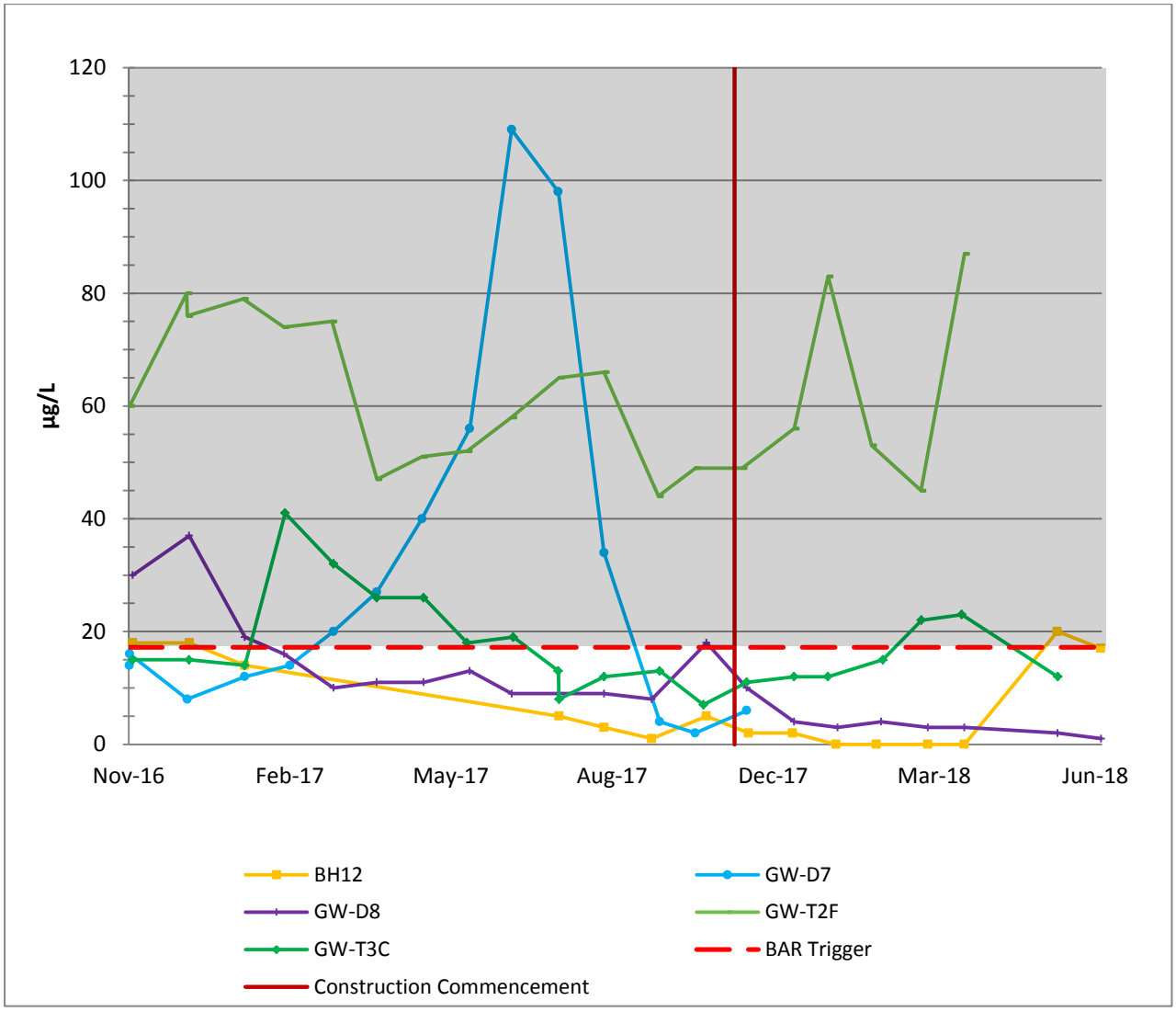

Figure 3-9. Filtered manganese concentration at semi-frequently exceeding bores

Filtered Zinc

Dissolved zinc was detected at all locations; Figure 3-10 displays zinc concentration at BH12 and GW-D8 and Figure 3-11 shows concentrations of all other semi-frequent exceedances. The baseline trigger is 5 µg/L, which is also the LOR for filtered zinc, therefore all detections exceed the baseline. 42 of the 48 exceedances were above both guideline values (red area), whilst only six of the 42 exceeded only the BAR trigger. Figure 3-10 shows a sharp peak for GW-D8 and BH12 in July 2017, however these occurred prior to construction activities and returned below the guideline values in following further monitoring, and therefore is likely due to natural groundwater conditions. Figure 3-11 shows the semi-frequent exceedances for the remainder of the bores that are a result of natural variation (Aurecon 2016).

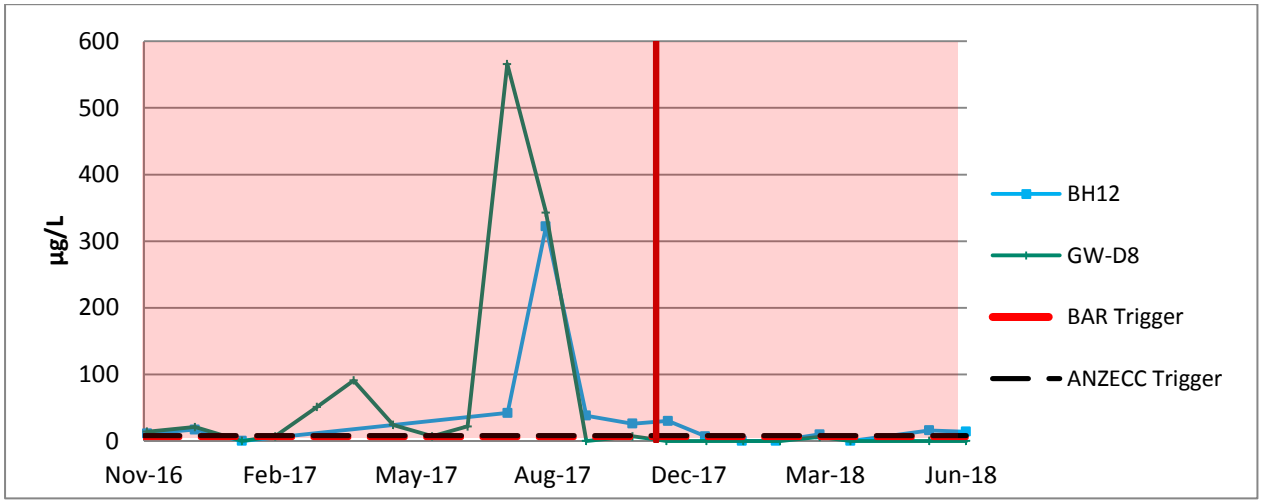

Figure 3-10. Filtered zinc concentration at BH12 and GW-D8 groundwater bores

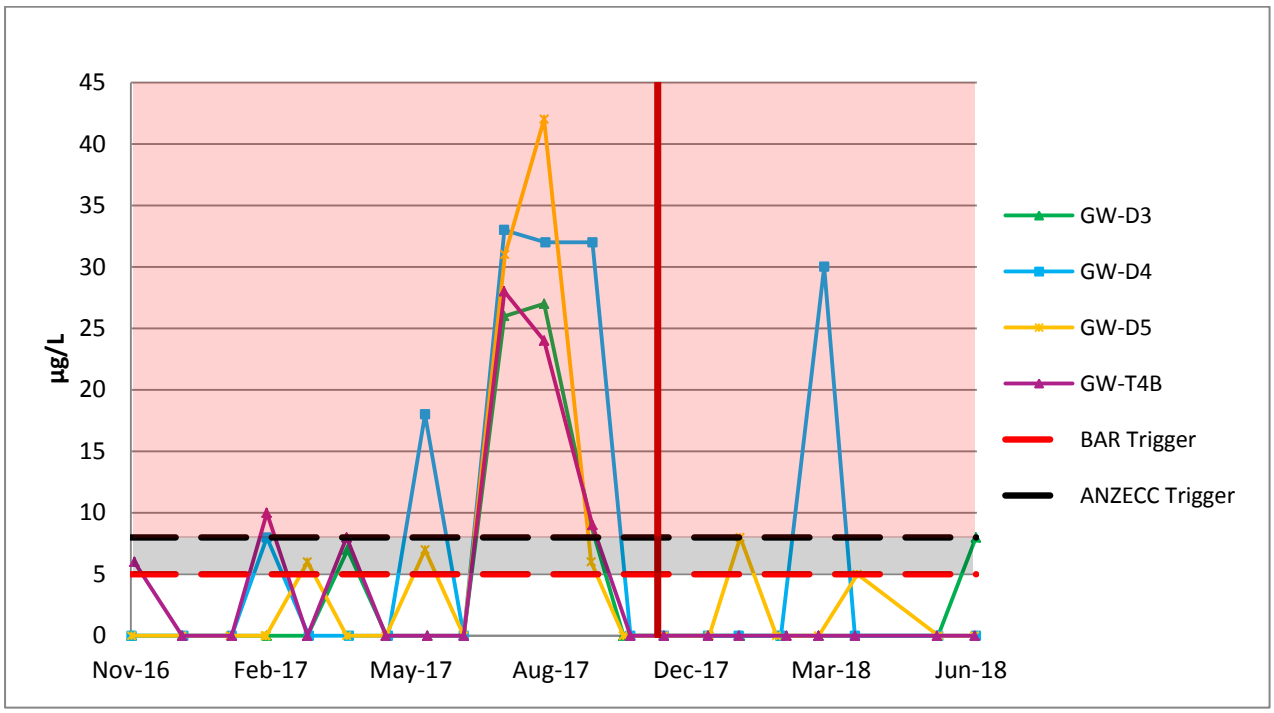

Figure 3-11. Filtered Zinc concentration at 'low range' exceeding groundwater bores

3.3.3 Nutrients

Summary

1. Nitrite (as N) results were below both the baseline trigger (0.65 µg/L) and ANZECC trigger (0.1 µg/L) across all locations
2. Results for Ammonia (as N), nitrate (as N), total Kjeldahl nitrogen, total nitrogen (as N) and total phosphorus all semi-frequently exceeded the guideline triggers, and are discussed in further detail below

Ammonia (as N)

All locations, with the exception of GW-D4 have results exceeding the ANZECC trigger level of 0.04 mg/L (Figure 3-12). In the last 12 months only GW-T4B (reference bore) exceeded both guidelines, however the bore is outside the construction impact zone and results are consistent with the data prior to construction.

The ANZECC guideline for ammonia concentrations is not appropriate, as the majority of bores consistently exceed the 0.04 mg/L trigger level. Apart from GW-T4B reference bore there were no other exceedances of the baseline trigger, therefore the baseline levels are a more suitable trigger level for the Project WMMP.

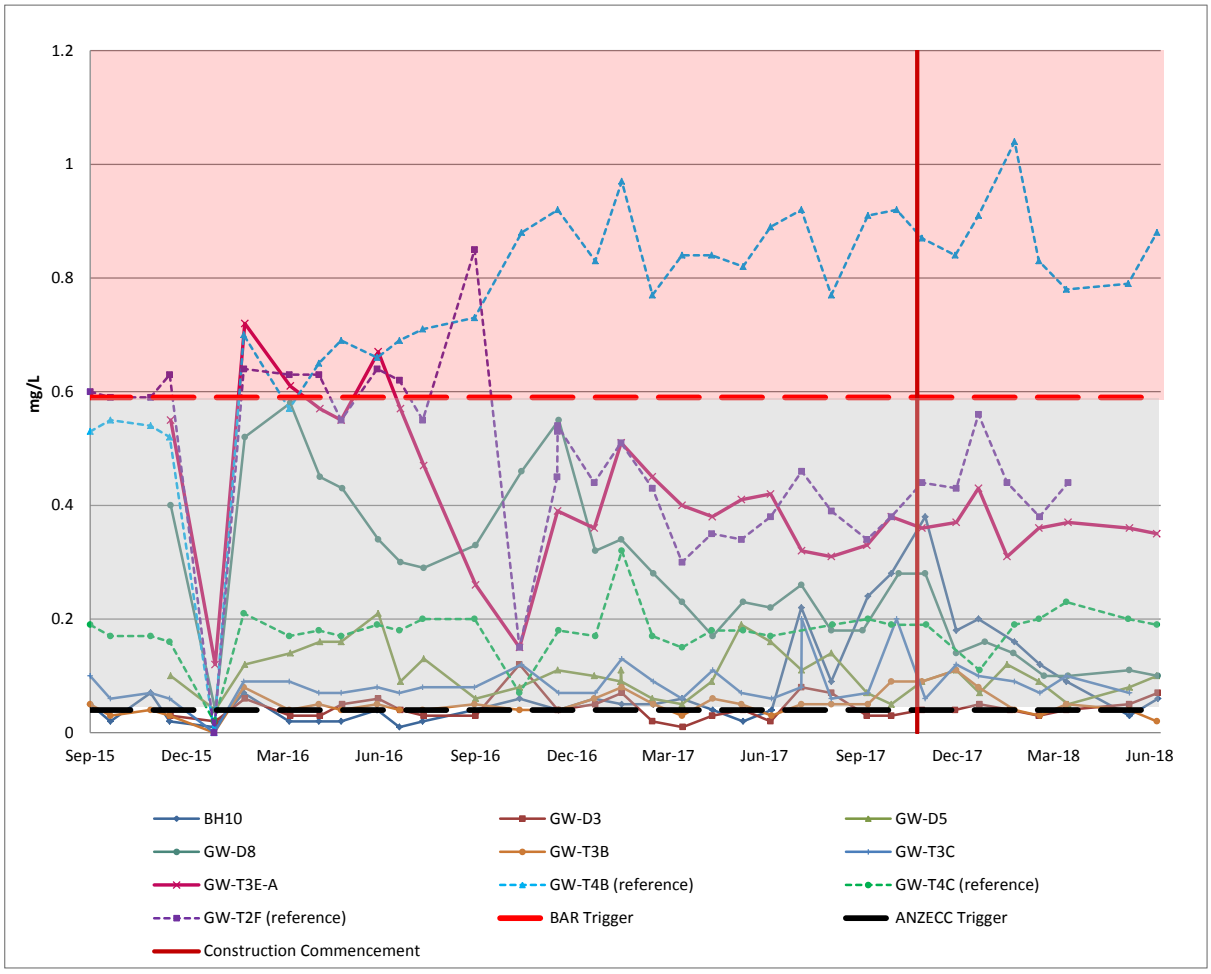

Figure 3-12. Ammonia concentration at exceeding groundwater bores

Nitrate (as N)

Nitrate was detected at all locations, with regular exceedances of both the baseline and ANZECC triggers occurring at six groundwater locations (Figure 3-13). However considering long term data (prior to construction), GW-D7, BH12 and GW-D4 have consistently been above the baseline, and are likely to be representative of natural water conditions. Additionally, GW-D4 results from the BAR were noted to be one order of magnitude above the trigger level (Aurecon 2016). All other semi-frequent considered as natural variation, suggested by previous years of monitoring.

Considering the high frequency of detection in all bores, it appears that the ANZECC guidelines may not be suitable for the project WMMP, and an adjustment to the baseline trigger is required to allow for natural variation of nitrate.

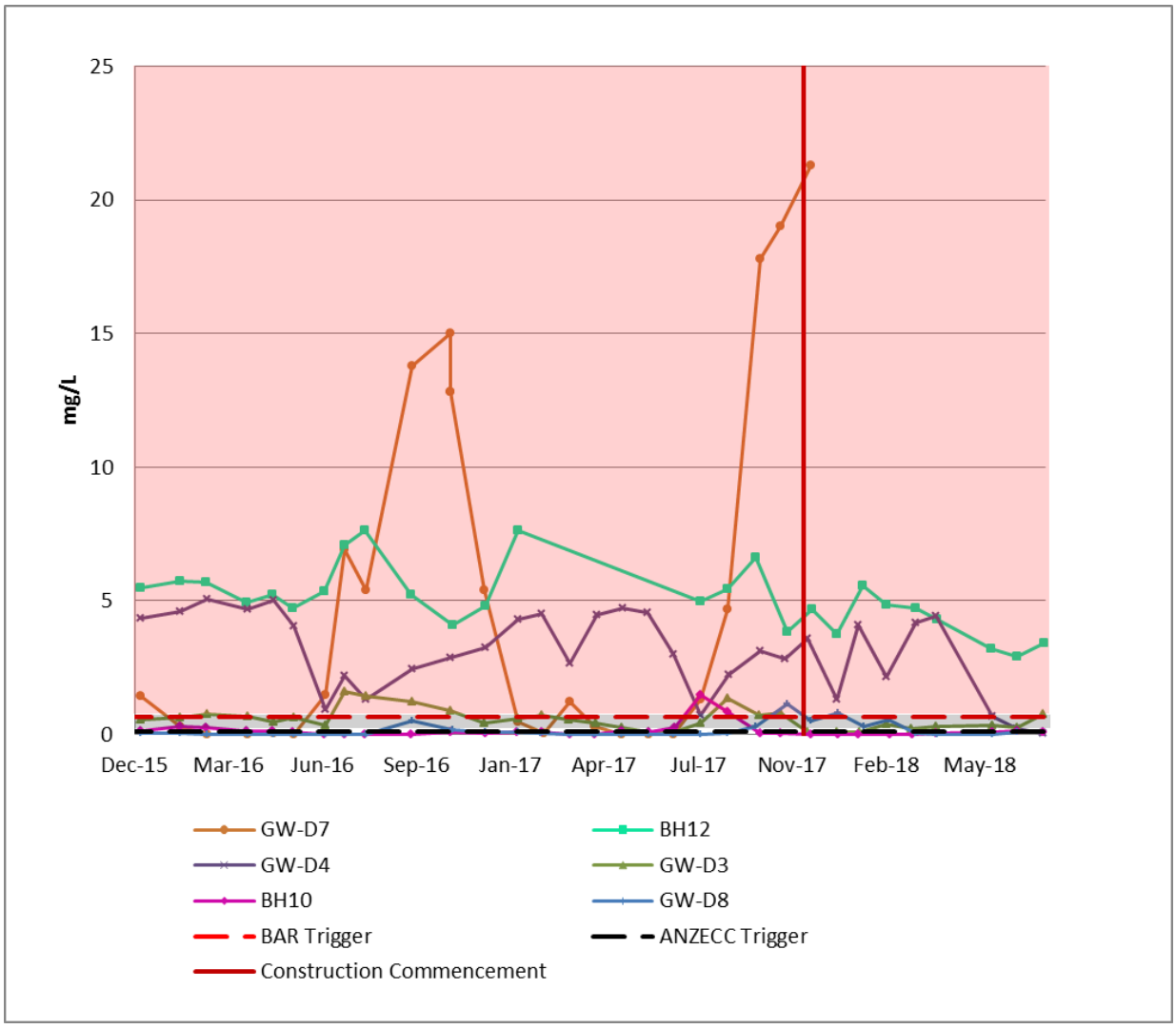

Figure 3-13. Nitrate concentration at exceeding groundwater bores

Total Kjeldahl nitrogen (TKN)

TKN does not have an ANZECC guideline trigger and data was only compared to the baseline trigger of 1.46 mg/L. Figure 3-14 shows concentrations of TKN from September 2015, with variations and exceedances consistently occurring prior to the construction start date. In the current reporting period only three locations had semi-frequent to frequent exceedances, being BH10, GW-D7 and GW-D8. With peaks occurring prior to construction start date as well as some semi-frequent exceedances the results are likely to represent natural groundwater variation.

The data set from the baseline survey shows GW-D4, GW-D7 and GW-D8 were consistently exceeding the baseline trigger and BH10 was consistently below the trigger (Aurecon 2016). Analysing the monitoring data in Figure 3-14, it can be noted that BH10 has had several spike occurrences, and GW-D4 results were all below the baseline trigger. The data set additionally shows consistent fluctuation in TKN from 0 – 6.4 mg/L, which are considered to be natural variation. Adjustment of the baseline trigger is required to reflect the natural water conditions at these locations.

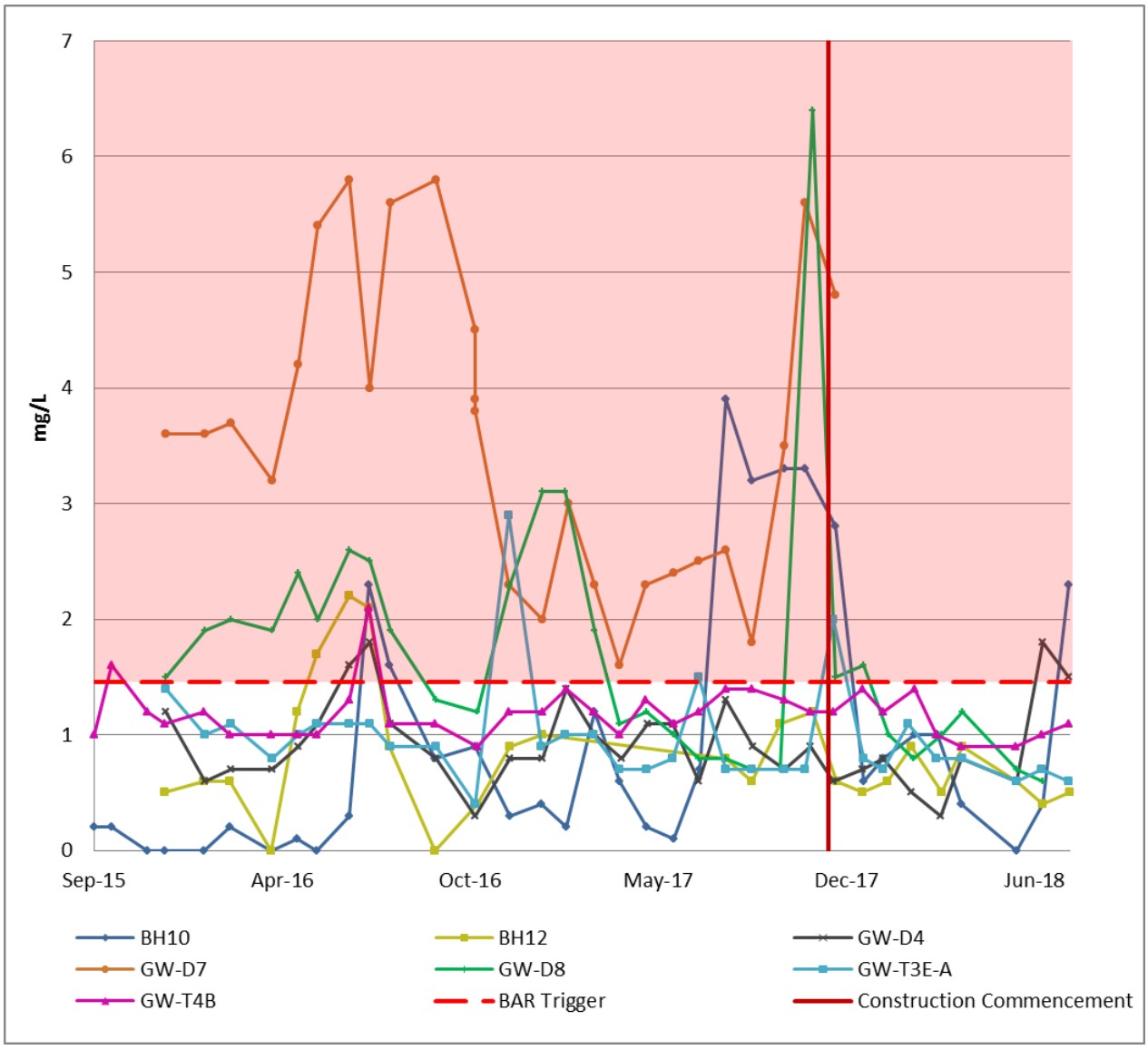

Figure 3-14. Total kjeldahl nitrogen concentration at exceeding groundwater bores

Total nitrogen (as N)

Total nitrogen (TN) results semi-frequently exceeded both the ANZECC guidelines and the baseline trigger at BH10 over the reporting period. BH10 (Figure 3-15) had variations above the guideline prior to construction, therefore is consistent with natural variation. The figure also shows BH12, GW-D7 and GW-D4 consistently above the guideline triggers (including pre-construction data), and therefore the results are characteristic of the local natural conditions.

The BAR identified GW-D7 and GW-D8 values above the trigger in the baseline survey. In the most recent reporting round, GW-D8 had only three exceedances from October to December 2017, whilst BH12 and GW-D7 were consistently above.

Given the variation in concentration prior to construction, the baseline trigger levels should be altered to reflect natural groundwater conditions.

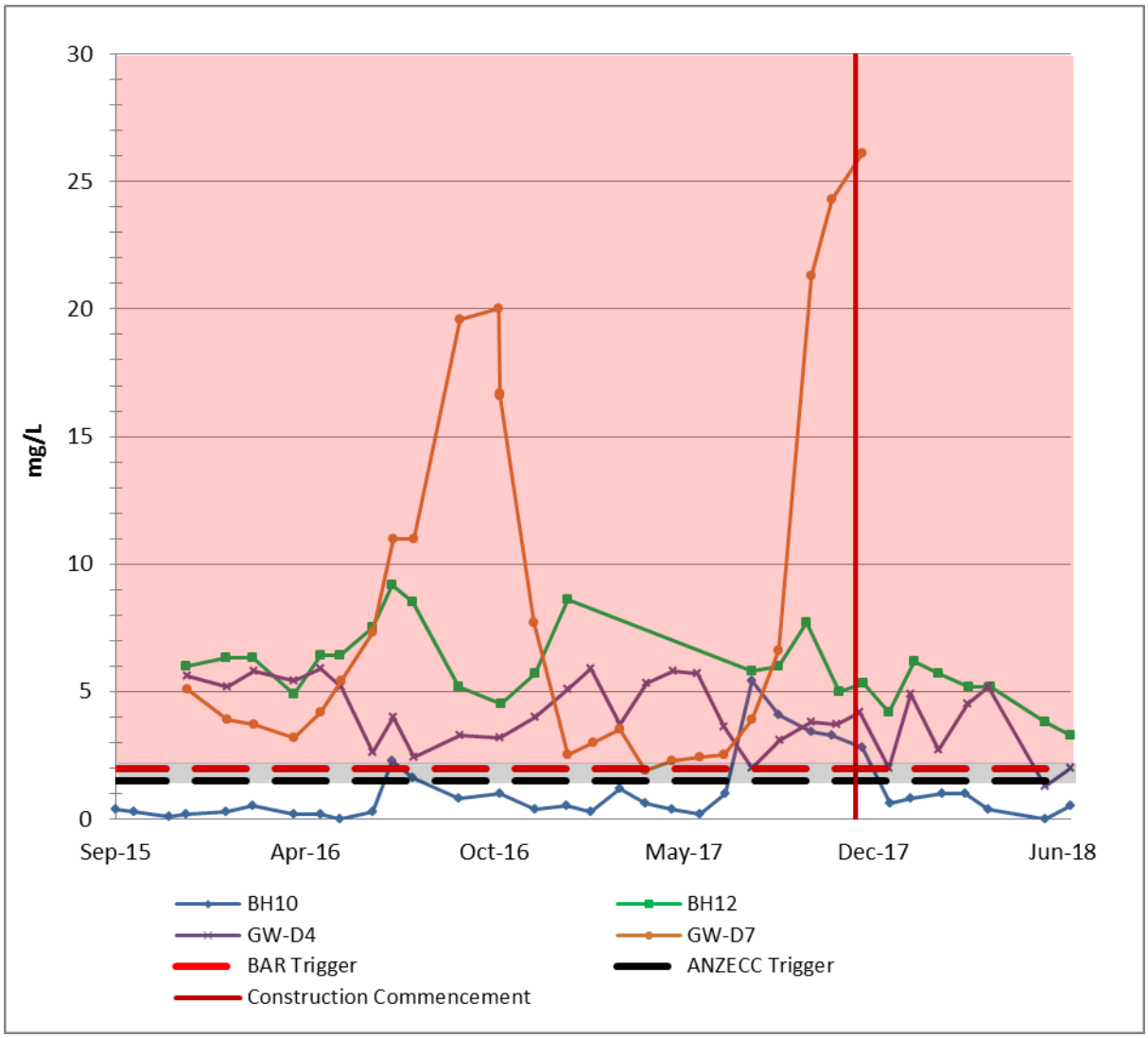

Figure 3-15. Total nitrogen concentration at exceeding groundwater locations

Total Phosphorous

All locations had results exceeding the ANZECC guideline trigger (0.06 mg/L) for total phosphorous (TP) over the reporting period, with the exception of GW-T3C. Figure 3-16 shows TP concentration for all other locations from September 2015.

GW-T4B is consistently above the baseline range, to which in the Aurecon define in the BAR as this location having a higher baseline trigger of 0.374 mg/L, allowing for natural variation. At the start of the reporting period (July to November 2017), GW-D7 was frequently above both Guideline triggers (red area). However viewing previous data, there have been several spikes of TP at this location. Further testing (after November 2017) was not possible due to a blockage in the bore; however due to spikes occurring prior to construction, results are likely to be the within natural variation of TP. The one-off spike in BH10 in January 2018, (post-construction) was potentially of concern, however as the concentration decreased below the guideline triggers in the following round, it is not likely to be a result of contamination.

All other semi-frequent exceedances and spikes (BH12, GW-T3E-A and GW-D4) are characteristic of natural variation.

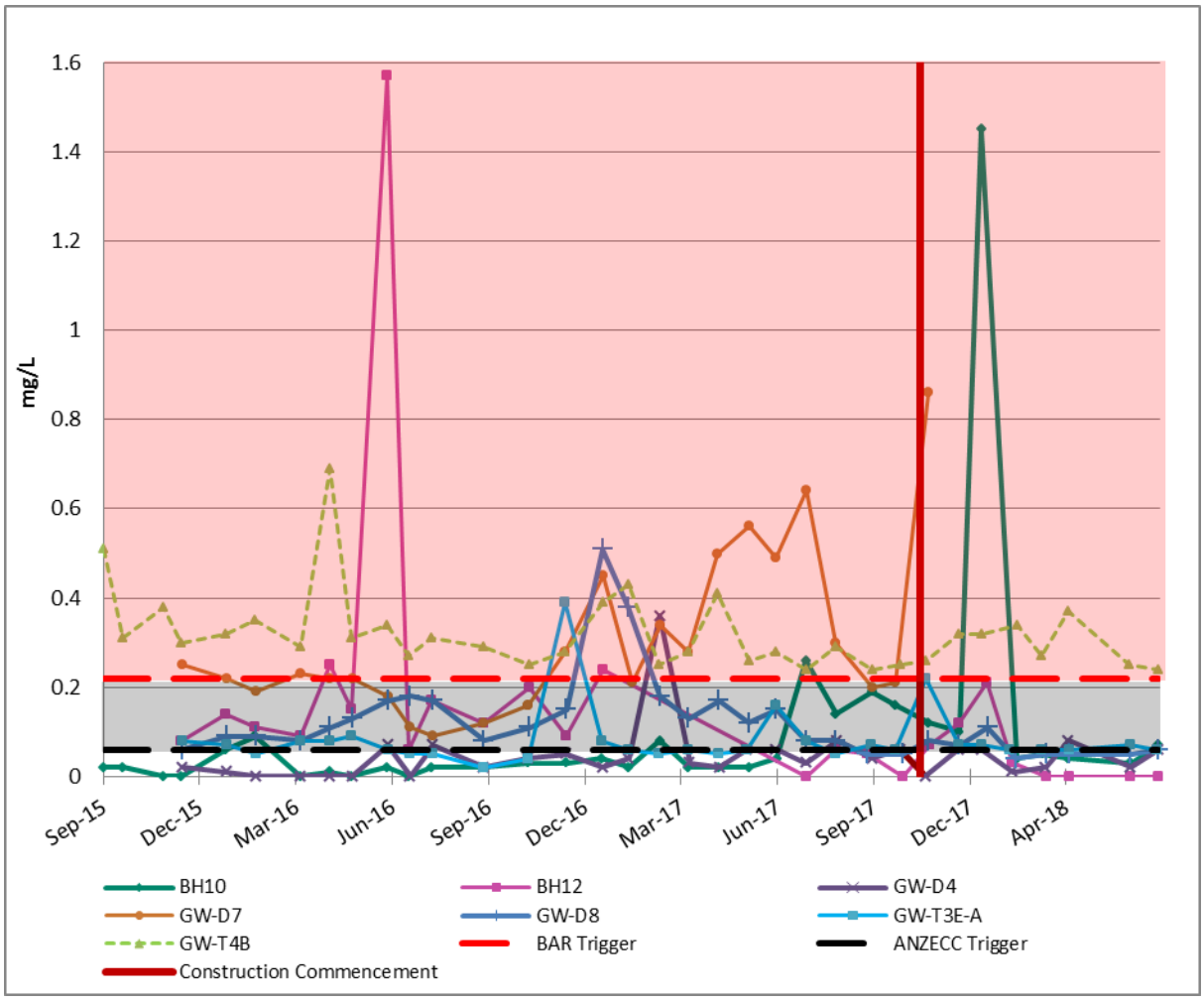

Figure 3-16. Total phosphorous concentration at exceeding groundwater locations

4 SURFACE WATER

4.1 Background Information

Surface water monitoring was undertaken at the same frequency as the groundwater monitoring, with 14 monitoring locations over five wetlands. Each wetland has individual BAR trigger levels. Bibra Lake is a permanent wetland with sampling occurring throughout the 12 month period. The remaining lakes; North Lake , Frog Swamp, Roe Drain and Roe Swamp are ephemeral and could not be sampled in dry months. Water quality parameters are discussed in relation to other surface water locations.

Table 6. Sampling period for wetlands

Surface water Location		Sampling Period	
Reporting period: 2 July 2017 – 1 July 2018		Start	Finish
Bibra Lake	BLNS-B1	July 2017	July 2018
	A2	July 2017	July 2018
	A2S	July 2017	July 2018
North Lake	NLWS (N2)	July 2017	March 2018
	A1	July 2017	February 2018
	A1N	August 2017	February 2018
	A1E	August 2017	February 2018
Frog Swamp	FS2	July 2017	December 2017
	FS4A	August 2017	November 2017
Roe Drain	RD1	July 2017	November 2017
	RD1A	August 2017	October 2017
Roe Swamp	A3	August 2017	November 2017
	S1	July 2017	November 2017

Figure 3 in the WMMP shows the surface water monitoring locations in relation to the previously proposed project envelope. Due to changes to the overall project, the project construction envelope is now smaller in size, with the majority of wetland monitoring locations located outside the construction area and at a considerable distance to any Project activities. Current construction activities for the Murdoc Drive connection are in closest proximity to Roe Swamp and Roe Drain.

4.2 Water Quality Parameters

4.2.1 pH

The WMMP outlines individual trigger level ranges for pH at each wetland; five in total. The acceptable pH range is a result from 5.2 to 8.9, with the range varying slightly at each individual wetland. Results were also compared to the ANZECC guidelines for freshwater, which has an acceptable pH range of 7 – 8.5. The majority of pH results seen in Figure 4-1 are reported from 5.5 – 8.5. These results are within the overall acceptable pH range and are indicative of neutral water conditions.

At ephemeral wetlands, pH recorded in the reporting period (2 July 2017 to 1 July 2018) varied greatly between 'drying' and 'wetting' cycles. Baseline data collected from November 2016 (shown in Figure 4-1) shows that there is consistent seasonal variance across the wetlands. The pH at all locations is seen to increase in months following high rainfall periods, and decrease following low rainfall periods. Aurecon (2016) also confirm in the BAR that low pH at North Lake locations (A1, A1N, NLWS-N2) occurs periodically (June to July) in the initial wetting cycle. Results from August 2018 have also been included, which show all North Lake locations increase to a neutral pH.

pH results are not of concern, with exceedances considered within seasonal and natural variance (Aurecon 2016). The full list of results and comparison against individual triggers are shown in Table 1 in Appendix A.

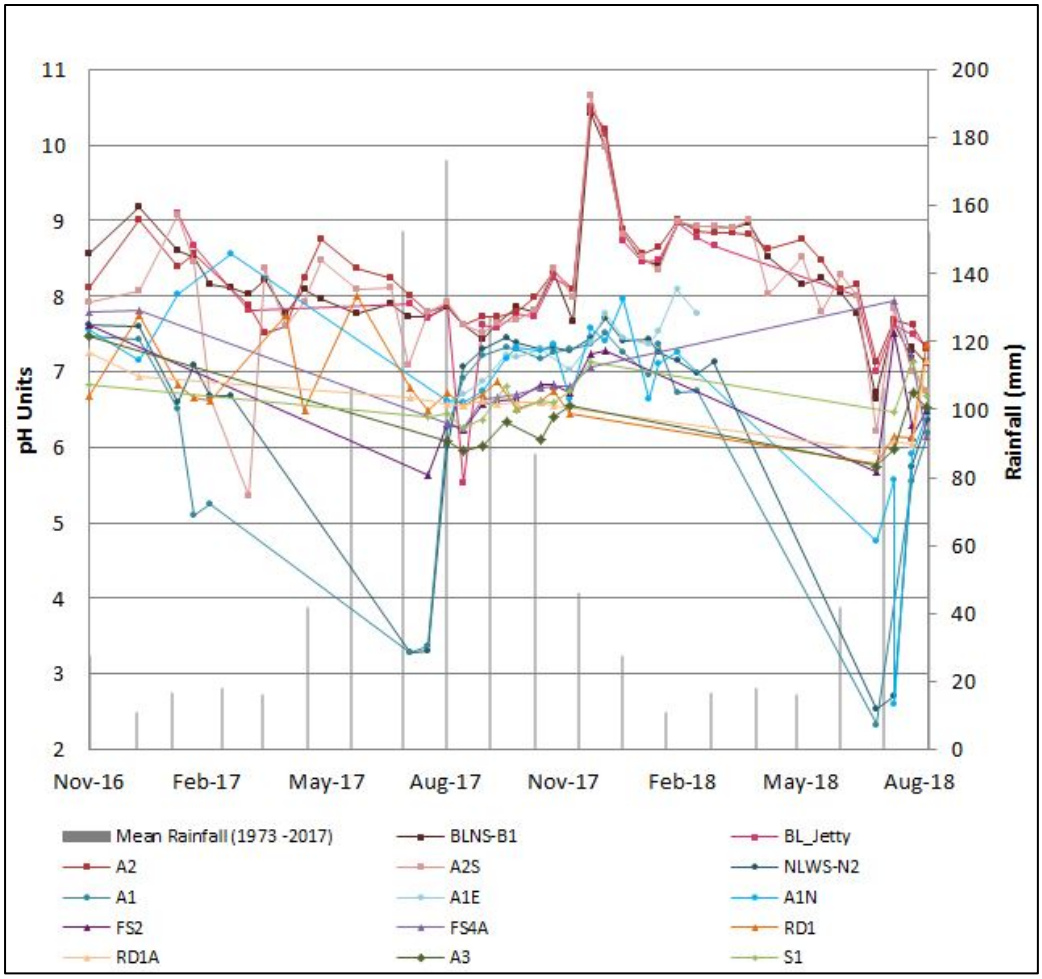

Figure 4-1. pH at surface water locations

4.2.2 Electrical Conductivity and Total Dissolved Solids

Electrical conductivity (EC) and total dissolved solids (TDS) results were compared against respective trigger levels as defined by the WMMP and developed in the BAR for each wetland (Aurecon, 2016; Strategen, 2016). The variance identified in the BAR for EC is high, with the total range across all triggers from 344 uS/cm to 8130 uS/cm. All locations semi-frequently exceeded their respective wetland trigger, however these are considered to be within natural and seasonal variation, with results presented in Figure 4-2, below. EC generally showed a subsequent decrease after high rainfall periods, with higher EC reported following dry conditions.

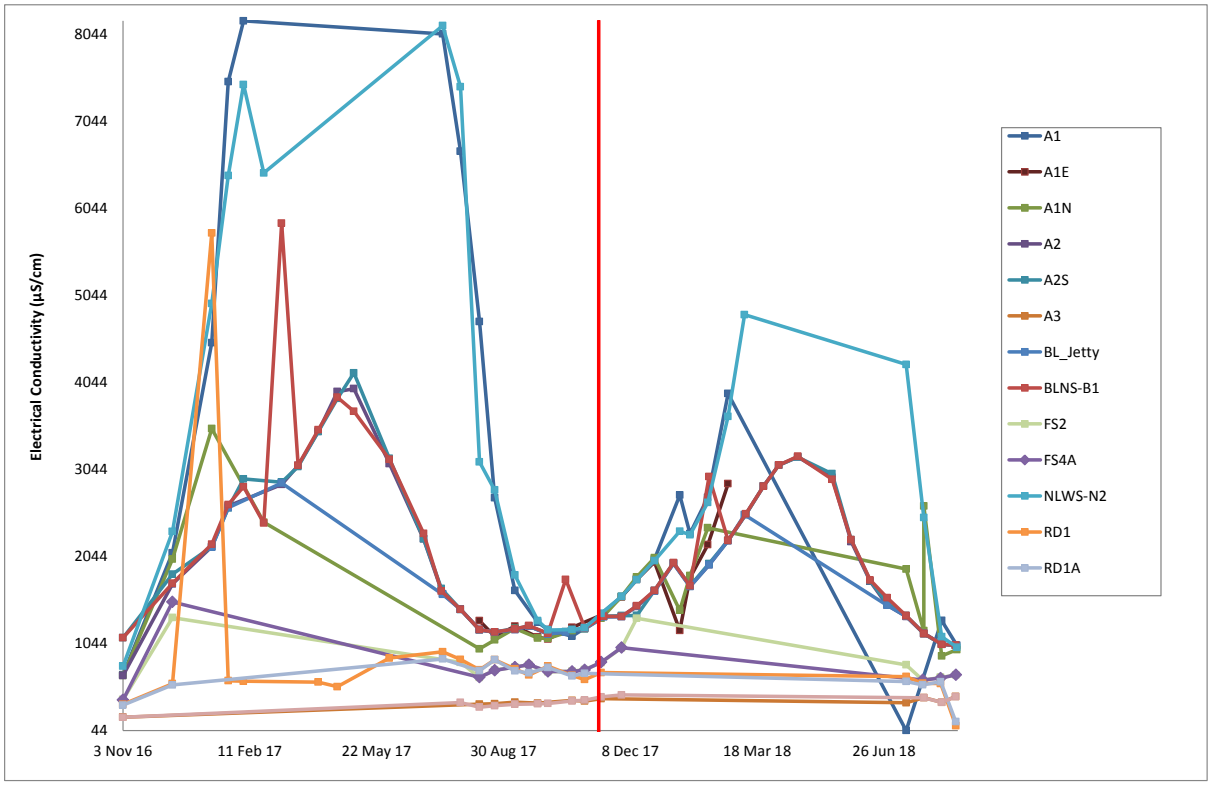

Figure 4-2 - Electrical conductivity (EC) at all surface water locations

TDS results are derived from EC, with results exceeding individual baseline triggers at every monitoring round at all wetlands, with the exception of Frog Swamp (FS2 and FS4A).

According to the WMMP, an acceptable TDS range at Frog Swamp is between 0.522 mg/L to 732 mg/L. The remaining wetlands have a much smaller baseline trigger value, with the total range for acceptable TDS values between 0.283 mg/L to 4.3 mg/L. Figure 4-3 shows TDS results from November 2016, showing consistent trends in variations prior to construction commencement. TDS results for the current reporting period are considered to be within natural and seasonal variation. The baseline triggers for TDS are therefore considered inaccurate and require updating to reflect natural conditions present at the wetlands.

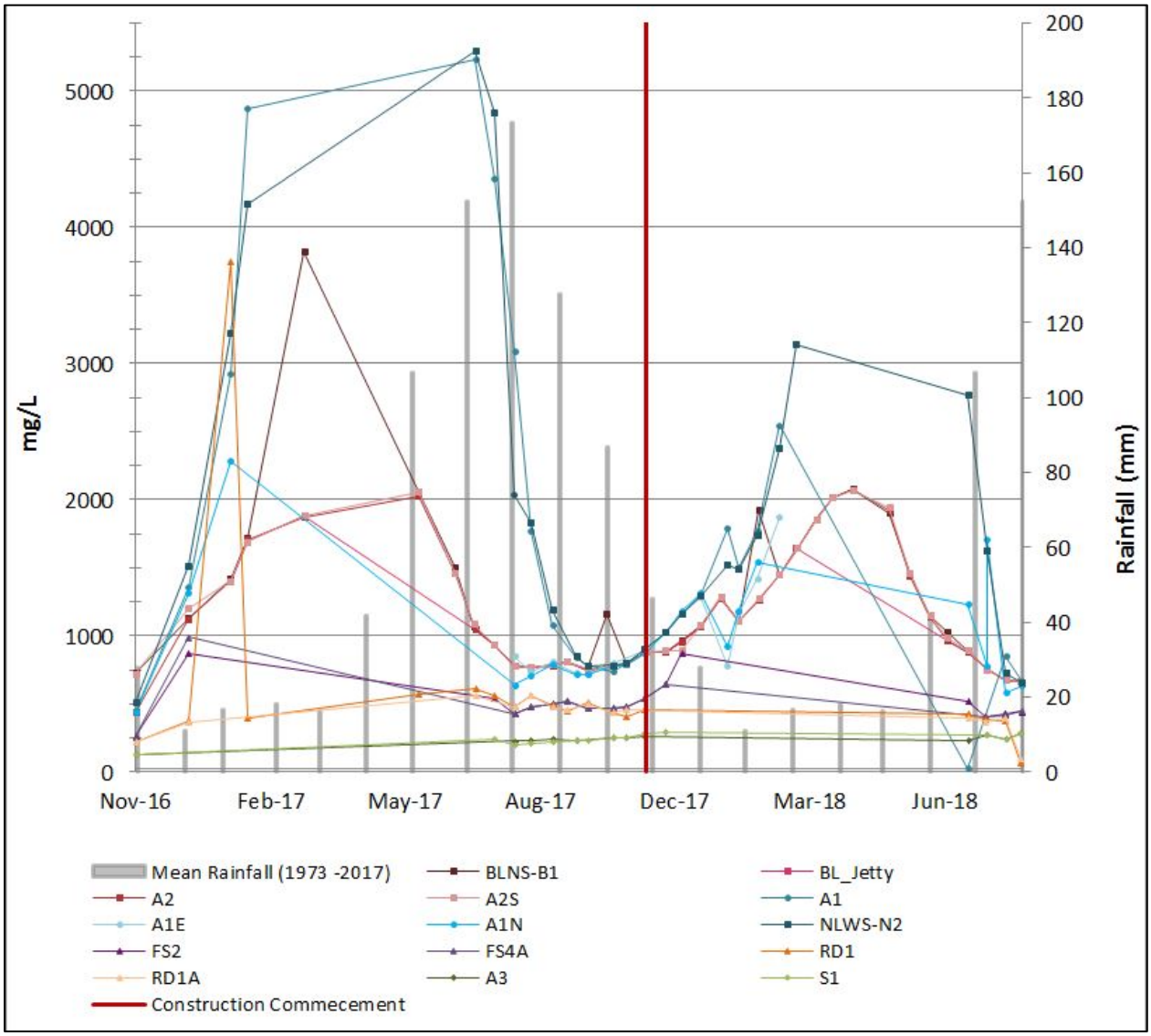

Figure 4-3. TDS at surface water locations

4.2.3 Turbidity

Turbidity results varied considerably over the reporting period, and in previously collected baseline data, shown in Figure 4-4. The baseline triggers identified by Aurecon (2016) in the BAR vary substantially between each wetland. According to the WMMP, the highest baseline trigger was identified for Roe Swamp, with an acceptable turbidity range of 8.98 to 1078 NTU, whilst the lowest was at Frog Swamp with an acceptable range of 1.5 – 5.5 NTU. Turbidity was also compared to the ANZECC freshwater guidelines, which have an acceptable range of 10-100 NTU.

With consistently varying results prior to construction and infrequent exceedances against either individual BAR triggers or the ANZECC guideline, turbidity results are considered to be within natural variation.

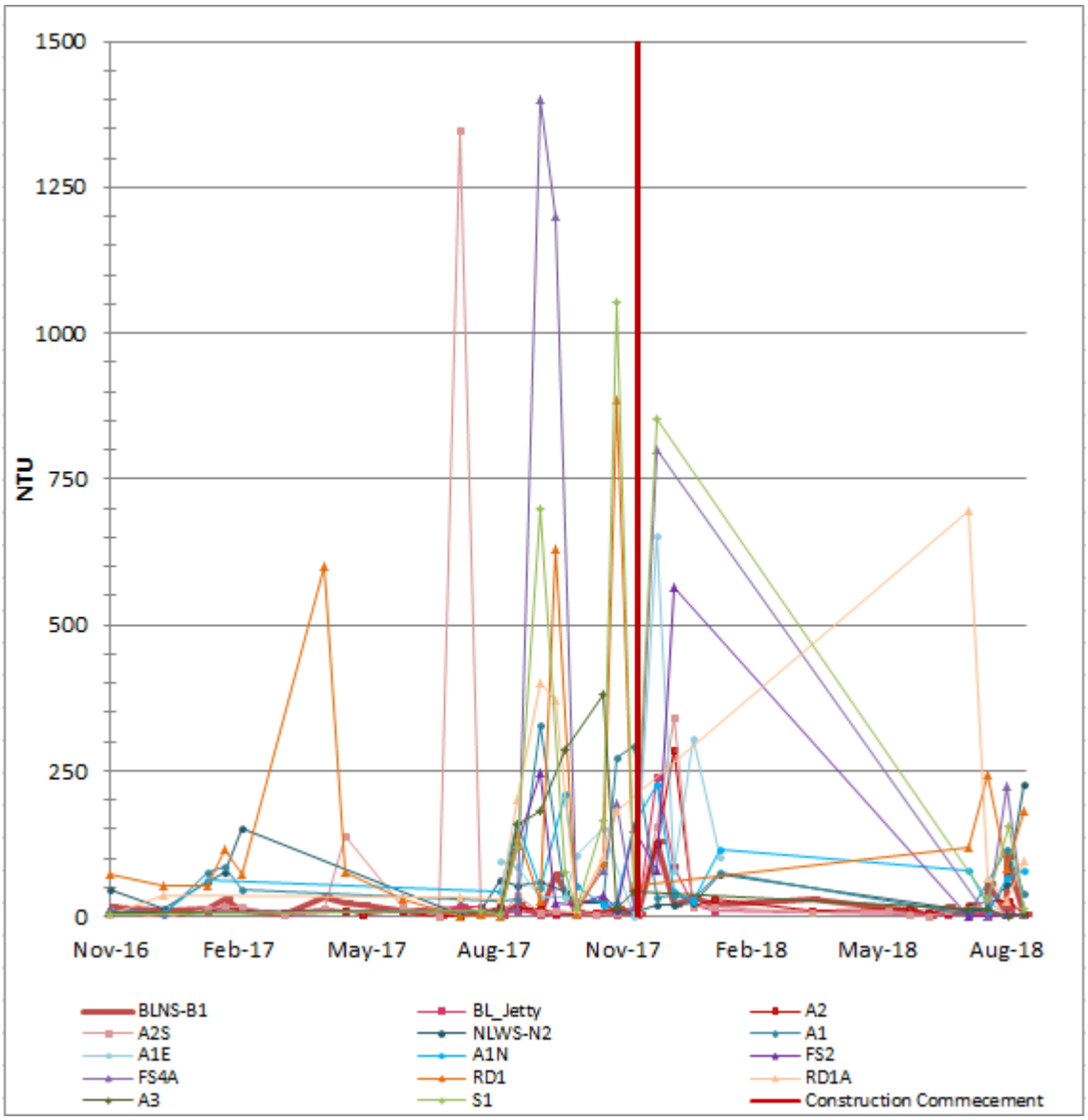

Figure 4-4. Turbidity (NTU) at surface water locations

4.3 Analytical Results

The WMMP also outlines localised BAR triggers for analytes of concern (AOC), specific to each wetland. The analytical results for surface water are summarised in three sections; 4.3.1, 4.3.2 and 4.3.3. A high level summary of each results section is presented at the end of each section.

Individual exceeding results against localised BAR trigger and the ANZECC guidelines are provided in tables after each summary for the wetland locations presenting the following information:

- Where baseline trigger values are displayed in RED text, an exceedance of that trigger has occurred.
- AOC are only listed if there are corresponding guidelines to compare results and if one or both triggers have been exceeded.
- For analytes where either only the BAR or ANZECC trigger is available, only one guideline is listed in the table.

The full analytical results are presented in Table 2, Appendix A. Laboratory reports are provided in Appendix C.

4.3.1 TRH/BTEXN

Surface water samples were analysed for total recoverable hydrocarbons (TRH), total petroleum hydrocarbons (TPH) and organics (BTEXN). TRH and BTEXN AOC were compared to localised BAR and ANZECC triggers. TPH analytes do not have an associated baseline or ANZECC guideline and as such are not discussed in the report. As each wetland has localised trigger levels, detailed exceedances for each wetland are shown in Tables 7 to10. Several increases in the TRH fraction >C10-C16 were noted throughout the reporting period, with trigger levels and monitoring results displayed in Figure 4-5. The trigger levels (dotted lines) correspond to the similar coloured location results.

S1 (Roe Swamp; blue line) and FS4A (Frog Swamp; red line) have historically shown increases in concentrations recorded in baseline data during November 2015, in November 2016 and again in November 2017 (Aurecon, 2016). Monitoring location RD1 (Roe Drain; green line) also increased in concentration during November 2017, however had not previously shown an increase during the current program. Baseline data collected to inform the trigger values shows that concentrations at this location increased during November and December 2015 at a smaller scale. For all locations, it was not possible to continue sampling after November 2017, due to the ephemeral nature of the wetland (drying cycle).

Increased concentrations of >C10-C16, as well as other TRH fractions which show an increase during this time period, are considered representative of seasonal variation. Decreased surface water depth combined with an increase in temperature can result in increased breakdown of natural organic matter, causing an increased concentration of non-petroleum organic matter and polar compounds. These compounds can be detected as part of TRH analysis and cannot be separated unless silica gel clean-up is performed on the samples (CRC, 2018). In this circumstance, due to the distance of the surface water locations from project activity, the infrequency of exceedances and the small scale of the exceedances, it is considered unlikely to relate to the activities of the Project and is not considered to be a contamination event. Results from August 2018, following seasonal rainfall, have been included to show all locations have decreased below the LOR for C10-C16 when sampling was possible again.

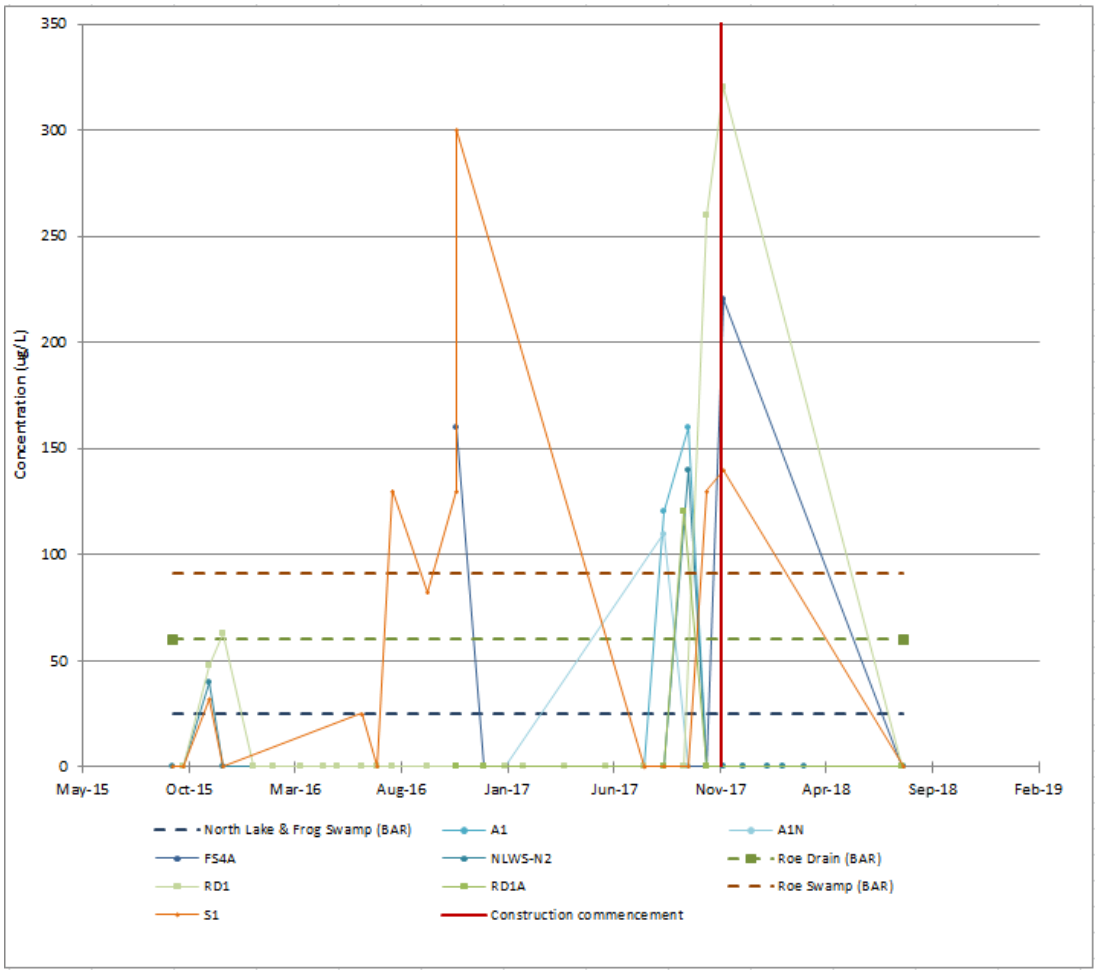

Figure 4-5. C10-C16 TRH Fraction at North Lake, Frog Swamp, Roe Drain and Roe Swamp locations

North Lake shows minor exceedances of C6-C10 and >C10-C16 fraction hydrocarbons throughout the reporting period. These exceedances have occurred during August and September, in comparison with baseline data which historically recorded concentrations at these levels or greater throughout warmer months. The fluctuations above and below the trigger value can be attributed to natural variation; as the wetland is located at a significant distance from the Project activities and the exceedances are minor in nature.
Toluene exceedances at this location are relatively minor in nature and are considered unrelated to Project activities.

Table 7. TRH and BTEXN Exceedances at North Lake

AOC	Triggers (µg/L)	Exceedances			
TRH		A1	A1E	A1N	NLWS-N2
C6-C10 fraction	BAR: 25 LOR: 20	• 40 µg/L (Sep 17)	• 40 µg/L (Sep 17)	• 30 µg/L (Sep 17)	• 40 µg/L (Sep 17)
>C10-C16 fraction	BAR: 25 LOR: 20	• 120 µg/L (Aug 17) • 160 µg/L (Sep 17)	-	• 110 µg/L (Aug 17)	• 140 µg/L (Sep 17)
>C16-C34 fraction	BAR: 828 LOR: 100	• 970 µg/L (Aug 17)	-	-	-
BTEXN		A1	A1E	A1N	NLWS-N2
Toluene	BAR: 1 LOR: 2	• 9 µg/L (Sep 17)	• 17 µg/L (Sep 17) • 11 µg/L (Oct 17)	• 18 µg/L (Sep 17) • 2 µg/L (Oct - Nov 17)	• 9 µg/L (Sep 17) • 2 µg/L (Oct 17)
Total BTEX	BAR: 5 LOR: 10	• 9 µg/L (Sep 17)	• 17 µg/L (Sep 17) • 11 µg/L (Oct 17)	• 18 µg/L (Sep 17)	• 9 µg/L (Sep 17)

Frog Swamp only had minor exceedances over the reporting period; with >C10-C16 detected once and >C16-C34 reported twice over the twelve month period. As has been discussed previously, spikes in TRH fraction detects during the “drying cycle” are likely to be attributed to an increased concentration of natural organic matter (NOM).

Table 8. TRH and BTEXN Exceedances at Frog Swamp

AOC	Triggers (µg/L)	Exceedances	
TRH		FS2	FS4A
>C10-C16 fraction	BAR: 25 LOR: 20	-	• 220 µg/L (Nov 17)
>C16-C34 fraction	BAR: 100 LOR: 100	• 140 µg/L (Nov 17) • 190 µg/L (Dec 17)	• 320 µg/L (Nov 17)
BTEXN		• No exceedances of BTEXN	

Roe Drain results were largely below the laboratory limit of reporting (LOR), with the majority of exceedances occurring during November. Following November sampling, conditions are too dry to enable samples to be taken again until significant rainfall has occurred. These high levels of TRH fractions are therefore attributed to seasonal influence on NOM.

Table 9. TRH and BTEXN Exceedances at Roe Drain

AOC	Triggers (µg/L)	Exceedances	
TRH		RD1	RD1A
>C10-C16 fraction	BAR: 60 LOR: 20	• 260 µg/L (Oct 17) • 320 µg/L (Nov 17)	• 120 µg/L (Sep 17)
>C16-C34 fraction	BAR: 940 LOR: 100	• 2160 µg/L (Nov 17)	-
>C34-C40 fraction	BAR: 426 LOR: 100	• 2200 µg/L (Nov 17)	-
BTEXN		• No exceedances of BTEXN	

Roe Swamp sampling locations recorded minor exceedances for toluene.

Table 10. TRH and BTEXN exceedances at Roe Swamp

AOCs	Triggers (µg/L)	Exceedances	
TRH		A3	S1
C6-C10 fraction	BAR: 25 LOR: 20	• 40 µg/L (Nov 17)	• 30 µg/L (Nov 17)
>C10-C16 fraction	BAR: 91 LOR: 20	-	• 130 µg/L (Oct 17) • 140 µg/L (Nov 17)
>C16-C34 fraction	BAR: 100 LOR: 100	• 110 µg/L (Nov 17)	• 260 µg/L (Nov 27)
>C34-C40 fraction	BAR: 100 LOR: 100	-	• 210 µg/L (Nov 17)
BTEXN			
Benzene	BAR: 1 ANZECC: 950 LOR: 1	• 9 µg/L (Sep 17) • 17 µg/L (Oct – Nov 17)	• 5 µg/L (Jul 17) • 3 µg/L (Sep 17) • 7 µg/L (Oct 17) • 14 µg/L (Nov 17)
Total BTEX	BAR: 5 LOR: 10	• 9 µg/L (Sep 17) • 17 µg/L (Oct – Nov 17)	• 5 µg/L (Jul 17) • 7 µg/L (Oct 17) • 14 µg/L (Nov 17)

A high level summary of all TRH and BTEXN results presented in Table 11, below. Overall, no concerning trends have been identified for these analytes, with infrequent and minor exceedances attributed to natural organic matter influenced by seasonal variation.

Table 11. Hydrocarbons/BTEXN surface water summary

Wetland	Exceedances	Conclusions
Bibra Lake	• No exceedances	NA (no exceeding results)
North Lake	• Occasional exceeding TRH fractions: C6-C10, C10-C16 and C16-C34 • Occasional exceeding BTEXN analytes: total BTEX and toluene • All exceedances occurred between Sep to Oct 2017	• All results appear to be within natural water variation, with occasional exceedances • There are no concerning trends (results fluctuating below trigger) • Some peaks in C10-C16 fraction, see Figure 4-5,
Frog Swamp	• All exceedances occurred between Nov to Dec 2017 • Exceeding TRH fractions C10-C16 and C16-C34	• There are no concerning trends (results fluctuating below trigger) • Spikes of C16-C34 are not of concern, as they are one off results • Some peaks at FS4A for C10-C16 fraction see in Figure 4-5
Roe Drain	• All exceedances occurred between Oct to Nov 2017 • Exceeding TRH fractions: C10-C16, C16-C34 and C34-40	• No concerning trends • Two large spikes of C16-C43 and C34-40 occurred at RD1 in Nov 17, however it was a one-off event, and no spikes occurred at RD1A • Some peaks in C10-C16 fraction, see Figure 4-5
Roe Swamp	• All exceedances occurred between Jul to Nov 2017 • Exceeding TRH fractions: C6-C10, C10-C16 and C16-C34 • Exceeding BTEXN analytes: total BTEX and toluene	• No concerning trends, all exceeding results appear to be within the natural water variation

4.3.2 Metals

Samples were analysed for total and filtered metals which were assessed against the BAR and ANZECC guidelines (see Appendix A). An overview is provided in Table 17, with detailed exceedances against individual wetland triggers displayed in Tables 14-18.

Bibra Lake, as the only permanent wetland, shows the most stable results for dissolved metals. All exceedances for this wetland occur within the natural variation of surface water (Aurecon 2016). The remaining ephemeral wetlands semi-frequently spike across several metal AOC and consistently exceed in others; detailed further below.

FS4A (Frog Swamp) had a significant increase in filtered copper (84 µg/L) in October 2017, exceeding both the BAR trigger (1.9 µg/L) and ANZECC trigger (1.4 µg/L). FS4A has not had any increases of this magnitude occurr in previous recorded data. This heightened concentration is not considered to be of concern, as this is a one-off occurrence, with no long term trends identified. The concentration immediately returned to below the trigger level the following sampling event and is not considered to be an anomalous result.

Filtered aluminium consistently exceeded respective BAR triggers at North Lake (A1, A1E, A1N and NLWS-N2) and Roe Drain locations (RD1 and RD1A), with concentrations shown Figure 4-6. Semi-frequent exceedances at the Roe Drain locations are consistent with previously collected baseline data. As such, the results from Roe Drain are considered likely to be within natural groundwater variation, and adjustment to the BAR trigger level may be necessary.

During the current reporting period, North Lake locations in July 2017 had the highest concentration of filtered aluminium, with concentrations immediately decreasing in the following monitoring round. July 2017 was the start of the wetting cycle, the previous sampling round was January 2017, and this seasonal variation is likely to result in the high concentration of filtered aluminium. This is further supported by an immediate decrease in concentration as the wetland increased in water volume, as well as a similar spike reported in July – August 2016 at location NLWS-N2. Semi-frequent exceedances after the July 2017 spike are considered to be within natural variation.

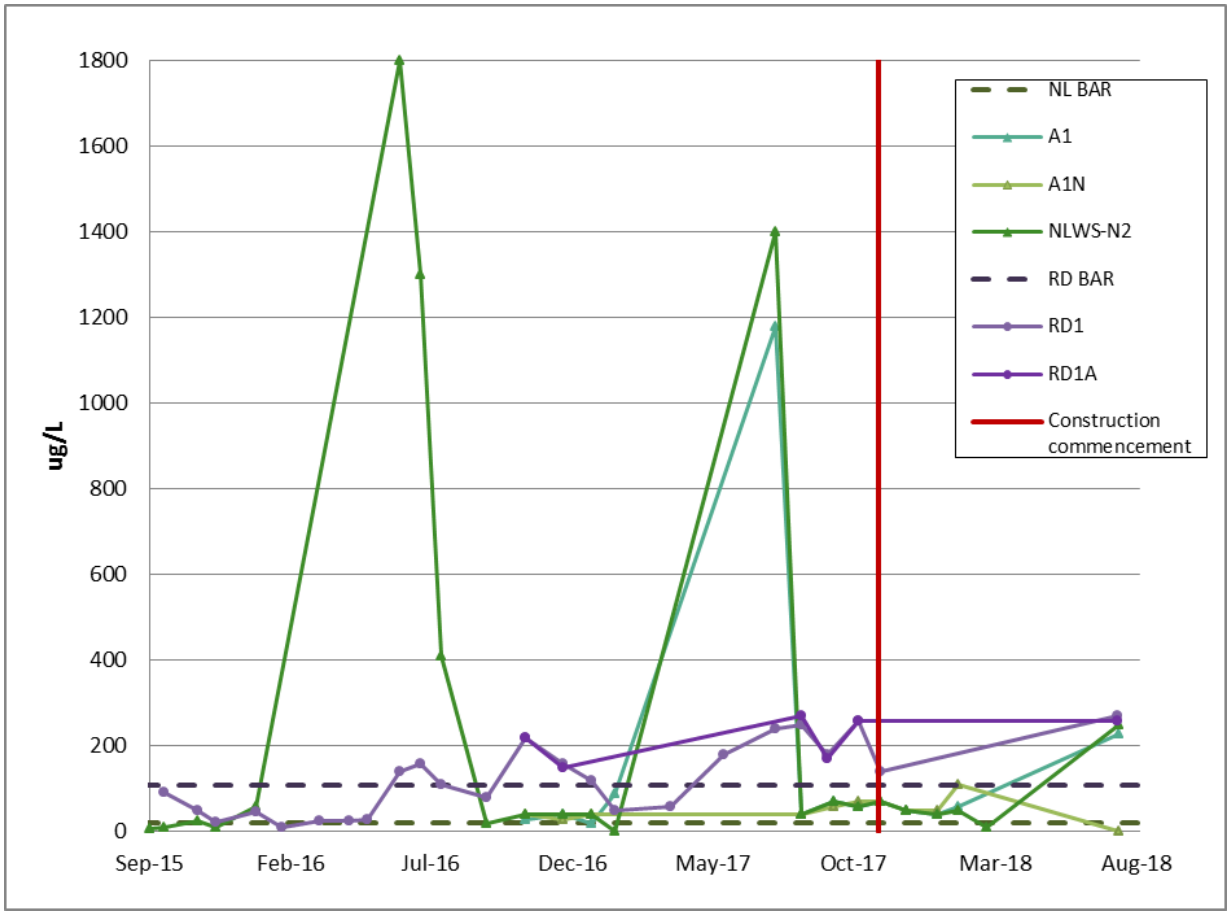

Figure 4-6. Filtered aluminium concentration at North Lake and Roe Drain locations

Bibra Lake reported minor exceedances, with concentrations recorded close to the BAR trigger and ANZECC guideline. For copper and chromium the BAR trigger falls directly on or below the LOR, meaning that any concentration above the LOR and non-detected results are reported as an exceedance.

Table 12. Metal exceedances at Bibra Lake

Filtered Metals	Triggers (µg/L)	Exceedances		
		BLNS-B1	A2	A2S
Aluminium (filtered)	BAR: 67 LOR: 10	• 80 µg/L (Dec 17)	• 80 µg/L (Dec 17)	• 90 µg/L (Dec 17)
Chromium (filtered)	BAR: 0.9 ANZECC: 1 LOR: 1	• 1 µg/L (Nov 17) • BAR trigger is at LOR	• No exceedances	• No exceedances
Copper (filtered)	BAR: 0.4 ANZECC: 1.4 LOR: 1	• 1 µg/L (Jan 18 - Duplicate sample) • BAR trigger is below LOR	• 2 µg/L (Sep 17)	• No exceedances
Nickel (filtered)	BAR: 1.3 ANZECC: 11 LOR: 1	-	• 2 µg/L (May 18)	-
Zinc (filtered)	BAR: 2 ANZECC: 8 LOR: 5	• 9 µg/L (Jul 17 - Duplicate sample)	• 13 µg/L (Sep 17)	• 8 µg/L (Aug – Sep 17)

Sample locations at North Lake reported exceedances for dissolved aluminium consistently throughout the reporting period. Total iron (unfiltered) concentrations were reported above the BAR trigger at three of the four locations, on a total of three occasions, with concentrations returning to below trigger levels after the exceedance events. Other filtered metals with reported exceedances (see Table 13, below) are attributed to natural variation due to the infrequency and small scale of the exceedance.

Table 13. Metal exceedances at North Lake

Filtered Metals	Triggers (µg/L)	Exceedances			
		NLWS-N2	A1	A1E	A1N
Aluminium (filtered)	BAR: 20.6 LOR: 10	• 1400 µg/L (Jul 17) • 40 µg/L (Aug 17) • 70 µg/L (Sep 17) • 60 µg/L (Oct 17) • 70 µg/L (Nov 17) • 50 µg/L (Dec 17) • 40 µg/L (Jan 18) • 50 µg/L (Feb 18) • Mar 18: no exceedance	• 1180 µg/L (Jul 17) • 40 µg/L (Aug 17) • 70 µg/L (Sep 17) • 60 µg/L (Oct 17) • 70 µg/L (Nov 17) • 50 µg/L (Dec 17) • 40 µg/L (Jan 18) • 60 µg/L (Feb 18)	• 40 µg/L (Aug 17) • 60 µg/L (Sep 17) • 60 µg/L (Oct 17) • 80 µg/L (Nov 17) • 30 µg/L (Dec 17) • 30 µg/L (Feb 18)	• 40 µg/L (Aug 17) • 60 µg/L (Sep 17) • 70 µg/L (Oct 17) • 70 µg/L (Nov 17) • 50 µg/L (Dec 17) • 50 µg/L (Jan 18) • 110 µg/L (Feb 18)
Arsenic (filtered)	BAR: 4 ANZECC: 13 LOR: 1	• 4 µg/L (Aug to Oct 17) • 5 µg/L (Nov & Dec 17) • 6 µg/L (Feb 18)	• 4 µg/L (Sep to Nov 17) • 5 µg/L (Dec 17 & Feb 18)	• 4 µg/L (Sep to Nov 17) • 5 µg/L (Dec 17) • 4 µg/L (Feb 18)	• 4 µg/L (Oct 17) • 5 µg/L (Nov – DeC 17 & Feb 18)
Cadmium (filtered)	BAR: 0.4 ANZECC: 0.2 LOR: 0.1	• 0.2 µg/L (Jul 17)	• 0.2 µg/L (Jul 17)	-	-
Chromium (filtered)	BAR: 2 ANZECC: 1 LOR: 1	• 2 µg/L (Jul 17) • 1 µg/L (Aug 17) • 2 µg/L (Sep 17 to Mar 18)	• 2 µg/L (Jul 17) • 1 µg/L (Aug 17) • 2 µg/L (Sep 17 to Feb 18)	• 1 µg/L (Aug 17) • 2 µg/L (Sep to Dec 17) • 1 µg/L (Jan 18) • 2 µg/L (Feb 18)	• 1 µg/L (Aug 17) • 2 µg/L (Sep to Nov 17) • 1 µg/L (Dec 17 to Jan 18) • 2 µg/L (Feb 18)
Copper (filtered)	BAR: 3.7 ANZECC: 1.4 LOR: 1	• 4 µg/L (Jul 17) • 9µg/L (Dec 17)	• 3 µg/L (Jul 17) • 5 µg/L (Dec 17)	-	-
Iron (unfiltered)	BAR: 13,600 LOR: 50	• 18,600 µg/L (Aug 17)	• 15,700 µg/L (Jul 17) • 19,400 µg/L (Aug 17)	-	• 15,500 µg/L (Jan 18)
Lead (filtered)	BAR: 6.6 ANZECC: 3.4 LOR: 1	• 12 µg/L (Jul 17)	• 10 µg/L (Jul 17)	-	-
Manganese (filtered)	BAR: 818 ANZECC: 1900 LOR: 1	• 818 µg/L (Jul 17) • 1090 µg/L (Aug 17)	• 1160 (Aug 17)	-	-
Nickel (filtered)	BAR: 5.8 ANZECC: 11 LOR: 1	• 8 µg/L (Jul 17)	• 7 µg/L (Jul 17)	-	-
Zinc (filtered)	BAR: 88 ANZECC: 8 LOR: 5	• 73 µg/L (Jul 17) • 9 µg/L (Sep 17)	• 80 µg/L (Jul 17)	-	• 31 µg/L (Dec 17)

Frog Swamp sampling locations largely reported results below the respective BAR trigger values. Minor exceedances occurred infrequently for most metals/metalloids; indicative of natural variation due to the proximity of the concentrations to the BAR trigger and the subsequent return to lower concentrations.

Table 14. Metal exceedances at Frog Swamp

Filtered Metals	Triggers (µg/L)	Exceedances	
		FS2	FS4A
Aluminium (filtered)	BAR: 302 LOR: 10	• 490 µg/L (Jul 17) • 330 µg/L (Aug 17)	• 320 µg/L (Aug 17)
Arsenic (filtered)	BAR: 0.9 ANZECC: 13 LOR: 1	• 2 µg/L (Dec 17)	-
Chromium (filtered)	BAR: 1.9 ANZECC: 1 LOR: 1	• 2 µg/L (Jul 17) • 1 µg/L (Aug to Sep 17) • 2 µg/L (Oct to Dec 17)	• 1 µg/L (Aug to Sep 17) • 2 µg/L (Oct to Nov 17)
Copper (filtered)	BAR: 0.9 ANZECC: 1.4 LOR: 1	• 1 µg/L (Jul17)	• 84 µg/L (Oct 17)
Iron (unfiltered)	BAR: 1820 LOR: 50	• 1930 µg/L (Nov 17)	• 1990 µg/L Sep 17 • 1920 µg/L Nov 17
Lead (filtered)	BAR: 0.7 ANZECC: 3.4 LOR: 1	• 1 µg/L (Jul 17) • BAR trigger is below LOR	-
Manganese (filtered)	BAR: 30 ANZECC: 1900 LOR: 1	• 35 µg/L (Aug 17) • 30 µg/L (Sep & Dec 17)	• 38 µg/L (Aug 17) • 33 µg/L (Nov 17)
Nickel (filtered)	BAR: 1.2 ANZECC: 11 LOR: 1	• 2 µg/L (Jul 17)	• 7 µg/L (Oct 17)
Zinc (filtered)	BAR: 14.4 ANZECC: 8 LOR: 5	• 11 µg/L (Jul 17) • 8 µg/L (Dec 17)	-

Filtered aluminium results reported for Roe Drain largely fell above the BAR trigger, indicating that higher concentrations of this analyte are naturally present in these locations. Minor and infrequent exceedances of either the BAR trigger or the ANZECC guideline were reported for dissolved arsenic, dissolved chromium, dissolved manganese and dissolved zinc. These minor exceedances are reflective of natural variation. Total iron concentrations exceeded on three occasions at RD1 and once at RD1A, with the increases in total iron likely a result of seasonal variation.

It is also noted that the grating designed to capture solid waste in the stormwater at Roe Drain has been observed by field staff to be displaced; allowing considerable amounts of metal and plastic rubbish to flow into the drain.

Table 15. Metal exceedances at Roe Drain

Filtered Metals	Triggers (µg/L)	Exceedances	
		RD1	RD1A
Aluminium (filtered)	BAR: 110 LOR: 10	• 240 µg/L (Jul 17) • 250 µg/L (Aug 17) • 180 µg/L (Sep 17) • 260 µg/L (Oct 17) • 140 µg/L (Nov 17)	• 270 µg/L (Aug 17) • 170 µg/L (Sep 17) • 260 µg/L (Oct 17)
Arsenic (filtered)	BAR: 0.9 ANZECC: 13 LOR: 1	• 1 µg/L (Oct 17)	-
Chromium (filtered)	BAR: 1.1 ANZECC: 1 LOR: 1	• 1 µg/L (Jul to Oct 17)	• 1 µg/L (Aug & Oct 17)
Iron (unfiltered)	BAR: 3900 LOR: 50	• 4070 µg/L (Jul 17) • 14,200 µg/L (Oct 17) • 5710 µg/L (Nov 17)	• 5170 µg/L (Sep 17)
Manganese (filtered)	BAR: 36 ANZECC: 1900 LOR: 1	• 53 µg/L (Nov 17)	-
Zinc (filtered)	BAR: 27 ANZECC: 8 LOR: 5	• 9 µg/L (Jul 17) • 10 µg/L (Oct 17) • 11 µg/L (Nov 17)	• 8 µg/L (Aug17)

Reported exceedances above the BAR trigger for Roe Swamp occurred on a regular basis for dissolved manganese and total iron. As these analytes regularly flucuate above the BAR trigger, prior to construction commencement, the high concentrations are considered to reflect natural conditions. Dissolved nickel exceeded at one location during the reporting period with a concentration recorded at the trigger level, for 2 consequetive months and in November. It is also considered to be reflective of natural conditions, due to the minor nature of the exceedances. Chromium (filtered) reported concentrations at both locations at the LOR and the ANZECC guideline, but below the BAR trigger, and as such is not considered to be a contamination event.

Table 16. Metal Exceedances and Roe Swamp

Metal AOCs	Triggers (µg/L)	Exceedances	
		A3	S1
Chromium (filtered)	BAR: 1.4 ANZECC: 1 LOR: 1	• 1 µg/L (Aug to Nov 17)	• 1 µg/L (Oct 17)
Iron (unfiltered)	BAR: 880 LOR: 50	• 1090 µg/L (Aug 17) • 1470 µg/L (Sep 17) • 1300 µg/L (Oct 17) • 2770 µg/L (Nov 17)	• 1190 µg/L (Oct 17) • 1020 µg/L (Nov 17)
Manganese (filtered)	BAR: 16.8 ANZECC: 1900 LOR: 1	• 36 µg/L (Aug 17) • 32 µg/L (Sep17) • 20 µg/L (Oct 17) • 32 µg/L (Nov 17)	• 26 µg/L (Jul 17) • 20 µg/L (Aug 17) • 22 µg/L (Sep17) • 18 µg/L (Oct 17) • 30 µg/L (Nov 17)
Nickel (filtered)	BAR: 1 ANZECC: 11 LOR: 1	• 1 µg/L (Aug, Sep & Nov 17)	-

A high level summary of all metal/metalloid results is presented in Table 17, below. Overall, no concerning trends have been identified for these analytes, with infrequent and minor exceedances attributed to natural variation.

Table 17. Metal summary

Wetland	Exceedances	Conclusions
Bibra Lake	• Some 'one-off' exceedances exist for filtered metals; aluminium, chromium, copper and zinc • Consistent results across wetland locations	• All exceedances are considered to be within the natural variation
North Lake	• Infrequent or one-off small exceedances of some filtered metals; including arsenic, cadmium, chromium, copper lead, iron (unfiltered), manganese, nickel and zinc • Filtered aluminium results were consistently reported above the BAR trigger level (Jul 2017 results were significantly high)	• Semi-frequent and one-off exceedances are likely to be natural variation of surface water • See Figure 4-6 for Aluminium
Frog Swamp	• Semi-frequent/one-off small exceedances of of filtered metals; aluminium, arsenic, chromium, iron (not filtered), lead, manganese and nickel • Zinc only exceeded ANZECC guidelines • High spike of copper at FS4A in Oct 2017	• Semi-frequent and one-off exceedances are likely to be natural variation of surface water • Analytes that exceeded ANZECC, but not the BAR are not of concern • High spike in copper.
Roe Drain	• Semi-frequent/one-off small exceedances of other filtered metals; arsenic and manganese • One-off peaks for unfiltered iron (returned below trigger level in immediate following round) • Chromium (filtered) and zinc only exceeded ANZECC guidelines • High concentration of aluminium compared to BAR	• Semi-frequent and one-off exceedances are likely to be natural variation of surface water • Analytes that exceeded ANZECC, but not the BAR are not of concern • See Figure 4-6 for Aluminium
Roe Swamp	• Filtered chromium results exceeded the ANZECC guidelines twice • Filtered nickel concentration exceeded the BAR trigger on one occasion • Filtered manganese and unfiltered iron results semi-frequently exceeded the BAR, but not the ANZECC guidelines	• Minor exceedances largely reported close to the guideline and trigger values. • Total iron and dissolved manganese regularly exceeded BAR triggers, indicating natural conditions at these locations are not reflected in the current BAR trigger. • No concerning trends identified.

4.3.3 Nutrients and Biological

Surface water samples were analysed for nutrients and chlorophyll a (biological), with the overall results presented in A high level summary of results in presented in Table 23, with individual exceedances at each wetland in tables 18-22. Overall, no concerning trends have been identified for these analyst, with infrequent and minor exceedances attributed to natural variation.

Total nitrogen semi-frequently exceeded respective BAR triggers and the ANZECC guideline at all wetland locations. However given exceedances were within close proximity to the BAR and concentrations regularly fluctuated below trigger levels, results are considered within natural variation.

Total phosphorous concentrations at all wetland locations, with the exception of Roe Drain, semi-frequently exceed and fluctuate below the BAR trigger, indicative of natural water conditions. Roe Drain locations, as seen in Figure 4-7 has been consistently higher than the BAR trigger, including pre-construction results from September 2015. The results from the current reporting period are therefore likely to be reflective of natural water conditions for total phosphorous, with an adjustment to the BAR trigger recommended.

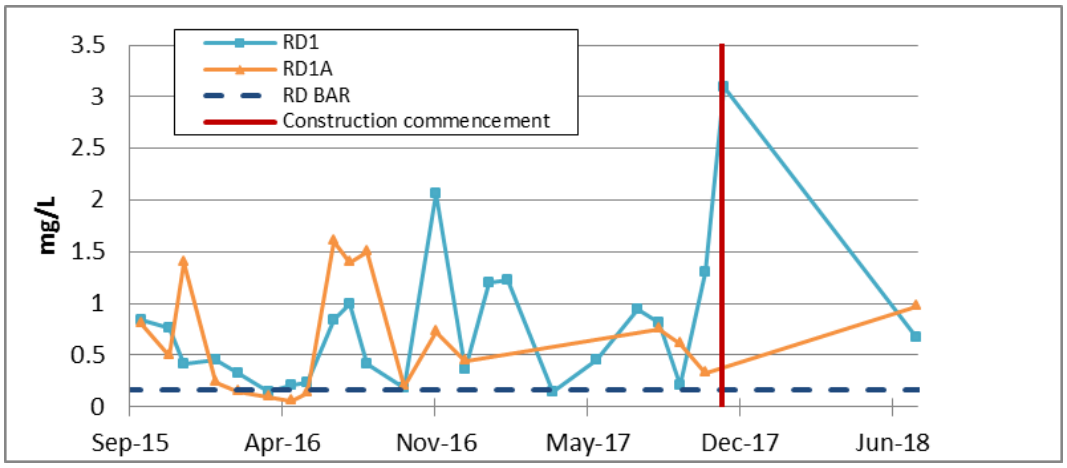

Figure 4-7. Total phosphorus at Roe Drain locations

Figure 4-8 displays ammonia concentration results at Bibra Lake, Frog Swamp and Roe Drain. Bibra Lake has the most consistent results across its monitoring locations; with similar conditions recorded at each location (peaks and trends). Exceedances at Bibra Lake previously occurred in July 2016 and again in August 2017 (current reporting period). Results from August 2018 have also been included (the next reporting period) as evidence to further support the seasonal exceeding pattern identified.

Frog Swamp and Roe Drain have the same BAR trigger level (as shown by the green dashed line). Considering the previously collected baseline data from September 2015; FS2 and FS4A results are mostly below the BAR, with a few peak exceedances occurring. Using previous data, it can be determined that exceedances in the current reporting period are within natural surface water variation.
Roe Drain (RD1 and RD1A locations) frequently reports results above the BAR trigger level, including extensive baseline data shown in Figure 4-8. It is therefore considered likely that all ammonia concentrations reported to date at Roe Drain are within the natural water variation for this location; with adjustments to the BAR trigger necessary.

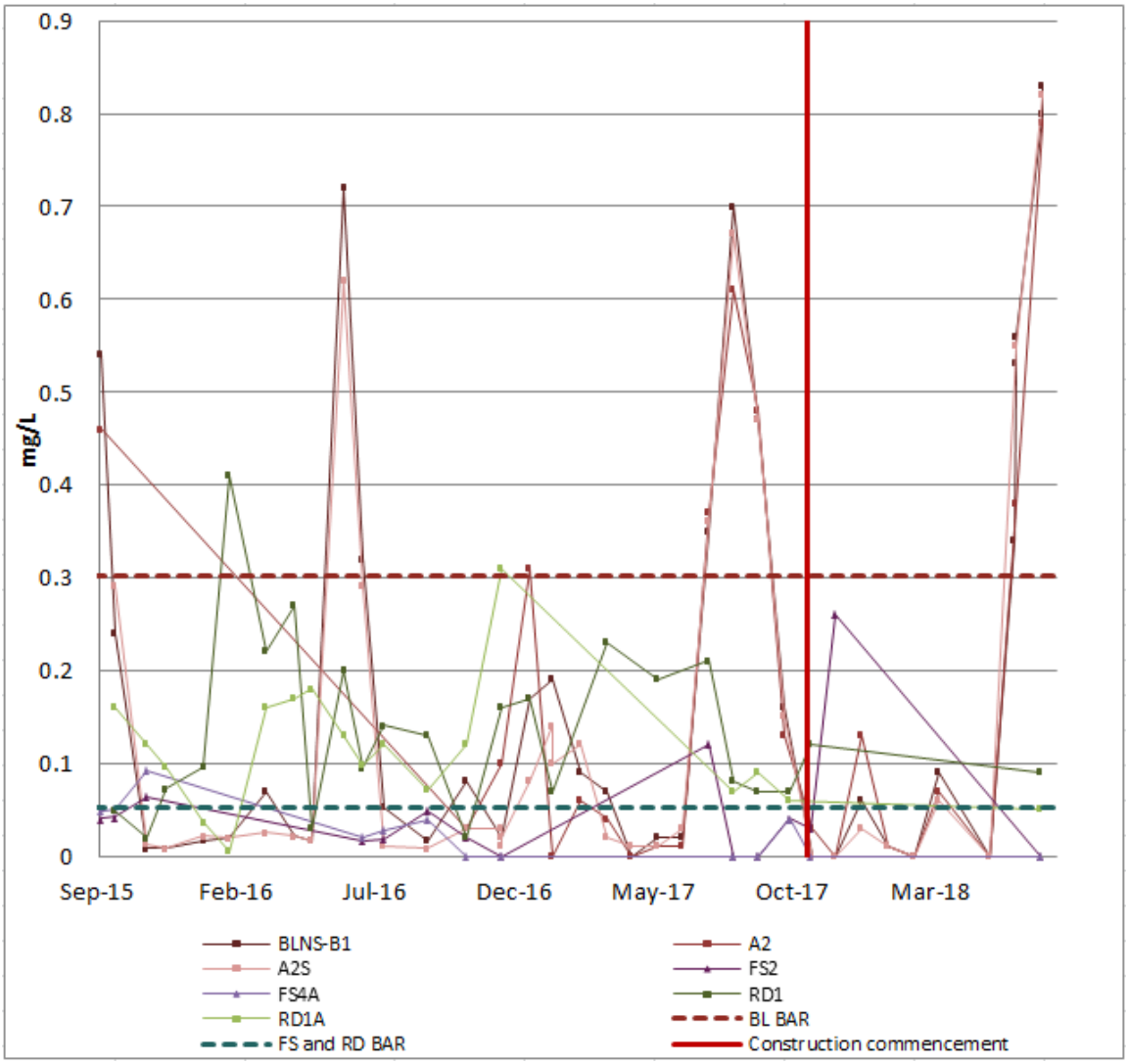

Figure 4-8. Ammonia concentration at Bibra Lake, Frog Swamp and Roe Drain

Bibra Lake sampling locations show consistent results for all analytes. As is previously mentioned, Bibra Lake is the only permanent surface water body in the area which is able to be sampled consistently. All exceedances are minor in nature, reported close to the BAR trigger, and are considered to represent natural and seasonal variation. Ammonia, total nitrogen and total phosphorous exceed frequently, indicating that the BAR trigger requires adjustment to better reflect natural conditions.

Table 18. Nutrients/Biological exceedances at Bibra Lake

Nutrients	Triggers (mg/L)	Exceedances		
		BLNS-B1	A2	A2S
Ammonia	BAR: 0.302 ANZECC: 0.04 LOR: 0.01	• 0.33 mg/L (Jul 17) • 0.7 mg/L (Aug 17) • 0.47 mg/L (Sep 17) • 0.16 mg/L (Oct 17) • 0.06 mg/L (Jan 18) • 0.07 mg/L (Apr 18) • 0.56 mg/L (Jun 18)	• 0.37 mg/L (Jul 17) • 0.61 mg/L (Aug 17) • 0.48 mg/L (Sep 17) • 0.13 mg/L (Oct 17) • 0.13 mg/L (Jan 18) • 0.07 mg/L (Apr 18) • 0.38 mg/L (Jun 18)	• 0.36 mg/L (Jul 17) • 0.67 mg/L (Aug 17) • 0.47 mg/L (Sep 17) • 0.15 mg/L (Oct 17) • 0.06 mg/L (Apr 18) • 0.55 mg/L (Jun 18)
Nitrate	BAR: 0.099 ANZECC: 0.1 LOR: 0.01	• 0.23 mg/L (Aug17) • 0.29 mg/L (Sep 17) • 0.18 mg/L (Oct 17)	• 0.23 mg/L (Aug17) • 0.24 mg/L (Sep 17) • 0.18 mg/L (Oct 17)	• 0.21 mg/L (Aug17) • 0.28 mg/L (Sep 17) • 0.18 mg/L (Oct 17)
Nitrite	BAR: 0.099 ANZECC: 0.1 LOR: 0.01	-	• 0.1 mg/L (Aug 17) • Trigger is at LOR	-

Nutrients	Triggers (mg/L)	Exceedances		
		BLNS-B1	A2	A2S
Nitrate & Nitrite	BAR: 0.099 ANZECC: 0.01 LOR: 0.1	• 0.32 mg/L (Aug17) • 0.37 mg/L (Sep 17) • 0.22 mg/L (Oct 17)	• 0.33 mg/L (Aug17) • 0.32 mg/L (Sep 17) • 0.22 mg/L (Oct 17)	• 0.30 mg/L (Aug17) • 0.36 mg/L (Sep 17) • 0.21 mg/L (Oct 17)
Total Nitrogen	BAR: 15 ANZECC: 1.5 LOR: 0.1	• All results between 1.6 – 5.0 mg/L.	• All results between 1.8 – 5.5 mg/L.	• All results between 1.6 – 5.2 mg/L.
Total Phosphorus	BAR: 0.428 ANZECC: 0.06 LOR: 0.01	• All results between 0.08 – 0.34 mg/L (ANZECC) • Exception: 0.76 mg/L (BAR exceedance – Dec 17)	• All results between 0.08 – 0.34 mg/L (ANZECC) • Exception: 0.76 mg/L (BAR exceedance – Dec 17)	• All results between 0.09 – 0.32 mg/L (ANZECC) • Exception: 0.70 mg/L (BAR exceedance – Dec 17)

North Lake location results show minor exceedances close to BAR trigger values for nitrate, total kjeldahl nitrogen as well as nitrate & nitrite. As with Bibra Lake, North Lake locations also show regular exceedances of ammonia, total nitrogen and total phosphorous. As these concentrations are consistently reported above the BAR trigger and are recorded prior to construction commencement, it is considered that they are representative of natural conditions. The respective BAR trigger values are therefore recommended to be adjusted to reflect the additional baseline data collected.

Table 19. Nutrients/Biological exceedances at North Lake

Nutrients	Triggers (mg/L)	Exceedances			
		A1	A1E	A1N	NLWS-N2
Ammonia	BAR: 1.72 ANZECC: 0.04 LOR: 0.01	• All exceedances from Jul 17 to Feb 18 between 0.04 – 0.37 mg/L (ANZECC)	• All exceedances from Aug 17 to Feb 18 between 0.05 – 0.59 mg/L (ANZECC)	• All exceedances from Aug 17 to Feb 18 between 0.08 – 0.46 mg/L (ANZECC)	• All exceedances from Jul 17 to Feb 18 between 0.05 – 0.42 mg/L (ANZECC)
Nitrate	BAR: 0.0194 ANZECC: 0.1 LOR: 0.01	• 0.02 mg/L (Oct 17)	• 0.02 mg/L (Aug17)	-	• 0.02 mg/L (Oct 17)
Total Kjeldahl Nitrogen	BAR: 7.22 LOR: 0.01	-	-	• 7.6 mg/L (Feb 18)	-
Nitrate & Nitrite	BAR: 0.0194 ANZECC: 0.01 LOR: 0.1	• 0.02 mg/L (Oct 17)	• 0.02 mg/L (Aug17)	-	• 0.02 mg/L (Oct 17)
Total Nitrogen	BAR: 7.22 ANZECC: 1.5 LOR: 0.1	• All results were between 3.0 – 6.2 mg/L (ANZECC)	• All results were between 2.6 – 5.9 mg/L (ANZECC) • Exception: 7.6 mg/L (BAR exceedance – Feb 18)	• All results were between 2.9 – 5.0 mg/L (ANZECC) • Exception: 11.3 mg/L (BAR exceedance – Feb 18)	• All results were between 1.6– 6.4 mg/L (ANZECC) • Exception: 8.3 mg/L (BAR exceedance – Feb 18)
Total Phosphorus	BAR: 0.754 ANZECC: 0.06 LOR: 0.01	• All results were between 0.32 to 1.55 mg/L	• All results were between 0.47 to 1.48 mg/L	• All results were between 0.61 to 1.98 mg/L	• All results were between 0.17 to 2.03 mg/L

Frog Swamp sampling locations data largely reported nutrients below the respective BAR trigger values. Exceedances outlined vary slightly from the relevant trigger or guideline, with most exceedances relating to the ANZECC guidelines. Infrequent exceedances of the BAR trigger are attributed to natural variation.

Table 20. Nutrients/Biological exceedances at Frog Swamp

Filtered Metals	Triggers (mg/L)	Exceedances	
		FS2	FS4A
Ammonia	BAR: 0.0528 ANZECC: 0.04 LOR: 0.01	• 0.12 mg/L (Jul 17) • 0.04 mg/L (Oct 17) • 0.26 mg/L (Dec 17)	• 0.04 mg/L (Oct 17)
Total Kjeldahl Nitrogen	BAR: 2.74 LOR: 0.1	• 4.2 mg/L (Dec 17)	• 4.9 mg/L (Sep 17) • 11.7 mg/L (Nov 17)
Total Nitrogen	BAR: 2.74 ANZECC: 1.5 LOR: 0.1	• All results from July to Nov 17 were between 1.8 – 2 mg/L (ANZECC) • 4.2 mg/L (Dec 17) (BAR trigger)	• 1.5 mg/L (Aug 17) • 4.9 mg/L (Sep 17) • 1.6 mg/L (Oct 17) • 11.7 mg/L (Nov 17)
Total Phosphorus	BAR: 0.164 ANZECC: 0.06 LOR: 0.01	• All results from July to Nov 17 were between 0.06 – 0.16 mg/L (ANZECC) • 0.25 mg/L (Dec 17) (BAR trigger)	• 0.16 mg/L (Aug 17) • 0.37 mg/L (Sep 17) • 0.09 mg/L (Oct 17) • 1.67 mg/L (Nov 17)
Chlorophyll a	BAR: 15 ANZECC: 30 LOR: 0.01	• 34 mg/m3 (Nov 17) • 38 mg/m3 (Dec 17)	• 24 mg/m3 (Nov 17)

Roe Drain locations regularly exceed the BAR triggers and ANZECC guidelines for nutrients. As has been mentioned previously, the drainage grating for Roe Drain has become dislodged. This has allowed large amounts of leaf matter and general waste to pass into the drain. Large quantities of floating aquatic plants and algae have also been reported at these locations. The large volumes of organic matter present are likely to influence the amount of nutrients present in the water at this location.

Table 21. Nutrients/Biological exceedances at Roe Drain

Filtered Metals	Triggers (mg/L)	Exceedances	
		RD1	RD1A
Ammonia	BAR: 0.0528 ANZECC: 0.04 LOR: 0.01	• 0.21 mg/L Jul 17 • 0.08 mg/L Aug 17 • 0.07 mg/L Sep to Oct 17 • 0.12 mg/L Nov 17	• 0.07 mg/L Aug 17 • 0.09 mg/L Sep 17 • 0.06 mg/L Oct 17
Nitrate	BAR: 0.0866 ANZECC: 0.1 LOR: 0.01	• 0.10 mg/L (Aug 17) • 0.18 mg/L (Sep 17)	-
Total Kjeldahl Nitrogen	BAR: 3.04 LOR: 0.1	• 3.6 mg/L (Jul 17) • 4.1 mg/L (Oct 17) • 8.2 mg/L (Nov 17)	• 3.7 mg/L (Sep 17)
Nitrate & Nitrite	BAR: 0.0866 ANZECC: 0.01 LOR: 0.1	• 0.10 mg/L (Aug 17) • 0.20 mg/L (Sep 17)	• 0.11 mg/L (Aug 17)
Total Nitrogen	BAR: 2.74 ANZECC: 1.5 LOR: 0.1	• 3.6 mg/L (Jul 17) • 2.3 mg/L (Aug 17) • 1.8 mg/L (Sep 17) • 4.1 mg/L (Oct 17) • 8.2 mg/L (Nov 17)	• 1.7 mg/L (Aug 17) • 3.8 mg/L (Sep 17) • 1.6 mg/L (Oct 17)
Total Phosphorus	BAR: 0.164 ANZECC: 0.06 LOR: 0.01	• 0.94 mg/L (Jul 17) • 0.81 mg/L (Aug 17) • 0.21 mg/L (Sep 17) • 1.3 mg/L (Oct 17) • 3.09 mg/L (Nov 17)	• 0.75 mg/L (Aug 17) • 0.61 mg/L (Sep 17) • 0.32 mg/L (Oct 17)
Chlorophyll a	BAR: 79.4 ANZECC: 30 LOR: 0.01	• 52 mg/m3 (Oct 17) • 46 mg/m3 (Nov 17)	-

Roe Swamp locations returned exceedances of the ANZECC guidelines over the current reporting period. Total Kjeldahl Nitrogen and total nitrogen each recorded one exceedance at each location during spring, with a subsequent decrease of concentrations. Total phosphorous is reported above the BAR on one occasion at S1, October 2017, otherwise only exceeding the ANZECC guidelines. The exceedances for Roe Swamp are overall minor in nature and are attributed to natural variation.

Table 22. Nutrients/Biological exceedances at Roe Swamp

Filtered Metals	Triggers (mg/L)	Exceedances	
		A3	S1
Ammonia	BAR: 0.09 ANZECC: 0.04 LOR: 0.01	• 0.05 mg/L (Sep 17)	• 0.07 mg/L (Jul 17) • 0.04 mg/L (Oct 17)
Total Kjeldahl Nitrogen	BAR: 2.86 LOR: 0.1	• 3.7 mg/L (Sep 17)	• 6.6 mg/L (Oct 17)
Total Nitrogen	BAR: 2.86 ANZECC: 1.5 LOR: 0.1	• 1.5 mg/L (Aug 17) • 3.7 mg/L (Sep 17) • 2.8 mg/L (Oct 17) • 1.7 mg/L (Nov 17)	• 1.7 mg/L (Jul 17) • 6.6 mg/L (Oct 17) • 2.1 mg/L (Nov 17)
Total Phosphorus	BAR: 0.222 ANZECC: 0.06 LOR: 0.01	• 0.12 mg/L (Aug 17) • 0.19 mg/L (Sep 17) • 0.14 mg/L (Oct 17) • 0.06 mg/L (Nov 17)	• 0.13 mg/L (Jul 17) • 0.22 mg/L (Aug 17) • 0.17 mg/L (Sep 17) • 0.60 mg/L (Oct 17) • 0.22 mg/L (Nov 17)
Chlorophyll a	BAR: 9.3 ANZECC: 30 LOR: 0.01	-	• 10 mg/m3 (Nov 17)

A high level summary of all nutrient and biological results is presented in Table 23, below. Overall, no concerning trends have been identified for these analytes, with infrequent and minor exceedances attributed to natural variation.

Table 23. Nutrients and Biological surface water summary

Wetland	Exceedances	Conclusions
Bibra Lake	• Ammonia frequently exceeds the ANZECC trigger and semi-frequently exceeds the BAR at all locations • Nitrate and nitrate & nitrite exceed both guidelines during August to October 2017 (no exceedances after) • All total nitrogen results exceeded only the ANZECC trigger (no BAR exceedance) • All total phosphorous results exceeded only the ANZECC trigger, with the exception of Dec 17 which exceeds the BAR at all locations.	• Ammonia exceedances are within natural variation • Nitrate and nitrate & nitrite results are considered within seasonal variation • The spike BAR exceedance of Total phosphorous is a one off event, and not a concerning result. • In all cases, exceedances of only the ANZECC guideline, but not the BAR trigger is not a concerning result
North Lake	• Ammonia only exceeded the ANZECC guidelines, but not the BAR trigger • Nitrate and nitrate & nitrite exceeded the BAR trigger slightly in Oct 17 (A1 & North LakeW-N2) and Aug 17 (A1E) • All total nitrogen results exceeded only the ANZECC trigger, with the exception of Feb 18 which A1E, A1N and NLWS-N2 exceeded the BAR trigger • All total phosphorous results exceeded only the ANZECC trigger (no BAR exceedance).	• Ammonia exceedances are within natural variation • Nitrate and nitrate & nitrite results are considered within seasonal variation • The spike BAR exceedance of Total nitrogen is due to seasonal variation (drying cycle) • In all cases, exceedances of only the ANZECC guideline, but not the BAR trigger is not a concerning result

Wetland	Exceedances	Conclusions
Frog Swamp	• Ammonia semi-frequently exceeded at both guidelines at FS2 • Total kjeldahl nitrogen exceeds the BAR trigger in Sep & Nov 17 at FS4A and in Dec 17 at FS2 • Total nitrogen and total phosphorous frequently exceeded the ANZECC guideline, and exceeded the BAR in a few cases • Chlorophyll a exceeded both guidelines in Nov – Dec 17	• Ammonia exceedances are within natural variation • Total kjeldahl nitrogen, total nitrogen, total phosphorous and chlorophyll exceeding results appear to be within seasonal variation of the wetland (drying cycle)
Roe Drain	• Ammonia frequently exceeds both guideline values • Nitrate and nitrate & nitrite semi-frequently exceed both guidelines in Aug to Sep 17 • Total kjeldahl nitrogen exceeds the BAR trigger in Jul, Oct & Nov 17 at RD1 and in Sep 17 at RD1A • Total nitrogen and total phosphorous semi-frequently exceeded both guideline triggers through the sampling period • Chlorophyll a exceeded the ANZECC in Oct to Nov 17 at RD1 (no BAR exceedances occurred)	• Ammonia exceedances appear to be within natural variation • Nitrate and nitrate & nitrite results are considered within seasonal variation • Total nitrogen and total phosphorous are within natural variation (results fluctuate around the BAR trigger) • Chlorophyll does not exceed the BAR, and hence ANZECC exceedances are not of concern
Roe Swamp	• Ammonia has a three exceedances across A3 and S1 of the ANZECC trigger (No BAR exceedances) • Total kjeldahl nitrogen and Chlorophyll have one of exceedances of the BAR trigger • Total nitrogen and total phosphorous semi-frequently exceed both guidelines	• Ammonia exceedances are not of concern (no BAR trigger exceedances) • One-off exceedances of total kjeldahl nitrogen and chlorophyll, are considered to be a result of season variation • Semi-frequent exceedances of total nitrogen and total phosphorous are likely to be natural variation (see

5 RECOMMENDATIONS

5.1 Application of Triggers

Assessing against previously collected baseline data has helped to characterise natural conditions recorded at groundwater bores and surface water locations. Both natural and seasonal variations have proven to have a significant impact on water conditions, with the BAR and guideline triggers unable to account for these exceedances.

Through interpretation of long term data, it was determined that the majority of 'exceeding' results were attributed to natural or seasonal variation, and an adjustment to the BAR triggers is necessary for some analytes. Application of the ANZECC 2000 guideline for some analytes was also shown to be inappropriate, particularly in cases where the AOC was consistently (including previous data) above the guideline.

Table 24 summarises potential changes to BAR and ANZECC triggers. Some errors are also apparent in the BAR triggers as they are presented in the WMMP (Strategen, 2016). These relate to conversion errors, for unfiltered iron for North Lake and total dissolved solids for all surface water locations.
Unfiltered iron for North Lake incorrectly stated in the WMMP as 13.6 µg/L, which should instead be 13.6 mg/L or 13,600 µg/L, as is recorded in the Baseline Analysis Report (Aurecon, 2016).
Total dissolved solids (TDS) was measured for the BAR in-situ as mg/L, calculated from conductivity in mS/cm and temperature. For presentation in the WMMP, Strategen have converted conductivity values to µS/cm, but neglected to convert the associated TDS values. This has resulted in a TDS range which does not match the current calculated TDS values for each location and the trigger range for each surface water body is required to be updated.

Table 24. Wetland monitoring BAR adjustment summary

AOCs	Groundwater	Surface water
pH	Use of one pH range, i.e. no 'grey area' in between the trigger and guideline ranges.	
EC/TDS	Use of a trigger level, rather than a range, to avoid 'below' range exceedances. Surface water trigger levels for TDS are incorrect.	
Filtered aluminium	-	Several surface water locations were consistently higher than their BAR trigger. These include locations from North Lake and Roe Drain.
Filtered chromium	There is a high frequency of exceedances of the ANZECC trigger and no results within close proximity to the BAR trigger. The ANZECC trigger may not be appropriate for filtered chromium.	-
Unfiltered iron	-	Roe Swamp frequently exceeds the BAR for total iron and requires an adjusted BAR. North Lake has a unit conversion error in relation to iron; with the trigger value outlined in the WMMP as 13.6 µg/L. This value should in fact be 13.6 mg/L or 13,600 µg/L, as is recorded in the Baseline Analysis Report.
Ammonia	-	North Lake surface water locations were consistently higher than their BAR trigger, indicating an update is required.
Total Phosphorous	-	Roe Swamp regularly exceeds BAR trigger values for total phosphorous. Update recommended.

5.2 Monitoring Extent

The Project footprint has changed significantly since the WMMP was developed, and hence the impact on groundwater and surface water has changed. The original footprint extended toward Bibra Lake and North Lake, whilst the current Project may potentially impact the eastern side of the Roe Swamp and Melaleuca Swamp area (Figure 1-1).
It is therefore recommended that monitoring of the extended surface water and groundwater locations beyond the current Project footprint be reduced in frequency or removed from the monitoring program.

6 REFERENCES

Aurecon 2016, *Roe Highway Extension 247607 Baseline Analysis Report – Rev 0 (BAR)*, dated 21 October 2016.

CRC CARE technical report no. 40, 2018, Slee, D. and Wright, J, *Weathered Petroleum Hydrocarbons (Silica Gel Clean-up)*, Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, Newcastle, Australia, January 2018

Strategen 2016, *Roe 8 Highway Extension – Wetlands Monitoring and Management Plan – Rev 4 (WMMP),* dated October 2016

7 APPENDICES

Appendix A Field and Analytical Results

Table 1
Groundwater Gauging Results
Roe Highway Extension - WMMP
Main Roads Western Australia

Type	Location Code	Date	Reference Elevation	Well Depth	Water Depth (m BTOC)	Groundwater Elevation (m AHD)
Impact	GW-D3	02-11-16	21.79	7.22	3.879	17.911
		08-12-16	21.79	7.21	4.127	17.663
		13-01-17	21.79	-	4.358	17.432
		25-01-17	21.79	-	4.44	17.35
		06-02-17	21.79	7.19	4.485	17.305
		22-02-17	21.79	7.204	4.35	17.44
		08-03-17	21.79	7.212	4.38	17.41
		21-03-17	21.79	7.2	4.4	17.39
		05-04-17	21.79	7.2	4.46	17.33
		20-04-17	21.79	7.21	4.53	17.26
		03-05-17	21.79	7.19	4.55	17.24
		01-06-17	21.79	7.189	4.447	17.343
		27-06-17	21.79	7.189	4.393	17.397
		12-07-17	21.79	7.18	4.21	17.58
		26-07-17	21.79	7.17	4.11	17.68
		10-08-17	21.79	7.154	3.865	17.925
		24-08-17	21.79	7.135	3.623	18.167
		07-09-17	21.79	7.12	3.615	18.175
		26-09-17	21.79	7.135	3.615	18.175
		27-09-17	21.79	7	3.9	17.89
		05-10-17	21.79	5.24	3.62	18.17
		19-10-17	21.79	7.12	3.69	18.1
		03-11-17	21.79	7.13	3.77	18.02
		17-11-17	21.79	7.2	3.86	17.93
		01-12-17	21.79	7.125	3.88	17.91
		19-12-17	21.79	7.17	4.03	17.76
		27-12-17	21.79	7.12	4.09	17.7
		11-01-18	21.79	7.13	4.17	17.62
Impact	GW-D4	02-11-16	17.28	3.925	0.337	16.943
		09-12-16	17.28	3.92	0.61	16.67
		13-01-17	17.28	-	0.84	16.44
		25-01-17	17.28	-	0.922	16.358
		07-02-17	17.28	3.91	0.965	16.315
		22-02-17	17.28	3.92	0.73	16.55
		09-03-17	17.28	3.93	0.838	16.442
		21-03-17	17.28	3.91	0.828	16.452
		06-04-17	17.28	3.94	0.9	16.38
		20-04-17	17.28	3.93	0.94	16.34
		04-05-17	17.28	3.92	0.96	16.32
		31-05-17	17.28	3.912	0.797	16.483
		27-06-17	17.28	3.905	0.715	16.565
		12-07-17	17.28	3.89	0.49	16.79
		26-07-17	17.28	3.92	0.39	16.89
		10-08-17	17.28	3.9	0.1	17.18
		25-08-17	17.28	3.92	0.1	17.18
		07-09-17	17.28	3.91	0.15	17.13
		05-10-17	17.28	3.91	0.15	17.13
		24-10-17	17.28	3.21	0.2	17.08
		03-11-17	17.28	3.9	0.295	16.985
		17-11-17	17.28	3.92	0.39	16.89
		01-12-17	17.28	3.9	0.48	16.8
		19-12-17	17.28	3.91	0.5	16.78
		27-12-17	17.28	3.9	0.6	16.68
		10-01-18	17.28	3.89	0.68	16.6
		02-11-16	16.8	6	2.281	14.519
		08-12-16	16.8	5.99	2.496	14.304
		12-01-17	16.8	5.98	2.725	14.075
		27-01-17	16.8	-	2.83	13.97
		06-02-17	16.8	5.97	2.892	13.908
		22-02-17	16.8	5.98	2.83	13.97
		08-03-17	16.8	5.99	2.923	13.877
		21-03-17	16.8	5.97	2.935	13.865
		05-04-17	16.8	6	3.02	13.78
		20-04-17	16.8	6	3.07	13.73
		03-05-17	16.8	5.97	3.11	13.69
		31-05-17	16.8	5.95	3.071	13.729

Table 1
Groundwater Gauging Results
Roe Highway Extension - WMMP
Main Roads Western Australia

Impact	GW-D5	27-06-17	16.8	5.971	3.018	13.782
		12-07-17	16.8	5.96	2.9	13.9
		27-07-17	16.8	5.96	2.78	14.02
		10-08-17	16.8	5.95	2.52	14.28
		24-08-17	16.8	5.95	2.3	14.5
		06-09-17	16.8	5.95	2.26	14.54
		26-09-17	16.8	5.96	2.22	14.58
		05-10-17	16.8	5.95	2.21	14.59
		19-10-17	16.8	5.95	2.235	14.565
		03-11-17	16.8	5.96	2.27	14.53
		17-11-17	16.8	5.94	2.38	14.42
		04-12-17	16.8	5.96	2.45	14.35
		20-12-17	16.8	5.95	2.39	14.41
		27-12-17	16.8	5.97	2.57	14.23
		11-01-18	16.8	5.97	2.47	14.33
Impact	GW-D7	02-11-16	16.77	6.38	3.322	13.448
		08-12-16	16.77	6.36	3.467	13.303
		13-01-17	16.77	-	3.655	13.115
		06-02-17	16.77	-	-	-
		22-02-17	16.77	6.347	3.697	13.073
		09-03-17	16.77	6.33	3.79	12.98
		21-03-17	16.77	6.325	3.805	12.965
		03-04-17	16.77	6.24	3.88	12.89
		04-04-17	16.77	6.19	3.9	12.87
		05-04-17	16.77	6.42	3.9	12.87
		06-04-17	16.77	5.91	3.9	12.87
		07-04-17	16.77	5.74	3.91	12.86
		08-04-17	16.77	5.84	3.92	12.85
		09-04-17	16.77	5.84	3.92	12.85
		20-04-17	16.77	5.51	3.95	12.82
		03-05-17	16.77	5.28	3.98	12.79
		01-06-17	16.77	4.948	3.967	12.803
		27-06-17	16.77	4.663	3.932	12.838
		12-07-17	16.77	4.67	3.81	12.96
		26-07-17	16.77	4.48	3.75	13.02
		10-08-17	16.77	4.52	3.51	13.26
		24-08-17	16.77	4.35	3.325	13.445
		07-09-17	16.77	-	3.375	13.395
		27-09-17	16.77	4.37	3.27	13.5
		19-10-17	16.77	4.19	3.22	13.55
		06-11-17	16.77	4.16	3.265	13.505
		20-11-17	16.77	4.1	3.32	13.45
		27-12-17	16.77	3.51	3.48	13.29
Impact	GW-D8	04-11-16	22.97	13.09	10.21	12.76
		09-12-16	22.97	13.155	10.283	12.687
		13-01-17	22.97	13.02	10.374	12.596
		25-01-17	22.97	-	10.415	12.555
		06-02-17	22.97	12.84	10.443	12.527
		22-02-17	22.97	12.75	10.44	12.53
		09-03-17	22.97	12.731	10.48	12.49
		21-03-17	22.97	13.02	10.47	12.5
		03-04-17	22.97	12.7	10.53	12.44
		04-04-17	22.97	12.67	10.53	12.44
		05-04-17	22.97	12.87	10.54	12.43
		06-04-17	22.97	12.62	10.53	12.44
		07-04-17	22.97	12.62	10.54	12.43
		08-04-17	22.97	12.62	10.545	12.425
		09-04-17	22.97	12.62	10.54	12.43
		20-04-17	22.97	12.68	10.565	12.405
		04-05-17	22.97	12.54	10.56	12.41
		01-06-17	22.97	12.141	10.59	12.38
		27-06-17	22.97	12.24	10.6	12.37
		12-07-17	22.97	12.29	10.55	12.42
		26-07-17	22.97	12.23	10.515	12.455
		09-08-17	22.97	12.24	-	-
		24-08-17	22.97	12.32	10.34	12.63
		22-09-17	22.97	12.37	10.225	12.745
		04-10-17	22.97	12.57	10.19	12.78
		05-10-17	22.97	4.3	3.255	19.715
		26-10-17	22.97	12.2	10.15	12.82
		06-11-17	22.97	11.96	10.15	12.82

Table 1
Groundwater Gauging Results
Roe Highway Extension - WMMP
Main Roads Western Australia

		20-11-17	22.97	11.93	10.18	12.79
		05-12-17	22.97	11.3	10.21	12.76
		19-12-17	22.97	11.88	10.27	12.7
		27-12-17	22.97	11.6	10.29	12.68
		16-01-18	22.97	11.77	10.33	12.64
		02-11-16	18.19	8.9	1.632	16.558
		09-12-16	18.19	8.9	1.928	16.262
		12-01-17	18.19	8.88	2.108	16.082
		27-01-17	18.19	-	2.265	15.925
		07-02-17	18.19	8.86	2.285	15.905
		22-02-17	18.19	8.89	2.02	16.17
		09-03-17	18.19	8.85	2.124	16.066
		21-03-17	18.19	8.86	2.125	16.065
		05-04-17	18.19	8.88	2.19	16
		20-04-17	18.19	8.88	2.22	15.97
		04-05-17	18.19	8.865	2.27	15.92
		31-05-17	18.19	8.859	2.079	16.111
		28-06-17	18.19	8.851	2.01	16.18
Impact	GW-T3B	12-07-17	18.19	8.86	1.82	16.37
		26-07-17	18.19	8.85	1.72	16.47
		10-08-17	18.19	8.86	1.51	16.68
		24-08-17	18.19	8.85	1.295	16.895
		06-09-17	18.19	8.85	1.43	16.76
		27-09-17	18.19	3.23	1.42	16.77
		05-10-17	18.19	8.84	1.54	16.65
		19-10-17	18.19	8.85	1.59	16.6
		03-11-17	18.19	8.85	1.59	16.6
		17-11-17	18.19	8.85	1.68	16.51
		01-12-17	18.19	8.835	1.79	16.4
		20-12-17	18.19	8.85	1.83	16.36
		27-12-17	18.19	8.83	1.91	16.28
		10-01-18	18.19	8.87	1.97	16.22
		04-11-16	15.88	-	0.06	15.82
		09-12-16	15.88	5.17	0.21	15.67
		13-01-17	15.88	-	0.53	15.35
		27-01-17	15.88	-	0.678	15.202
		07-02-17	15.88	5.15	0.68	15.2
		22-02-17	15.88	5.17	0.36	15.52
		09-03-17	15.88	5.13	0.513	15.367
		21-03-17	15.88	5.15	0.555	15.325
		05-04-17	15.88	5.17	0.665	15.215
		20-04-17	15.88	5.17	0.695	15.185
		04-05-17	15.88	5.15	0.735	15.145
		31-05-17	15.88	5.142	0.471	15.409
		28-06-17	15.88	5.127	0.371	15.509
Impact	GW-T3C	12-07-17	15.88	5.14	0.18	15.7
		26-07-17	15.88	5.14	0.15	15.73
		10-08-17	15.88	5.13	0	15.88
		24-08-17	15.88	5.12	0	15.88
		06-09-17	15.88	5.13	0.05	15.83
		27-09-17	15.88	5.12	0	15.88
		05-10-17	15.88	5.08	0	15.88
		24-10-17	15.88	5.14	0.1	15.78
		03-11-17	15.88	5.135	0.1	15.78
		20-11-17	15.88	5.13	0.15	15.73
		01-12-17	15.88	5.135	0.27	15.61
		20-12-17	15.88	5.135	0.235	15.645
		27-12-17	15.88	5.14	0.41	15.47
		10-01-18	15.88	5.13	0.5	15.38
		02-11-16	16.72	3.62	2.75	13.97
		08-12-16	16.72	6.01	2.964	13.756
		12-01-17	16.72	6	3.185	13.535
		27-01-17	16.72	-	3.285	13.435
		06-02-17	16.72	5.97	3.34	13.38
		22-02-17	16.72	5.99	3.24	13.48
		08-03-17	16.72	5.99	3.355	13.365
		21-03-17	16.72	5.96	3.385	13.335
		05-04-17	16.72	5.98	3.44	13.28
		20-04-17	16.72	5.98	3.5	13.22
		03-05-17	16.72	3.55	3.5	13.22

Table 1
Groundwater Gauging Results
Roe Highway Extension - WMMP
Main Roads Western Australia

Impact	GW-T3E-A	31-05-17	16.72	6.01	3.47	13.25
		27-06-17	16.72	5.966	3.427	13.293
		12-07-17	16.72	5.98	3.17	13.55
		27-07-17	16.72	3.66	3.18	13.54
		10-08-17	16.72	5.98	2.89	13.83
		24-08-17	16.72	3.6	2.66	14.06
		06-09-17	16.72	3.72	2.68	14.04
		26-09-17	16.72	3.62	2.615	14.105
		05-10-17	16.72	3.6	2.62	14.1
		19-10-17	16.72	3.625	2.655	14.065
		03-11-17	16.72	3.61	2.72	14
		17-11-17	16.72	3.63	2.835	13.885
		01-12-17	16.72	3.65	2.91	13.81
		20-12-17	16.72	3.62	2.98	13.74
		27-12-17	16.72	3.62	3.03	13.69
		10-01-18	16.72	3.59	3.13	13.59
Reference	BH12	04-11-16	32.76	16.28	13.76	19
		09-12-16	32.76	16.195	13.965	18.795
		13-01-17	32.76	16.16	14.115	18.645
		06-02-17	32.76	-	-	-
		27-07-17	32.76	17.69	13.43	19.33
		09-08-17	32.76	17.52	13.3	19.46
		24-08-17	32.76	17.47	13.06	19.7
		06-09-17	32.76	17.43	13.08	19.68
		22-09-17	32.76	17.61	12.865	19.895
		26-10-17	32.76	17.59	12.875	19.885
		21-11-17	32.76	17.26	12.965	19.795
		05-12-17	32.76	17.2	13.03	19.73
		19-12-17	32.76	17.22	13.12	19.64
		28-12-17	32.76	17.17	13.19	19.57
		15-01-18	32.76	17.4	13.26	19.5
Reference	GW-T2F	02-11-16	17.61	9.5	2.255	15.355
		08-12-16	17.61	9.49	2.534	15.076
		12-01-17	17.61	9.45	2.958	14.652
		27-01-17	17.61	-	3.104	14.506
		06-02-17	17.61	3.52	3.12	14.49
		22-02-17	17.61	3.53	3.07	14.54
		08-03-17	17.61	3.53	3.185	14.425
		21-03-17	17.61	3.52	3.23	14.38
		05-04-17	17.61	3.72	3.3	14.31
		20-04-17	17.61	3.48	3.34	14.27
		03-05-17	17.61	3.83	3.36	14.25
		31-05-17	17.61	4.019	3.298	14.312
		27-06-17	17.61	4.162	3.261	14.349
		12-07-17	17.61	4.17	3.11	14.5
		27-07-17	17.61	4.16	2.925	14.685
		10-08-17	17.61	4.16	2.53	15.08
		24-08-17	17.61	4.165	2.285	15.325
		06-09-17	17.61	4.16	2.25	15.36
		26-09-17	17.61	4.16	2.185	15.425
		05-10-17	17.61	4.15	2.19	15.42
		19-10-17	17.61	4.16	2.2	15.41
		03-11-17	17.61	4.16	2.24	15.37
		17-11-17	17.61	4.16	2.34	15.27
		20-12-17	17.61	4.16	2.645	14.965
		27-12-17	17.61	4.16	2.74	14.87
		10-01-18	17.61	9.44	4.29	13.32
		04-11-16	17.54	2.19	0.84	16.7
		08-12-16	17.54	2.15	0.905	16.635
		13-01-17	17.54	-	1.154	16.386
		25-01-17	17.54	-	1.255	16.285
		07-02-17	17.54	2.16	1.288	16.252
		22-02-17	17.54	1.18	1.11	16.43
		08-03-17	17.54	2.175	1.194	16.346
		21-03-17	17.54	2.16	1.21	16.33
		05-04-17	17.54	2.18	1.3	16.24
		20-04-17	17.54	2.195	1.33	16.21
		03-05-17	17.54	2.17	1.37	16.17
		01-06-17	17.54	2.141	1.238	16.302
		27-06-17	17.54	2.135	1.138	16.402

Table 1
Groundwater Gauging Results
Roe Highway Extension - WMMP
Main Roads Western Australia

Reference	GW-T4B	12-07-17	17.54	2.14	0.97	16.57
		26-07-17	17.54	2.13	0.86	16.68
		10-08-17	17.54	2.14	0.685	16.855
		24-08-17	17.54	2.135	0.59	16.95
		07-09-17	17.54	2.19	0.56	16.98
		27-09-17	17.54	2.12	0.49	17.05
		05-10-17	17.54	2.12	0.56	16.98
		24-10-17	17.54	1.17	0.57	16.97
		03-11-17	17.54	2.115	0.64	16.9
		17-11-17	17.54	2.12	0.725	16.815
		04-12-17	17.54	2.12	0.92	16.62
		19-12-17	17.54	2.125	0.945	16.595
		27-12-17	17.54	2.09	0.985	16.555
		10-01-18	17.54	2.1	1.04	16.5
Reference	GW-T4C	02-11-16	20.62	10.93	5.382	15.238
		13-01-17	20.62	5	-	-
		25-01-17	20.62	-	5	15.62
		07-02-17	20.62	-	5	15.62
		22-02-17	20.62	10.86	5.826	14.794
		08-03-17	20.62	10.876	5.884	14.736
		21-03-17	20.62	10.84	5.895	14.725
		05-04-17	20.62	10.81	5.955	14.665
		20-04-17	20.62	10.87	6.02	14.6
		03-05-17	20.62	10.84	6.05	14.57
		01-06-17	20.62	10.84	5.981	14.639
		27-06-17	20.62	10.835	5.952	14.668
		12-07-17	20.62	10.83	5.83	14.79
		26-07-17	20.62	10.83	5.75	14.87
		10-08-17	20.62	10.835	5.63	14.99
		25-08-17	20.62	10.83	5.43	15.19
		07-09-17	20.62	10.53	5.365	15.255
		27-09-17	20.62	10.82	5.215	15.405
		05-10-17	20.62	10.82	5.31	15.31
		19-10-17	20.62	10.825	5.295	15.325
		03-11-17	20.62	10.83	5.33	15.29
		21-11-17	20.62	10.83	5.43	15.19
		04-12-17	20.62	10.85	5.51	15.11
		19-12-17	20.62	10.865	5.55	15.07
		11-01-18	20.62	10.9	6	14.62

Legend

m BTOC = metres
mAHD = metres above Australian Height Datum
Surface water locations were unable to be gauged
ND = No Data

Table 2a
Groundwater Field Parameters
Roe Highway Extension - WMMP
MRIA

		pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)
		pH Units	°C	µS/cm	mg/L	mg/L	mV	mV
BR8 Groundwater Baseline Trigger		5.2-5.9		274-1199	178-780			
BR8 Groundwater Guideline Trigger		7-8.5						
Location	**Sample Date**							
BH10	12-Jul-17	5.99	18.5	576	374.4	2.25	-192.3	7.7
	26-Jul-17	5.52	17.8	671	436.15	2.81	-148	52
	10-Aug-17	5.28	16.5	463	300.95	3.84	-157	43
	24-Aug-17	4.69	18.3	491	319.15	1.01	201	401
	07-Sep-17	4.91	18.4	243.5	158.275	0.15	160.8	360.8
	27-Sep-17	5.09	17.8	387.9	252.135	0.66	120.5	320.5
	04-Oct-17	5.52	21.1	237.6	154.44	8.47	211.6	411.6
	05-Oct-17	4.68	18.4	387	251.55	0.22	138.5	338.5
	19-Oct-17	4.7	19.3	351.5	228.475	0.19	117.3	317.3
	03-Nov-17	5.17	20.1	283.9	184.535	0.22	79	279
	20-Nov-17	5.73	22.9	270.4	175.76	0.46	-19.1	180.9
	01-Dec-17	6.16	22.7	238.8	155.22	0.14	-98.4	101.6
	20-Dec-17	6.13	20.8	213.8	138.97	0.19	-66.7	133.3
	27-Dec-17	6.02	21.3	242.2	157.43	0.17	-114.8	85.2
	10-Jan-18	5.99	22.7	284.1	184.665	0.09	-91.3	108.7
	24-Jan-18	5.86	23.2	351.8	228.67	0.6	93.5	293.5
	13-Feb-18	6.2	22.7	339.8	220.87	0.23	-94.4	105.6
	22-Feb-18	6.09	22.8	300.2	195.13	0.17	-80.9	119.1
	08-Mar-18	6.16	22.8	284.8	185.12	0.22	-71	129
	22-Mar-18	6.17	22.9	2657	1727.05	0.23	-88.6	111.4
	03-Apr-18	6.11	22.9	240.2	156.13	0.22	-56.7	143.3
	18-Apr-18	5.39	21.9	247.1	160.615	0.26	40.8	240.8
	17-May-18	5.09	21.8	234.2	152.23	0.96	57.6	257.6
	01-Jun-18	4.83	21.1	216.4	140.66	0.29	92.7	292.7
	14-Jun-18	5.53	20.3	245.9	159.835	3.28	61.6	261.6
	28-Jun-18	5.21	19.6	178.8	116.22	0.44	118.3	318.3
BH12	27-Jul-17	5.26	19.7	190.2	123.63	9.04	-79.6	120.4
	09-Aug-17	4.34	16.9	249.9	162.435	2.94	-120.9	79.1
	24-Aug-17	4.33	21	241.6	157.04	6.79	329	529
	06-Sep-17	4.47	20.7	254.7	165.555	6.01	311.6	511.6
	22-Sep-17	5.8	19.9	254.2	165.23	8.55	211.4	411.4
	26-Oct-17	5.45	18.9	254.9	165.685	8.59	211.1	411.1
	21-Nov-17	5.89	23.5	239.3	155.545	8.68	180.5	380.5
	05-Dec-17	5.87	22.5	287.7	187.005	8.17	180.6	380.6
	19-Dec-17	5.53	22.3	270.8	176.02	8.45	195.9	395.9
	28-Dec-17	5.34	27	264.7	172.055	10.3	168.8	368.8
	15-Jan-18	5.54	19.4	215.6	140.14	9.14	194.7	394.7
	29-Jan-18	5.36	22.3	255.7	166.205	8.84	190.1	390.1
	09-Feb-18	5.37	23.1	204.9	133.185	9.08	187.1	387.1
	22-Feb-18	5.32	24.1	243.8	158.47	9.22	203.3	403.3
	12-Mar-18	5.43	22.8	267.5	173.875	9	184.6	384.6
	23-Mar-18	5.45	23.5	272.2	176.93	8.87	141	341
	04-Apr-18	5.52	22.5	2680	1742	8.73	141.5	341.5
	19-Apr-18	7.27	22	621	403.65	5.57	37.8	237.8
	16-May-18	5.95	20.6	802	521.3	5.88	157.9	357.9
	01-Jun-18	5.76	18.5	793	515.45	6.86	114.2	314.2
	15-Jun-18	5.85	19.8	721	468.65	8.57	90.2	290.2
	28-Jun-18	5.52	16.8	765	497.25	7.16	141.5	341.5
GW-D3	12-Jul-17	5.54	20.8	314.1	204.165	1.98	-225.3	-25.3
	27-Jul-17	5.46	20.3	336.9	218.985	1.6	-236.9	-36.9
	10-Aug-17	5.74	19.4	333	216.45	1.96	-217	-17
	24-Aug-17	5.75	18.6	321.4	208.91	3.81	164.8	364.8
	07-Sep-17	5.8	19.4	311.9	202.735	3.33	144.5	344.5
	26-Sep-17	5.7	19.1	332.7	216.255	2.52	131.9	331.9
	05-Oct-17	5.66	19.7	330.2	214.63	2.61	107.2	307.2
	19-Oct-17	5.7	19.9	317.4	206.31	1.34	102.9	302.9
	03-Nov-17	5.61	19.9	329.2	213.98	0.56	93.2	293.2
	17-Nov-17	5.5	19.9	350.3	227.695	0.23	86	286
	01-Dec-17	5.65	21.2	355.3	230.945	1.35	84	284
	19-Dec-17	5.53	20.8	374.2	243.23	0.36	105.9	305.9
	27-Dec-17	5.3	20.6	386	250.9	0.23	57	257
	11-Jan-18	5.25	21.5	382.7	248.755	0.27	138.1	338.1
	25-Jan-18	5.56	22.1	351.8	228.67	0.29	115.8	315.8
	09-Feb-18	5.46	22.2	363.5	236.275	0.33	109.4	309.4

Table 2a
Groundwater Field Parameters
Roe Highway Extension - WMMP
MRIA

		pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)
		pH Units	°C	µS/cm	mg/L	mg/L	mV	mV
BR8 Groundwater Baseline Trigger		5.2-5.9		274-1199	178-780			
BR8 Groundwater Guideline Trigger		7-8.5						
Location	**Sample Date**							
	22-Feb-18	5.38	22.4	378.1	245.765	0.29	103.6	303.6
	08-Mar-18	5.49	21.9	376.4	244.66	0.27	84.6	284.6
	22-Mar-18	5.49	22.2	374.8	243.62	0.3	79.9	279.9
	03-Apr-18	5.61	22.8	344.7	224.055	0.35	72.6	272.6
	18-Apr-18	5.32	21.9	379.2	246.48	0.3	92.6	292.6
	16-May-18	5.18	22.3	374.4	243.36	0.3	63.2	263.2
	01-Jun-18	5.11	21.5	364.2	236.73	0.36	57.8	257.8
	15-Jun-18	5.12	20.7	373.1	242.515	0.35	20.7	220.7
	28-Jun-18	5.11	20.9	364.7	237.055	0.43	78.6	278.6
GW-D4	12-Jul-17	6.22	17.9	245.5	159.575	4.42	-172.4	27.6
	26-Jul-17	6.19	18.4	202.5	131.625	3.86	-165.1	34.9
	10-Aug-17	6.81	17.2	169	109.85	4.63	169	369
	25-Aug-17	6.04	17.6	216	140.4	6.04	172	372
	07-Sep-17	6.11	18.4	216	140.4	2.02	151.3	351.3
	27-Sep-17	6.17	18.3	258.7	168.155	2.64	143.6	343.6
	05-Oct-17	6.04	18.4	262.8	170.82	3.06	135.4	335.4
	24-Oct-17	6	19	221.7	144.105	1.81	142.1	342.1
	03-Nov-17	5.92	19.3	258.7	168.155	2.04	127.5	327.5
	17-Nov-17	5.99	19.6	256.2	166.53	2.45	134.5	334.5
	01-Dec-17	5.99	20	249.7	162.305	3.11	106.7	306.7
	19-Dec-17	6.02	21.1	188.3	122.395	0.82	132.4	332.4
	27-Dec-17	5.68	20.6	252.4	164.06	2.75	107	307
	10-Jan-18	5.68	21.2	259.1	168.415	2.96	137	337
	25-Jan-18	5.84	22.3	255.8	166.27	2.8	145.6	345.6
	09-Feb-18	5.83	21.8	219.5	142.675	2.91	149.3	349.3
	23-Feb-18	5.89	22	254.5	165.425	4.07	163.7	363.7
	09-Mar-18	5.96	22.8	251.5	163.475	4.06	118	318
	22-Mar-18	5.96	22.5	253.9	165.035	3.5	110.7	310.7
	03-Apr-18	5.92	22.8	238.5	155.025	3.31	101	301
	18-Apr-18	5.65	22.3	250.2	162.63	2.96	124.7	324.7
	16-May-18	5.61	21.7	233.6	151.84	5.78	104.5	304.5
	01-Jun-18	5.76	19.8	177.6	115.44	2.49	99.7	299.7
	14-Jun-18	5.69	19.7	267	173.55	2.28	76.9	276.9
	28-Jun-18	5.83	17.5	274.4	178.36	4.59	62.1	262.1
GW-D5	12-Jul-17	5.28	18.3	970	630.5	0.57	-299	-99
	27-Jul-17	5.26	18.5	1015	659.75	0.47	-299.1	-99.1
	10-Aug-17	5.13	17.5	634	412.1	1.04	-239.7	-39.7
	24-Aug-17	5.37	18.6	778	505.7	1.56	100.3	300.3
	06-Sep-17	5.43	18.7	971	631.15	0.11	11.8	211.8
	26-Sep-17	5.24	17.7	734	477.1	1.03	113.2	313.2
	05-Oct-17	5.47	17.6	898	583.7	0.13	27.8	227.8
	19-Oct-17	5.49	18	957	622.05	0.21	48.9	248.9
	03-Nov-17	5.32	18.3	1144	743.6	0.16	30.4	230.4
	17-Nov-17	5.44	19.4	1206	783.9	0.18	43.7	243.7
	04-Dec-17	5.45	19	1063	690.95	0.21	-15.7	184.3
	20-Dec-17	5.43	19.3	1165	757.25	0.17	-13.1	186.9
	27-Dec-17	5.09	19.2	1206	783.9	0.23	-9.6	190.4
	11-Jan-18	5.25	20.2	1163	755.95	0.19	26.8	226.8
	24-Jan-18	5.41	20.7	1066	692.9	0.22	18	218
	06-Feb-18	5.45	21.3	1090	708.5	0.22	-21.3	178.7
	22-Feb-18	5.3	21	1291	839.15	0.2	-3.9	196.1
	08-Mar-18	5.44	20.3	1273	827.45	0.23	-29.6	170.4
	23-Mar-18	5.49	19.9	1129	733.85	0.27	-26	174
	04-Apr-18	5.3	21.4	1406	913.9	0.27	-33.6	166.4
	18-Apr-18	5.25	20.9	1447	940.55	0.23	-53.5	146.5
	17-May-18	5.16	19.5	1018	661.7	0.33	-48.2	151.8
	01-Jun-18	4.92	19.5	998	648.7	0.42	-21.5	178.5
	14-Jun-18	4.76	19.2	972	631.8	0.33	8.6	208.6
	27-Jun-18	4.83	18.8	846	549.9	0.4	1.5	201.5
GW-D7	12-Jul-17	6.92	19.8	2132	1385.8	0.78	-274	-74
	26-Jul-17	6.83	19.4	1944	1263.6	0.55	-344.7	-144.7
	10-Aug-17	7.44	17.8	798	518.7	4.99	-168	32
	24-Aug-17	7.22	17.3	1197	778.05	3.71	-27.5	172.5
	07-Sep-17	7.13	18.7	1381	897.65	4.33	75.7	275.7

Table 2a
Groundwater Field Parameters
Roe Highway Extension - WMMP
MRIA

		pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)
		pH Units	°C	µS/cm	mg/L	mg/L	mV	mV
BR8 Groundwater Baseline Trigger		5.2-5.9		274-1199	178-780			
BR8 Groundwater Guideline Trigger		7-8.5						
Location	**Sample Date**							
	27-Sep-17	7.28	18.2	1456	946.4	6.23	90.5	290.5
	19-Oct-17	7.09	18.9	1601	1040.65	6.2	84.6	284.6
	06-Nov-17	7.06	19.3	1240	806	5.38	101	301
	20-Nov-17	7.04	20.1	1312	852.8	4.7	67.3	267.3
GW-D8	12-Jul-17	5.18	19.6	402.6	261.69	0.59	-289.1	-89.1
	26-Jul-17	5.12	19.2	395	256.75	0.75	-264	-64
	09-Aug-17	5.68	19.9	412	267.8	0.67	-328	-128
	24-Aug-17	5.29	19.7	577	375.05	1.81	35.5	235.5
	22-Sep-17	6.23	19.9	732	475.8	0.38	-99.2	100.8
	04-Oct-17	6.16	20	850	552.5	0.37	-67.7	132.3
	05-Oct-17	7.29	18.1	939	610.35	6.02	86	286
	26-Oct-17	6.09	19.9	1083	703.95	0.61	-57.8	142.2
	06-Nov-17	6.02	21.3	1204	782.6	0.48	-78.2	121.8
	20-Nov-17	6.28	21.1	1055	685.75	0.38	-79.1	120.9
	05-Dec-17	6.31	22.6	877	570.05	0.39	-109.1	90.9
	19-Dec-17	6.38	20.3	669	434.85	1.82	-116	84
	27-Dec-17	6.29	22	576	374.4	2.17	-113.9	86.1
	16-Jan-18	6.78	20.8	434.2	282.23	3.14	-108.6	91.4
	29-Jan-18	7.34	21.6	472.6	307.19	8.82	-77.9	122.1
	12-Feb-18	6.38	21.1	533	346.45	0.42	-95.6	104.4
	23-Feb-18	6.32	21.2	475	308.75	0.49	-97.5	102.5
	12-Mar-18	6.44	21.9	385.6	250.64	0.41	-118.8	81.2
	23-Mar-18	6.55	21.3	342.3	222.495	0.4	-128.4	71.6
	04-Apr-18	6.27	23.6	320.7	208.455	0.62	-107.7	92.3
	19-Apr-18	6.23	20.7	325.5	211.575	1.91	-100	100
	16-May-18	5.95	20.6	334.1	217.165	0.57	-108.5	91.5
	01-Jun-18	6.05	20.5	320.4	208.26	1.39	-111.3	88.7
	15-Jun-18	6.12	18.5	322.7	209.755	2.55	-93.5	106.5
	28-Jun-18	6.23	19.8	289.4	188.11	2.45	-73.6	126.4
GW-T2F	12-Jul-17	5.9	19.2	891	579.15	0.53	-322.7	-122.7
	27-Jul-17	5.83	19.1	920	598	0.54	-332.1	-132.1
	10-Aug-17	5.87	18.5	966	627.9	0.66	-304	-104
	24-Aug-17	5.9	18.4	975	633.75	0.44	9.4	209.4
	06-Sep-17	5.87	19.4	923	599.95	0.14	-54.3	145.7
	26-Sep-17	6.01	18	808	525.2	0.12	53	253
	05-Oct-17	5.97	18	791	514.15	0.11	-26.8	173.2
	19-Oct-17	5.94	18	885	575.25	0.25	-33.5	166.5
	03-Nov-17	5.82	18.2	856	556.4	0.16	-20.1	179.9
	17-Nov-17	5.98	18.6	887	576.55	0.24	-50.1	149.9
	01-Dec-17	5.92	18.7	1000	650	0.21	-44.2	155.8
	20-Dec-17	5.94	18.6	1023	664.95	0.2	-77.8	122.2
	27-Dec-17	5.69	18.5	985	640.25	0.4	-58	142
	10-Jan-18	5.25	20.5	1217	791.05	0.23	-20.3	179.7
	24-Jan-18	5.83	19.1	873	567.45	0.27	-44.6	155.4
	06-Feb-18	5.8	19.6	951	618.15	0.23	-82.2	117.8
	22-Feb-18	5.81	19.5	948	616.2	0.28	-64.8	135.2
	08-Mar-18	5.91	19.6	879	571.35	0.25	-78.9	121.1
	23-Mar-18	5.96	19.1	839	545.35	0.33	-70.2	129.8
	04-Apr-18	5.3	19.8	1451	943.15	0.29	-35.6	164.4
	18-Apr-18	5.74	19.6	816	530.4	0.33	-91.8	108.2
GW-T3B	12-Jul-17	5.94	20.3	138.1	89.765	0.56	-333.7	-133.7
	26-Jul-17	5.9	19.8	137	89.05	0.62	-333	-133
	10-Aug-17	6.11	19	159	103.35	0.6	159	359
	24-Aug-17	5.81	20	181	117.65	0.68	74.3	274.3
	06-Sep-17	5.79	20.3	195.6	127.14	0.15	24.6	224.6
	27-Sep-17	5.94	19.6	184	119.6	0.18	70.1	270.1
	05-Oct-17	5.85	19.8	180.8	117.52	0.17	44.6	244.6
	19-Oct-17	5.92	19.7	180.2	117.13	0.19	39.8	239.8
	03-Nov-17	5.82	20.2	164.4	106.86	0.16	49.3	249.3
	17-Nov-17	5.94	20.1	156.7	101.855	0.23	11.9	211.9
	01-Dec-17	5.84	20	143.6	93.34	0.22	-15	185
	20-Dec-17	5.99	19.9	146.8	95.42	0.21	-52.7	147.3
	27-Dec-17	5.7	20	149.9	97.435	0.23	-47.2	152.8
	10-Jan-18	5.72	20.2	163.2	106.08	0.13	-33.7	166.3

Table 2a
Groundwater Field Parameters
Roe Highway Extension - WMMP
MRIA

		pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)
		pH Units	°C	µS/cm	mg/L	mg/L	mV	mV
BR8 Groundwater Baseline Trigger		5.2-5.9		274-1199	178-780			
BR8 Groundwater Guideline Trigger		7-8.5						
Location	**Sample Date**							
	24-Jan-18	5.76	21.1	183.2	119.08	0.24	-20.8	179.2
	13-Feb-18	5.77	20.2	215.1	139.815	0.25	-25.6	174.4
	22-Feb-18	5.73	20.5	231.8	150.67	0.23	-17	183
	08-Mar-18	5.73	20.7	245.6	159.64	0.25	-2.2	197.8
	22-Mar-18	5.75	20.6	243.9	158.535	0.27	-32.6	167.4
	03-Apr-18	5.8	20.6	211.1	137.215	0.32	-19.4	180.6
	18-Apr-18	5.53	20.7	220.2	143.13	0.39	-36.7	163.3
	17-May-18	5.53	20.6	214	139.1	0.27	-74.1	125.9
	01-Jun-18	5.38	20.5	196.3	127.595	0.4	-49.4	150.6
	14-Jun-18	5.36	20.4	166.6	108.29	0.37	-46.6	153.4
	27-Jun-18	5.51	20.2	143.8	93.47	0.3	-38.4	161.6
GW-T3C	12-Jul-17	5.33	17.9	384.4	249.86	0.87	-276	-76
	26-Jul-17	5.25	17.1	358.9	233.285	0.58	-308.5	-108.5
	10-Aug-17	5.31	16.6	444	288.6	0.91	-258	-58
	24-Aug-17	5.36	17.4	367	238.55	0.64	63.3	263.3
	06-Sep-17	5.3	17.1	373.5	242.775	0.1	18.1	218.1
	27-Sep-17	5.35	17.2	376.7	244.855	0.25	109.1	309.1
	05-Oct-17	5.3	17.2	380	247	0.16	79.7	279.7
	24-Oct-17	5.97	20.3	4711	3062.15	0.25	-5.8	194.2
	03-Nov-17	5.25	18.6	433	281.45	0.13	72	272
	20-Nov-17	5.4	18	353.3	229.645	0.2	81.2	281.2
	01-Dec-17	5.42	20.5	365.2	237.38	0.26	-9.6	190.4
	20-Dec-17	5.42	17.9	354.4	230.36	0.19	-12	188
	27-Dec-17	5.14	17.8	354.3	230.295	0.27	-27	173
	10-Jan-18	5.16	19	361.7	235.105	0.13	16.4	216.4
	25-Jan-18	5.26	19.1	394.1	256.165	0.23	31.9	231.9
	13-Feb-18	5.27	18.9	437.3	284.245	0.4	-2.7	197.3
	22-Feb-18	5.22	18.9	386.9	251.485	0.2	28.9	228.9
	08-Mar-18	5.17	19.3	612	397.8	0.2	15.5	215.5
	22-Mar-18	5.29	19.1	450.1	292.565	0.23	-8.7	191.3
	03-Apr-18	5.26	19.9	530	344.5	0.26	-7	193
	18-Apr-18	5.06	19.4	519	337.35	0.26	-12	188
	17-May-18	5.03	18.6	371.5	241.475	0.27	-30.6	169.4
	01-Jun-18	4.81	18.6	347.7	226.005	0.34	5.2	205.2
	14-Jun-18	4.83	18.3	351.7	228.605	0.41	9.9	209.9
GW-T3E-A	12-Jul-17	5.29	19.4	886	575.9	0.76	-291	-91
	27-Jul-17	5.23	19.4	731	475.15	0.56	-305.2	-105.2
	10-Aug-17	5.28	19	737	479.05	0.5	-295	-95
	24-Aug-17	5.08	19.1	820	533	0.51	47	247
	06-Sep-17	4.73	19.4	1093	710.45	0.1	-21.2	178.8
	26-Sep-17	5.25	18.7	830	539.5	0.18	73.4	273.4
	05-Oct-17	4.96	18.7	1029	668.85	0.12	30.1	230.1
	19-Oct-17	5.21	18.9	839	545.35	0.29	2.8	202.8
	03-Nov-17	5.11	19.1	811	527.15	0.18	11.6	211.6
	17-Nov-17	5.26	19.5	856	556.4	0.19	-4.1	195.9
	01-Dec-17	5.26	19.5	875	568.75	0.23	-28.2	171.8
	20-Dec-17	5.37	19.9	790	513.5	0.26	-63.9	136.1
	27-Dec-17	5.13	19.8	761	494.65	0.24	-49.4	150.6
	10-Jan-18	4.94	20.4	1026	666.9	0.22	-295	-95
	24-Jan-18	5.04	20.4	846	549.9	0.25	-6.6	193.4
	06-Feb-18	4.85	20.7	950	617.5	0.24	-33.3	166.7
	22-Feb-18	5.16	20.6	827	537.55	0.28	-28.8	171.2
	08-Mar-18	5.14	20.2	855	555.75	0.22	-39.1	160.9
	23-Mar-18	5.22	20.3	804	522.6	0.31	-46.6	153.4
	04-Apr-18	5.26	20.2	726	471.9	0.32	-56.2	143.8
	18-Apr-18	5.06	20.8	786	510.9	0.27	-47.6	152.4
	16-May-18	4.93	20.6	728	473.2	0.58	-41.6	158.4
	01-Jun-18	4.65	20.1	743	482.95	0.25	-58.7	141.3
	14-Jun-18	4.8	20.1	735	477.75	0.7	-57	143
	27-Jun-18	4.79	19.7	694	451.1	0.3	-54.5	145.5
GW-T4B	12-Jul-17	5.29	19	462.4	300.56	0.53	-299.8	-99.8
	26-Jul-17	5.21	18.8	435.4	283.01	0.56	-337.5	-137.5
	10-Aug-17	5.41	17	619	402.35	0.51	-327	-127
	24-Aug-17	5.26	18.7	517	336.05	0.91	-46.5	153.5

Table 2a
Groundwater Field Parameters
Roe Highway Extension - WMMP
MRIA

		pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)
		pH Units	°C	µS/cm	mg/L	mg/L	mV	mV
BR8 Groundwater Baseline Trigger		5.2-5.9		274-1199	178-780			
BR8 Groundwater Guideline Trigger		7-8.5						
Location	**Sample Date**							
	07-Sep-17	5.24	18	446.3	290.095	0.16	-60.5	139.5
	27-Sep-17	5.31	17.8	440.7	286.455	0.12	-28.6	171.4
	05-Oct-17	5.27	17.7	441.1	286.715	0.16	-50.6	149.4
	24-Oct-17	5.45	18.4	3949	2566.85	0.27	-64.7	135.3
	03-Nov-17	5.23	18.8	449.1	291.915	0.23	-51.8	148.2
	17-Nov-17	5.4	19.2	453.7	294.905	0.22	-43.7	156.3
	04-Dec-17	5.44	19.6	441.3	286.845	0.21	-94.7	105.3
	19-Dec-17	5.44	19.8	427.4	277.81	0.18	-91	109
	27-Dec-17	5.23	20	422.6	274.69	0.22	-82.1	117.9
	10-Jan-18	5.25	20.3	415.1	269.815	0.1	-61.9	138.1
	25-Jan-18	5.29	21.2	413.6	268.84	0.24	-50.4	149.6
	13-Feb-18	5.35	20.9	411.3	267.345	0.23	-58.6	141.4
	22-Feb-18	5.34	21.3	402.8	261.82	0.23	-52.7	147.3
	08-Mar-18	5.35	21	395.8	257.27	0.2	-48.2	151.8
	22-Mar-18	5.37	21.3	389.2	252.98	0.29	-53.9	146.1
	03-Apr-18	5.34	21.5	363.9	236.535	0.23	-73	127
	18-Apr-18	5.21	20.8	393.3	255.645	0.28	-52	148
	16-May-18	5.05	21.2	383.8	249.47	0.27	-54.3	145.7
	31-May-18	4.89	20.2	373.5	242.775	0.28	-90.9	109.1
	14-Jun-18	4.91	19.9	380.7	247.455	0.34	-79.2	120.8
	27-Jun-18	4.91	19.2	377.7	245.505	0.31	-49.3	150.7
GW-T4C	12-Jul-17	5.92	19.9	490.6	318.89	0.56	-331.2	-131.2
	26-Jul-17	5.87	19.8	479	311.35	0.52	-332	-132
	10-Aug-17	5.98	19.4	479	311.35	0.97	-343	-143
	25-Aug-17	5.97	18.9	504	327.6	1.11	285	485
	07-Sep-17	5.9	19.9	506	328.9	0.37	-9.4	190.6
	27-Sep-17	5.93	19.6	509	330.85	0.23	30.5	230.5
	05-Oct-17	5.9	20	511	332.15	0.13	1.7	201.7
	19-Oct-17	6	20	514	334.1	0.16	-11.3	188.7
	03-Nov-17	5.84	20.3	505	328.25	0.26	6.9	206.9
	21-Nov-17	6.07	20	516	335.4	0.32	-3.8	196.2
	04-Dec-17	6.01	20.6	511	332.15	0.17	-36.3	163.7
	19-Dec-17	6.02	20.2	513	333.45	0.23	-52.2	147.8
	11-Jan-18	5.79	21.2	513	333.45	0.27	-11.9	188.1
	29-Jan-18	5.91	20.7	510	331.5	0.32	-37	163
	13-Feb-18	5.89	21.1	515	334.75	0.22	-34	166
	22-Feb-18	5.91	22.4	517	336.05	0.45	-57.5	142.5
	08-Mar-18	5.93	21	517	336.05	0.25	-49	151
	22-Mar-18	5.94	20.8	516	335.4	0.23	-49.3	150.7
	03-Apr-18	5.94	21.5	481.1	312.715	0.95	-47	153
	18-Apr-18	5.74	20.4	575	373.75	0.3	-71.7	128.3
	16-May-18	5.67	20.4	493.7	320.905	0.32	-70.4	129.6
	31-May-18	5.53	20.1	478.1	310.765	0.39	-100.6	99.4
	14-Jun-18	5.55	20.3	473.7	307.905	0.35	-74.8	125.2
	27-Jun-18	5.56	20.1	440.4	286.26	0.3	-57	143

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					Location	BH10										GW-D3								
					Sample Date	26-Jul-17	24-Aug-17	27-Sep-17	19-Oct-17	20-Nov-17	20-Dec-17	10-Jan-18	13-Feb-18	09-Mar-18	03-Apr-18	01-Jun-18	26-Jul-17	24-Aug-17	26-Sep-17	19-Oct-17	17-Nov-17	19-Dec-17	11-Jan-18	09-Feb-18	08-Mar-18
					Field ID	BH10_260717	BH10_240817	BH10_270917	BH10_191017	BH10	BH10	BH10	BH10	BH10	BH10	BH10_01_06_18	GW-D3_260717	GW-D3_240817	GW-D3_260917	GW-D3_191017	GW-D3	GW-D3	GW03	GW-D3	GW-D3
					Lab Report No.	EP1707992	EP1709182	EP1710701	EP1711669	EP1713111	EP1714429	EM1801303	EP1802359	EP1803361	EP1804292	EP1806776	EP1707992	EP1709182	EP1710595	EP1711669	EP1712990	EP1714429	EM1801446	EP1802224	EP1803299
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																					
Total Petroleum Hydrocarbons																									
C6-C9 fraction	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100				<100	<100	<100	<100	<100	<100	**110**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50				<50	<50	<50	<50	<50	<50	**110**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																									
C6-C10 fraction	µg/L	20	**20**			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	**160**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100				<100	<100	<100	<100	<100	<100	**160**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEXN																									
Benzene	µg/L	1	**1**	**950**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																									
Aluminium	ug/L	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**			**1400**	**1280**	**950**	**1150**	**900**	**430**	**150**	**240**	**280**	**20**	**190**	**20**	**20**	**20**	**80**	**40**	**20**	**30**	**20**	**20**
Arsenic (Filtered)	ug/L	1	**2**	**13**		**2**	**1**	**2**	**2**	**3**	**5**	**2**	**3**	**3**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	ug/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**		**1**	**1**	**1**	**2**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1
Copper (Filtered)	ug/L	1	**4**	**1.4**		**5**	**2**	**2**	<1	<1	<1	<1	<1	<1	<1	<1	**5**	**4**	**10**	<1	<1	<1	**1**	<1	<1
Iron	ug/L	50				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**			**1250**	**1620**	**2550**	**3700**	**3540**	**3620**	**1500**	**3420**	**2990**	**3070**	**1080**	**640**	**270**	**340**	**490**	**410**	**300**	**240**	**510**	**580**
Lead (Filtered)	ug/L	1	**1**	**3.4**		**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**		**9**	**7**	**6**	**6**	**6**	**14**	**8**	**11**	**11**	**6**	**8**	**6**	**4**	**5**	**4**	**5**	**6**	**6**	**6**	**6**
Nickel	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**		**3**	**1**	**2**	**2**	**2**	<1	<1	<1	<1	<1	<1	**1**	**1**	**3**	<1	<1	<1	**1**	<1	<1
Selenium	ug/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**		<10	<10	**0.6**	**1**	**0.7**	<2	<2	<2	<2	<2	<10	<10	<10	**0.5**	**1.1**	**0.5**	<2	**0.3**	<2	<2
Zinc	ug/L	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**		**25**	<5	**8**	<5	<5	<5	<5	<5	<5	<5	<5	**26**	**27**	**9**	<5	<5	<5	<5	<5	<5
Nutrients																									
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**		**0.22**	**0.09**	**0.24**	**0.28**	**0.38**	**0.18**	**0.2**	**0.16**	**0.12**	**0.09**	**0.03**	**0.08**	**0.07**	**0.03**	**0.03**	**0.04**	**0.04**	**0.05**	**0.04**	**0.03**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**		**1.48**	**0.86**	**0.06**	**0.03**	<0.01	**0.02**	<0.01	**0.01**	<0.01	**0.03**	**0.08**	**0.41**	**1.36**	**0.72**	**0.79**	**0.1**	**0.1**	**0.09**	**0.37**	**0.22**
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**			**3.9**	**3.2**	**3.3**	**3.3**	**2.8**	**0.6**	**0.8**	**1**	**1**	**0.4**	<0.1	**0.3**	**0.4**	**0.2**	**0.2**	<0.1	**0.3**	**0.2**	**0.2**	<0.1
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		**1.48**	**0.86**	**0.06**	**0.03**	<0.01	**0.02**	<0.01	**0.01**	<0.01	**0.03**	**0.08**	**0.41**	**1.36**	**0.72**	**0.79**	**0.1**	**0.1**	**0.1**	**0.37**	**0.22**
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**		**5.4**	**4.1**	**3.4**	**3.3**	**2.8**	**0.6**	**0.8**	**1**	**1**	**0.4**	<0.1	**0.7**	**1.8**	**0.9**	**1**	**0.1**	**0.4**	**0.3**	**0.6**	**0.2**
Reactive Phosphorus (as P)	mg/L	0.01				**0.02**	**0.1**	**0.19**	**0.15**	**0.06**	**0.02**	<0.01	**0.02**	**0.01**	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**		**0.26**	**0.14**	**0.19**	**0.16**	**0.12**	**0.1**	**1.45**	**0.04**	**0.05**	**0.04**	**0.03**	<0.01	**0.08**	**0.02**	**0.02**	**0.02**	**0.05**	**0.07**	<0.01	**1.11**

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					Location			GW-D4													
					Sample Date	03-Apr-18	01-Jun-18	28-Jun-18	26-Jul-17	25-Aug-17	27-Sep-17	24-Oct-17	17-Nov-17	19-Dec-17	10-Jan-18	09-Feb-18	12-Mar-18	03-Apr-18	01-Jun-18	27-Jul-17	24-Aug-17	26-Sep-17	19-Oct-17
					Field ID	GW-D3	GW-D3_01_06_18	GW-D3_28_06_18	GW-D4_260717	GW-D4_250817	GW-D4_270917	GW-D4_241017	GW-D4	GW-D4	GW-D4	GW-D4	GW-D4	GW-D4	GW-D4_01_06_18	GW-D5_270717	GW-D5_240817	GW-D5_260917	GW-D5_191017
					Lab Report No.	EP1804292	EP1806776	EP1807774	EP1707992	EP1709224	EP1710701	EP1711878	EP1712990	EP1714429	EM1801303	EP1802224	EP1803480	EP1804292	EP1806776	EP1708050	EP1709182	EP1710595	EP1711669
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																		
Total Petroleum Hydrocarbons																						
C6-C9 fraction	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																						
C6-C10 fraction	µg/L	20	**20**		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEXN																						
Benzene	µg/L	1	**1**	**950**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																						
Aluminium	ug/L	10			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**		**20**	**20**	**20**	**230**	**50**	**40**	**330**	**390**	**370**	**330**	**660**	**380**	**3550**	**400**	**820**	**560**	**680**	**690**
Arsenic (Filtered)	ug/L	1	**2**	**13**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**2**	**1**	**1**	**1**
Cadmium	ug/L	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	**4**	<1	**3**	**2**	**2**	**3**
Copper (Filtered)	ug/L	1	**4**	**1.4**	<1	<1	<1	**10**	**8**	**29**	<1	<1	<1	<1	<1	<1	<1	<1	**3**	**8**	<1	<1
Iron	ug/L	50			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**		**440**	**800**	**590**	**90**	<50	<50	**120**	**100**	**110**	**110**	**150**	**100**	**670**	**100**	**2070**	**1180**	**1390**	**360**
Lead (Filtered)	ug/L	1	**1**	**3.4**	<1	<1	<1	**2**	**1**	**2**	Jul	<1	<1	<1	<1	<1	<1	<1	**2**	**2**	<1	<1
Manganese	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**	**4**	**8**	**9**	<1	**1**	**2**	**1**	**2**	**2**	**2**	<1	**1**	<1	<1	**3**	**3**	**3**	<1
Nickel	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**	<1	<1	<1	**2**	**1**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	**2**	**2**	**2**	<1
Selenium	ug/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**	<2	<10	<2	<10	<10	**1.2**	**1.6**	**1.8**	<2	<2	<2	<2	<2	<10	<10	<10	<0.2	**0.3**
Zinc	ug/L	5			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**	<5	<5	**8**	**33**	**32**	**32**	<5	<5	<5	<5	<5	**30**	<5	<5	**31**	**42**	**6**	<5
Nutrients																						
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**	**0.04**	**0.05**	**0.07**	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**	**0.02**	**0.03**	**0.03**	**0.02**	**0.02**	**0.02**	**0.11**	**0.14**	**0.07**	**0.05**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**	**0.3**	**0.35**	**0.26**	**0.74**	**2.22**	**3.14**	**2.81**	**3.57**	**1.31**	**4.11**	**2.16**	**4.19**	**4.44**	**0.67**	<0.01	<0.01	<0.01	**0.01**
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	**0.02**	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**		**0.1**	**0.2**	**0.3**	**1.3**	**0.9**	**0.7**	**0.9**	**0.6**	**0.7**	**0.8**	**0.5**	**0.3**	**0.8**	**0.6**	**0.9**	**0.7**	**1**	**0.4**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	**0.3**	**0.35**	**0.26**	**0.74**	**2.22**	**3.14**	**2.82**	**3.59**	**1.31**	**4.11**	**2.16**	**4.2**	**4.44**	**0.67**	<0.01	<0.01	<0.01	**0.01**
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**	**0.4**	**0.6**	**0.6**	**2**	**3.1**	**3.8**	**3.7**	**4.2**	**2**	**4.9**	**2.7**	**4.5**	**5.2**	**1.3**	**0.9**	**0.7**	**1**	**0.4**
Reactive Phosphorus (as P)	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**	<0.01	**0.01**	**0.02**	**0.03**	**0.08**	**0.04**	**0.06**	<0.01	**0.06**	**0.06**	**0.01**	**0.02**	**0.08**	**0.02**	**0.03**	**0.04**	**0.04**	<0.01

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					GW-D5								GW-D7								Impact Bore
				Location																	
				Sample Date	17-Nov-17	20-Dec-17	11-Jan-18	06-Feb-18	08-Mar-18	04-Apr-18	01-Jun-18	27-Jun-18	26-Jul-17	24-Aug-17	24-Aug-17	27-Sep-17	27-Sep-17	19-Oct-17	19-Oct-17	20-Nov-17	20-Nov-17	26-Jul-17
				Field ID	GW-D5	GW-D5	GW05	GW-D5	GW-D5	GW-D5	GW-D5_01_06_18	GW-D5_27_06_18	GW-D7_260717	GW-D7_240817	WQA01_240817	GW-D7_270917	WQA01_260917	GW-D7_191017	WQA01_191017	GW-D7	WQA01_201117	GW-D8_260717
				Lab Report No.	EP1712990	EP1714429	EM1801446	EP1802093	EP1803299	EP1804348	EP1806776	EP1807736	EP1707992	EP1709182	EP1709182	EP1710701	EP1710701	EP1711669	EP1711669	EP1713111	EP1713111	EP1707992
				Sample_Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Normal	Field_D	Normal	Field_D	Normal	Field_D	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																		
Total Petroleum Hydrocarbons																						
C6-C9 fraction	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			**70**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50			**70**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																						
C6-C10 fraction	µg/L	20	**20**		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEXN																						
Benzene	µg/L	1	**1**	**950**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																						
Aluminium	ug/L	10			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**		**410**	**460**	**370**	**300**	**510**	**850**	**440**	**540**	**10**	**10**	<10	**10**	**10**	**30**	**20**	**40**	**40**	**190**
Arsenic (Filtered)	ug/L	1	**2**	**13**	<1	**1**	**1**	<1	<1	**2**	**1**	<1	**7**	**5**	**5**	**1**	**1**	**2**	**2**	**2**	**2**	<1
Cadmium	ug/L	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**	**1**	**1**	**2**	**1**	**2**	**3**	**2**	<1	**2**	<1	<1	**1**	**1**	<1	**1**	**1**	**1**	**1**
Copper (Filtered)	ug/L	1	**4**	**1.4**	<1	<1	**2**	<1	<1	<1	<1	<1	**8**	**4**	**2**	**9**	**3**	**3**	**3**	**2**	**2**	<1
Iron	ug/L	50			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**		**730**	**2100**	**3440**	**6380**	**3970**	**980**	**950**	**140**	**5780**	**1570**	**1480**	<50	<50	**60**	**60**	**70**	**60**	**390**
Lead (Filtered)	ug/L	1	**1**	**3.4**	<1	<1	<1	<1	<1	<1	<1	<1	**2**	<1	<1	**2**	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**	<1	**2**	**5**	**7**	**3**	<1	**1**	<1	**98**	**34**	**33**	**4**	**4**	**2**	**2**	**6**	**6**	**9**
Nickel	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**	<1	<1	<1	<1	<1	<1	<1	<1	**4**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**96**
Selenium	ug/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**	<0.2	<2	**0.2**	<2	<2	<2	<10	<2	<10	<10	<10	<0.2	<0.2	**0.5**	**0.6**	**0.5**	**0.5**	<10
Zinc	ug/L	5			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**	<5	<5	**8**	<5	<5	**5**	<5	<5	**35**	**20**	<5	**31**	<5	<5	<5	<5	<5	**566**
Nutrients																						
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**	**0.09**	**0.11**	**0.07**	**0.12**	**0.09**	**0.05**	**0.08**	**0.1**	**0.38**	**0.14**	**0.15**	**0.01**	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**	**0.26**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	**0.03**	**0.01**	**0.01**	<0.01	<0.01	**0.02**	<0.01	**1.3**	**4.61**	**4.69**	**17.8**	**17.5**	**19**	**18.7**	**21.3**	**15.8**	<0.01
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	**0.05**	**0.06**	**0.02**	**0.02**	**0.01**	**0.01**	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**		**0.4**	**0.4**	**0.7**	**0.6**	**0.5**	**0.6**	**0.5**	**0.5**	**2.6**	**1.7**	**1.8**	**3.5**	**3.1**	**5**	**5.6**	**4.8**	**4.8**	**0.8**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	**0.03**	**0.01**	**0.01**	<0.01	<0.01	**0.02**	<0.01	**1.32**	**4.66**	**4.75**	**17.8**	**17.5**	**19**	**18.7**	**21.3**	**15.8**	<0.01
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**	**0.4**	**0.4**	**0.7**	**0.6**	**0.5**	**0.6**	**0.5**	**0.5**	**3.9**	**6.4**	**6.6**	**21.3**	**20.6**	**24**	**24.3**	**26.1**	**20.6**	**0.8**
Reactive Phosphorus (as P)	mg/L	0.01			<0.01	<0.01	**0.01**	<0.01	**0.01**	<0.01	<0.01	**0.01**	**0.28**	**0.26**	**0.27**	**0.19**	**0.19**	**0.21**	**0.21**	**0.2**	**0.28**	**0.08**
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**	**0.04**	<0.01	**0.11**	**0.02**	**0.01**	**0.2**	<0.01	**0.03**	**0.64**	**0.28**	**0.3**	**0.19**	**0.2**	**0.21**	**0.21**	**0.84**	**0.86**	**0.08**

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					Location	GW-D8										GW-T3B								
					Sample Date	26-Jul-17	24-Aug-17	22-Sep-17	26-Oct-17	20-Nov-17	20-Dec-17	16-Jan-18	12-Feb-18	13-Mar-18	04-Apr-18	01-Jun-18	26-Jul-17	24-Aug-17	27-Sep-17	19-Oct-17	17-Nov-17	20-Dec-17	10-Jan-18	13-Feb-18	09-Mar-18
					Field ID	WQA01_260717	GW-D8_240817	GW-D8_220917	GW-D8	GW-D8	GW-D8	GW-D8	GW-D8	GW-D8	GW-D8	GW-D8_01_06_18	T3B_260717	T3B_240817	GW-T3B_270917	GW-T3B_191017	T3B	T3B	T3B	T3B	T3B
					Lab Report No.	EP1707992	EP1709182	EP1710522	EP1712054	EP1713111	EP1714429	EP1801308	EP1802359	EP1803480	EP1804348	EP1806776	EP1707992	EP1709182	EP1710701	EP1711669	EP1712990	EP1714429	EM1801303	EP1802359	EP1803361
					Sample_Type	Field_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																				
Total Petroleum Hydrocarbons																								
C6-C9 fraction	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																								
C6-C10 fraction	µg/L	20	**20**			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEXN																								
Benzene	µg/L	1	**1**	**950**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																								
Aluminium	ug/L	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**			**170**	**140**	**80**	**120**	**350**	**250**	**280**	**160**	**160**	**310**	**160**	**40**	**20**	**20**	**370**	**1120**	**370**	**160**	**40**	**20**
Arsenic (Filtered)	ug/L	1	**2**	**13**		<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	ug/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**		<1	**2**	<1	<1	**1**	**1**	**2**	<1	<1	**1**	<1	**1**	<1	<1	<1	**2**	<1	<1	<1	<1
Copper (Filtered)	ug/L	1	**4**	**1.4**		<1	<1	<1	<1	**2**	<1	<1	<1	<1	<1	<1	4	6	<1	<1	<1	<1	<1	<1	<1
Iron	ug/L	50				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**			**380**	**2820**	**1250**	**710**	**790**	**260**	**190**	**180**	**320**	**230**	**70**	**390**	**610**	**590**	**540**	**450**	**440**	**150**	**700**	**760**
Lead (Filtered)	ug/L	1	**1**	**3.4**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	**1**	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**		**9**	**9**	**8**	**18**	**10**	**4**	**3**	**4**	**3**	**3**	**2**	**4**	**4**	**3**	**3**	**3**	**3**	**3**	**4**	**4**
Nickel	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**		**94**	**24**	**5**	**3**	**2**	**5**	**2**	**8**	**7**	<1	**1**	**2**	**1**	<1	<1	<1	<1	<1	<1	<1
Selenium	ug/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**		<10	<10	**0.3**	**0.3**	**0.9**	<2	**0.7**	<2	<2	<2	<10	<10	<10	<0.2	<0.2	**0.2**	<2	<2	<2	<2
Zinc	ug/L	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**		**553**	**343**	<5	**7**	<5	<5	<5	<5	**6**	<5	<5	**29**	**29**	<5	<5	<5	<5	<5	<5	<5
Nutrients																								
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**		**0.25**	**0.18**	**0.18**	**0.28**	**0.28**	**0.14**	**0.16**	**0.14**	**0.1**	**0.1**	**0.11**	**0.05**	**0.05**	**0.05**	**0.09**	**0.09**	**0.11**	**0.08**	**0.04**	**0.03**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	**0.06**	**0.28**	**1.15**	**0.51**	**0.82**	**0.31**	**0.57**	**0.05**	**0.01**	<0.01	<0.01	**0.02**	**0.01**	**0.01**	<0.01	**0.02**	**0.01**	<0.01	<0.01
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**			**0.8**	**0.7**	**0.7**	**6.4**	**1.5**	**1.6**	**1**	**0.8**	**1**	**1.2**	**0.7**	**0.3**	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	**0.2**	**0.4**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	**0.06**	**0.28**	**1.15**	**0.51**	**0.82**	**0.32**	**0.57**	**0.05**	**0.01**	<0.01	<0.01	**0.02**	**0.01**	**0.01**	<0.01	**0.02**	**0.01**	<0.01	<0.01
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**		**0.8**	**0.8**	**1**	**7.6**	**2**	**2.4**	**1.3**	**1.4**	**1**	**1.2**	**0.7**	**0.3**	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	**0.2**	**0.4**
Reactive Phosphorus (as P)	mg/L	0.01				**0.08**	**0.04**	**0.03**	**0.01**	**0.02**	**0.03**	**0.05**	**0.03**	**0.02**	**0.02**	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**		**0.07**	**0.08**	**0.05**	**0.05**	**0.08**	**0.07**	**0.11**	**0.04**	**0.05**	**0.05**	**0.05**	<0.01	**0.01**	**0.02**	<0.01	**0.02**	<0.01	**0.09**	<0.01	**0.02**

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

				Location				GW-T3C															
				Sample Date	03-Apr-18	01-Jun-18	27-Jun-18	26-Jul-17	27-Jul-17	24-Aug-17	27-Sep-17	24-Oct-17	20-Nov-17	20-Dec-17	10-Jan-18	13-Feb-18	09-Mar-18	03-Apr-18	01-Jun-18	27-Jul-17	24-Aug-17	26-Sep-17
				Field ID	T3B	T3B_01_06_18	T3B_27_06_18	T3C_260717	T3C_270717	T3C_240817	GW-T3C_270917	GW-T3C_241017	T3C	T3C	T3C	T3C	T3C	T3C	T3C	T3C_01_06_18	GW-T3E-A_270717	GW-T3E-A_240817	GW-T3E-A_260917
				Lab Report No.	EP1804292	EP1806776	EP1807736	EP1707992	EP1708050	EP1709182	EP1710701	EP1711878	EP1713111	EP1714429	EM1801303	EP1802359	EP1803361	EP1804292	EP1806776	EP1708050	EP1709182	EP1710595
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																		
Total Petroleum Hydrocarbons																						
C6-C9 fraction	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																						
C6-C10 fraction	µg/L	20	**20**		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEXN																						
Benzene	µg/L	1	**1**	**950**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																						
Aluminium	ug/L	10			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**		**40**	**160**	**910**	<10	**20**	<10	**80**	**30**	**70**	**30**	**10**	**50**	**20**	**10**	<10	**290**	**640**	**480**
Arsenic (Filtered)	ug/L	1	**2**	**13**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 [1]	<1
Cadmium	ug/L	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**	<1	<1	**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	**1**	<1
Copper (Filtered)	ug/L	1	**4**	**1.4**	<1	<1	<1	**9**	**3**	**6**	**8**	<1	<1	<1	<1	<1	<1	<1	<1	**3**	**2**	**1**
Iron	ug/L	50			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**		**840**	**970**	**580**	**850**	**3840**	**960**	**1210**	**4180**	**990**	**970**	**150**	**1290**	**1950**	**1850**	**950**	**360**	**600**	**460**
Lead (Filtered)	ug/L	1	**1**	**3.4**	<1	<1	<1	**2**	**1**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	**2**	<1	<1
Manganese	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**	**3**	**5**	**3**	**13**	**8**	**12**	**13**	**7**	**11**	**12**	**12**	**15**	**22**	**23**	**12**	**6**	**6**	**6**
Nickel	ug/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**	<1	<1	<1	**2**	**2**	**8**	**2**	<1	<1	<1	<1	<1	<1	<1	<1	**1**	**1**	**2**
Selenium	ug/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**	<2	<10	<2	<10	<10	<10	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<10	<10	<10	<0.2
Zinc	ug/L	5			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**	<5	<5	<5	**33**	**24**	**29**	**26**	<5	<5	<5	<5	<5	<5	<5	<5	**29**	**30**	**6**
Nutrients																						
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**	**0.05**	**0.04**	**0.02**	**0.08**	**0.2**	**0.06**	**0.07**	**0.2**	**0.06**	**0.12**	**0.1**	**0.09**	**0.07**	**0.1**	**0.07**	**0.32**	**0.31**	**0.33**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	**0.04**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	**0.01**	<0.01
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**		**0.1**	**0.2**	**0.1**	**0.1**	**0.3**	**0.1**	**0.3**	**0.4**	**0.2**	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	<0.1	**0.7**	**0.7**	**0.7**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	**0.04**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	**0.01**	<0.01
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**	**0.1**	**0.2**	**0.1**	**0.1**	**0.3**	**0.1**	**0.3**	**0.4**	**0.2**	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	<0.1	**0.7**	**0.7**	**0.7**
Reactive Phosphorus (as P)	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.07**	**0.04**	**0.05**
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**	<0.01	**0.01**	**0.02**	<0.01	<0.01	**0.02**	**0.02**	**0.01**	<0.01	<0.01	**0.02**	<0.01	**0.02**	**0.03**	<0.01	**0.08**	**0.05**	**0.07**

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					Location	GW-T3E-A															
					Sample Date	19-Oct-17	17-Nov-17	20-Dec-17	10-Jan-18	06-Feb-18	06-Feb-18	08-Mar-18	08-Mar-18	04-Apr-18	04-Apr-18	01-Jun-18	01-Jun-18	27-Jun-18	26-Jul-17	24-Aug-17	27-Sep-17	24-Oct-17
					Field ID	GW-T3E-A_191017	GW-T3E-A	GW-T3E-A	GW-T3E-A	GW-T3E-A	WQA01_060218	GW-T3E-A	WQA01_080318	GW-T3E-A	WQA01_040418	GW-T3E-A_01_06_18	WQA01_01_06_18	GW-T3E-A_27_06_18	T4B_260717	T4B_240817	GW-T4B_270917	GW-T4B_241017
					Lab Report No.	EP1711669	EP1712990	EP1714429	EM1801303	EP1802093	EP1802093	EP1803299	EP1803299	EP1804348	EP1804348	EP1806776	EP1806776	EP1807736	EP1707992	EP1709182	EP1710701	EP1711878
					Sample_Type	Normal	Normal	Normal	Normal	Normal	Field_D	Normal	Field_D	Normal	Field_D	Normal	Field_D	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																	
Total Petroleum Hydrocarbons																					
C6-C9 fraction	µg/L	20				<20	<20	<20	<20	<20	<20	**30**	**30**	<20	<20	<20	<20	<20	<20	**30**	<20	<20
C10-C14 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100				<100	**1110**	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50				<50	**190**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50				<50	**1300**	<50	<50	<50	<50	<50	<50	<50	<50	<50	**100**	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																					
C6-C10 fraction	µg/L	20	**20**			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100	**100**			<100	**1210**	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100	**100**			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100				<100	**1210**	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100
BTEXN																					
Benzene	µg/L	1	**1**	**950**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**2**	**200**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1	**2**			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																					
Aluminium	ug/L	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminium (Filtered)	ug/L	10	**430**			**550**	**500**	**310**	**610**	**590**	**630**	**400**	**410**	**300**	**320**	**340**	**320**	**280**	**240**	**240**	**210**	**280**
Arsenic (Filtered)	ug/L	1	**2**	**13**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	ug/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1		**1**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (Filtered)	ug/L	1	**10.8**	**1**		**1**	**1**	<1	<1	**1**	**1**	**1**	<1	<1	<1	<1	<1	**3**	<1	<1	<1	<1
Copper (Filtered)	ug/L	1	**4**	**1.4**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**2**	**2**	**1**	<1
Iron	ug/L	50				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	ug/L	50	**2932**			**370**	**480**	**340**	**610**	**630**	**680**	**440**	**450**	**380**	**370**	**470**	**480**	**410**	**110**	**170**	**110**	**120**
Lead (Filtered)	ug/L	1	**1**	**3.4**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1
Manganese	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	ug/L	1	**17.2**	**1900**		**6**	**7**	**7**	**8**	**7**	**7**	**7**	**7**	**6**	**6**	**6**	**7**	**5**	**6**	**8**	**6**	**6**
Nickel	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	ug/L	1	**10.4**	**11**		<1	<1	<1	**2**	**1**	**1**	<1	<1	<1	<1	<1	<1	**2**	**2**	**1**	**1**	<1
Selenium	ug/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	ug/L	0.2	**10**	**11**		<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2	<2	<10	<10	<2	<10	<10	**0.4**	**1.2**
Zinc	ug/L	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	ug/L	5	**5**	**8**		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**28**	**24**	**9**	<5
Nutrients																					
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**		**0.38**	**0.36**	**0.37**	**0.43**	**0.3**	**0.31**	**0.36**	**0.36**	**0.36**	**0.37**	**0.36**	**0.35**	**0.35**	**0.92**	**0.77**	**0.91**	**0.92**
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**		**0.02**	<0.01	**0.05**	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	**0.01**	**0.02**
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**			**0.7**	**2**	**0.8**	**0.7**	**1**	**1.1**	**0.8**	**0.8**	**0.8**	**0.7**	**0.6**	**0.6**	**0.7**	**1.4**	**1.4**	**1.3**	**1.2**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		**0.02**	<0.01	**0.05**	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	**0.01**	**0.02**
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**		**0.7**	**2**	**0.8**	**0.7**	**1**	**1.1**	**0.8**	**0.8**	**0.8**	**0.7**	**0.6**	**0.6**	**0.7**	**1.4**	**1.4**	**1.3**	**1.2**
Reactive Phosphorus (as P)	mg/L	0.01				**0.06**	**0.07**	**0.08**	**0.04**	**0.03**	**0.03**	**0.05**	**0.05**	**0.06**	**0.05**	**0.05**	**0.05**	**0.05**	**0.24**	**0.28**	**0.24**	**0.23**
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**		**0.06**	**0.22**	**0.07**	**0.07**	**0.06**	**0.05**	**0.05**	**0.06**	**0.06**	**0.06**	**0.07**	**0.07**	**0.06**	**0.24**	**0.29**	**0.24**	**0.25**

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 2b
Groundwater Analytical Results
Roe Highway Extension - WMMP
MRIA

					Location	GW-T4B											GW-T4C									Reference Bore
					Sample Date	17-Nov-17	19-Dec-17	19-Dec-17	19-Dec-17	10-Jan-18	13-Feb-18	08-Mar-18	03-Apr-18	31-May-18	27-Jun-18	25-Aug-17	27-Sep-17	19-Oct-17	21-Nov-17	11-Jan-18	13-Feb-18	08-Mar-18	03-Apr-18	31-May-18	27-Jun-18	
					Field ID	T4B	T4B	T4B-A	T4B-B	T4B	T4B	T4B	T4B	T4B_31_05_18	T4B_27_06_18	T4C_250817	GW-T4C_270917	GW-T4C_191017	T4C	T4C	T4C	T4C	T4C	T4C_31_05_18	T4C_27_06_18	
					Lab Report No.	EP1712990	EP1714429	EP1714429	EP1714429	EM1801303	EP1802359	EP1803299	EP1804292	EP1806725	EP1807736	EP1709224	EP1710701	EP1711669	EP1713111	EM1801446	EP1802359	EP1803299	EP1804292	EP1806725	EP1807736	
					Sample_Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
COPC Group	**Units**	**LOR**	**BAR Trigger**	**ANZECC Guidline**																						
Total Petroleum Hydrocarbons																										
C6-C9 fraction	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
C10-C14 fraction	µg/L	50				<50	<50	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
C15-C28 fraction	µg/L	100				<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
C29-C36 fraction	µg/L	50				<50	<50	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
C10-C36 fraction (sum)	µg/L	50				<50	<50	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
Total Recoverable Hydrocarbons																										
C6-C10 fraction	µg/L	20	**20**			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
>C10-C16 fraction	µg/L	100	**100**			<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
>C16-C34 fraction	µg/L	100	**100**			<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
>C34-C40 fraction	µg/L	100	**100**			<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
>C10-C40 fraction (sum)	µg/L	100				<100	<100	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
BTEXN																										
Benzene	µg/L	1	**1**	**950**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Toluene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Ethylbenzene	µg/L	2	**2**			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Total Xylenes	µg/L	2	**2**	**200**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Total BTEX	µg/L	1	**2**			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Metals																										
Aluminium	ug/L	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aluminium (Filtered)	ug/L	10	**430**			**290**	40 - 330	-	-	**260**	**240**	**230**	**180**	**220**	**200**	**20**	**30**	**20**	**30**	**30**	**30**	**20**	**340**	**20**	**20**	
Arsenic (Filtered)	ug/L	1	**2**	**13**		<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**2**	<1	<1	
Cadmium	ug/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cadmium (Filtered)	ug/L	0.1	**0.1**	**0.2**		<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium	ug/L	1		**1**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chromium (Filtered)	ug/L	1	**10.8**	**1**		<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Copper (Filtered)	ug/L	1	**4**	**1.4**		<1	<1	-	-	<1	<1	<1	<1	<1	<1	**1**	4	<1	<1	<1	<1	<1	<1	<1	<1	
Iron	ug/L	50				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Iron (Filtered)	ug/L	50	**2932**			**100**	100 - 4150	-	-	**80**	**90**	**80**	**80**	**100**	**80**	**3850**	**4310**	**3780**	**4320**	**3410**	**3900**	**3940**	**2770**	**4010**	**4150**	
Lead (Filtered)	ug/L	1	**1**	**3.4**		<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	
Manganese	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Manganese (Filtered)	ug/L	1	**17.2**	**1900**		**5**		-	-	**4**	**4**	**4**	**3**	**5**	**6**	**7**	**8**	**7**	**7**	**6**	**6**	**6**	**13**	**8**	**5**	
Nickel	ug/L	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nickel (Filtered)	ug/L	1	**10.4**	**11**		<1	<1	-	-	<1	<1	<1	<1	<1	**1**	**1**	**2**	**5**	<1	<1	<1	<1	<1	<1	<1	
Selenium	ug/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Selenium (Filtered)	ug/L	0.2	**10**	**11**		**0.2**	<2	-	-	<2	<2	<2	<2	<10	<2	<10	<0.2	<0.2	**0.2**	<0.2	<2	<2	<2	<10	<2	
Zinc	ug/L	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Zinc (Filtered)	ug/L	5	**5**	**8**		<5	<5	-	-	<5	<5	<5	<5	<5	<5	**23**	**11**	<5	<5	<5	<5	<5	<5	<5	<5	
Nutrients																										
Ammonia (as N)	mg/L	0.01	**0.59**	**0.04**		**0.87**	0.18 - 0.84	-	-	**0.91**	**1.04**	**0.83**	**0.78**	**0.79**	**0.88**	**0.19**	**0.2**	**0.19**	**0.19**	**0.11**	**0.19**	**0.2**	**0.23**	**0.2**	**0.19**	
Nitrate (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	0.01 - 0.02	-	-	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	**0.02**	**0.02**	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	
Total Kjeldahl Nitrogen	mg/L	0.1	**1.46**			**1.2**	0.3 - 1.4	-	-	**1.2**	**1.4**	**1**	**0.9**	**0.9**	**1**	**0.3**	**0.3**	**0.3**	**0.3**	**0.2**	**0.3**	**0.4**	**0.3**	**0.3**	**0.3**	
Nitrate & Nitrite (as N)	mg/L	0.01	**0.65**	**0.1**		<0.01	0.01 - 0.02	-	-	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	**0.02**	**0.02**	**0.02**	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	
Total Nitrogen (as N)	mg/L	0.1	**1.98**	**1.5**		**1.2**	0.3 - 1.4	-	-	**1.2**	**1.4**	**1**	**0.9**	**0.9**	**1**	**0.3**	**0.3**	**0.3**	**0.3**	**0.2**	**0.3**	**0.4**	**0.3**	**0.3**	**0.3**	
Reactive Phosphorus (as P)	mg/L	0.01				**0.26**	<0.01 - 0.31	-	-	**0.3**	**0.34**	**0.27**	**0.28**	**0.25**	**0.24**	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	
Total Phosphorus	mg/L	0.01	**0.22**	**0.06**		**0.26**	<0.01 - 0.32	-	-	**0.32**	**0.34**	**0.27**	**0.37**	**0.25**	**0.24**	<0.01	<0.01	**0.02**	<0.01	**0.06**	<0.01	<0.01	**0.04**	<0.01	<0.01	

Monitoring Bore
Reference Bore
BAR Trigger
ANZECC Guideline

Table 3a
Surface Water Field Parameters
Roe Highway Extenion - WMMP
Main Roads Western Australia

			Field							
			pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)	Turbidity
			pH Units	°C	µS/cm	mg/L	mg/L	mV	mV	NTU
BR8 Surface Water - Guideline			7-8.5							10-100
BR8 Surface Water Bibra Lake Trigger			7.5-8.9		1499-6393	1.08-4.3				4.1-31
BR8 Surface Water - Frog Swamp			5.7-6.9		737-8130	0.522-723				1.5-5.1
BR8 Surface Water - North Lake			5.82-6.98		1711-4040	1.25-3.55				16-35
BR8 Surface Water - Roe Drain			6.04-6.57		400-700	0.283-0.641				9.6-148.2
BR8 Surface Water - Roe Swamp			5.2-6.7		344-451	0.283-0.641				8.98-1078
Zone	**Location**	**Sample Date**								
Bibra Lake	A2	13-Jul-17	8	15.7	1615	1049.75	7.83	-35.4	164.6	1.2
		27-Jul-17	7.79	18.5	1438	934.7	8.03	-128	72	6.7
		11-Aug-17	7.88	14.5	1204	782.6	8.2	-138	62	17.7
		23-Aug-17	7.63	16.1	1174	763.1	5.9	144	344	13.5
		08-Sep-17	7.73	21	1202	781.3	5.21	111	311	15.5
		19-Sep-17	7.72	21.9	1242	807.3	6.24	83.7	283.7	7.6
		04-Oct-17	7.8	16.4	1155	750.75	7.64	86.8	286.8	5
		18-Oct-17	7.99	20.9	1175	763.75	8.95	85.2	285.2	6.5
		02-Nov-17	8.33	24.8	1222	794.3	9.93	60.6	260.6	11.3
		17-Nov-17	8.1	23.5	1355	880.75	5.56	77.5	277.5	14.2
		01-Dec-17	10.47	19	1355	880.75	12.36	-114	86	124
		13-Dec-17	10.2	27.6	1468	954.2	20.24	-32.8	167.2	286.5
		27-Dec-17	8.89	25.3	1644	1068.6	7.05	-45	155	18.7
		11-Jan-18	8.56	26.1	1965	1277.25	9.46	23.1	223.1	30
		24-Jan-18	8.65	27.2	1700	1105	8.58	63	263	-
		08-Feb-18	9	24.9	1946.6	1265.29	11.56	31.5	231.5	-
		23-Feb-18	8.87	25.3	2225	1446.25	8.53	4.6	204.6	-
		09-Mar-18	8.84	25.1	2525	1641.25	8.79	12.6	212.6	-
		23-Mar-18	8.83	25.1	2854	1855.1	10.82	12.9	212.9	11.2
		04-Apr-18	8.82	25.3	3094	2011.1	9.15	7.1	207.1	-
		19-Apr-18	8.63	18.6	3187	2071.55	7.42	-16.7	183.3	-
		16-May-18	8.76	20.9	2952	1918.8	11.2	8.76	208.76	-
		31-May-18	8.47	14	2214	1439.1	9.3	31.1	231.1	13.1
		15-Jun-18	8.1	14.1	1758	1142.7	8.1	47.4	247.4	6.3
		28-Jun-18	8.15	14.4	1484	964.6	6.22	54.9	254.9	6.7
Bibra Lake	A2S	12-Jul-17	7.09	15.3	1675	1088.75	6.61	120.3	320.3	1347
		27-Jul-17	7.8	17.4	1435	932.75	7.35	-125	75	3.1
		11-Aug-17	7.93	13.9	1201	780.65	8.03	-123	77	0.6
		23-Aug-17	7.61	15.8	1176	764.4	5.39	145	345	38
		08-Sep-17	7.51	20.7	1215	789.75	4.13	77	277	8
		19-Sep-17	7.65	22	1242	807.3	5.17	96.9	296.9	9.4
		04-Oct-17	7.69	16.1	1161	754.65	7.22	88.4	288.4	8.8
		18-Oct-17	7.81	20.2	1179	766.35	7.12	93.7	293.7	3.5
		02-Nov-17	8.36	24.8	1215	789.75	10.34	63.8	263.8	7.5
		17-Nov-17	7.98	23.1	1356	881.4	5.19	69.5	269.5	10.9
		01-Dec-17	10.66	19.4	1364	886.6	14.17	-81	119	154
		13-Dec-17	9.97	26.4	1366	887.9	16.5	-42.4	157.6	342.7
		27-Dec-17	8.82	26.2	1653	1074.45	6.95	-11.2	188.8	18.7
		11-Jan-18	8.51	26.2	1968	1279.2	8.55	24.7	224.7	16.6
		24-Jan-18	8.35	26.7	1706	1108.9	6.59	44.4	244.4	-
		08-Feb-18	8.99	24	1962	1275.3	11.27	-2.3	197.7	-
		23-Feb-18	8.93	25.2	2227	1447.55	8.8	15.5	215.5	-
		09-Mar-18	8.93	27.9	2527	1642.55	10.64	24.4	224.4	-
		23-Mar-18	8.9	23.3	2851	1853.15	8.81	-20.9	179.1	6.7
		04-Apr-18	9.01	27.3	3092	2009.8	11.57	7.1	207.1	-
		19-Apr-18	8.02	18	3186	2070.9	7.23	-37.8	162.2	-
		16-May-18	8.52	19.7	2994	1946.1	10.39	20.6	220.6	11.4
		31-May-18	7.79	14	2237	1454.05	9.2	80.8	280.8	5.3
		15-Jun-18	8.28	14.4	1764	1146.6	7.2	30.8	230.8	1.6
		28-Jun-18	8	13.9	1508	980.2	5.23	69.4	269.4	9.8
Bibra Lake	BL_Jetty	13-Jul-17	7.89	15.6	1608	1045.2	7.9	-31.1	168.9	17.2
		27-Jul-17	7.19 - 7.7	17.8 - 17.9	1433 - 1435	931.45 - 932.75	7.71 - 7.77	-124.9 - -124.2	75.1 - 75.8	2.8 - 16
		11-Aug-17	7.84 - 7.9	13.9	1200	780	7.89 - 8.36	-149 - -142	51 - 58	2.2 - 3.7
		23-Aug-17	5.39 - 5.53	16	1174	763.1	5.39 - 5.53	92.5 - 102	292.5 - 302	3.5 - 10.2
		08-Sep-17	7.63	20.1	1204	782.6	4.15	110	310	3.3
		08-Sep-17	7.59	20	1202	781.3	3.95	113.6	313.6	5
		19-Sep-17	7.51	22.1	1243	807.95	5.36	80.5	280.5	2.1
		19-Sep-17	7.57	21.7	1243	807.95	4.98	81.3	281.3	3.1
		04-Oct-17	7.64 - 7.77	16.4	1151	748.15	7.05 - 7.11	90.4 - 97.1	290.4 - 297.1	2.7 - 2.9
		18-Oct-17	7.61 - 7.73	20.2 - 20.4	1176	764.4	7.49 - 7.55	89.4 - 92.3	289.4 - 292.3	3.3 - 4.4
		02-Nov-17	8.23	24.7	1213	788.45	9.61	56.5	256.5	2.8
		17-Nov-17	8.1	23.4	1348	876.2	5.3	74.2	274.2	3.9
		01-Dec-17	10.5	19	1352	878.8	11.9	43	243	123
		01-Dec-17	10.37	19.1	1349	876.85	0.41	37.8	237.8	240
		13-Dec-17	10.14	26.6	1474	958.1	21.32	-25.2	174.8	34
		13-Dec-17	10.12	26.5	1474	958.1	21.05	-23	177	85
		27-Dec-17	8.74	25	1644	1068.6	6.99	-67.6	132.4	20
		11-Jan-18	8.45	25.9	1963	1275.95	9.28	33.5	233.5	9.9
		24-Jan-18	8.41	26.4	1697	1103.05	7.16	79.1	279.1	-
		24-Jan-18	8.48	26.2	1695	1101.75	6.86	72.5	272.5	-
		08-Feb-18	8.96	24.5	1947	1265.55	11.19	37	237	-
		08-Feb-18	8.96	24.3	1938	1259.7	11.1	35.5	235.5	-
		23-Feb-18	8.78	24.6	2225	1446.25	8.03	-2	198	-
		08-Mar-18	8.67	24.8	2524	1640.6	8.62	5.6	205.6	-
		28-Jun-18	8.01	14.5	1483	963.95	66.4	5.97	205.97	3.6
Bibra Lake	BLNS-B1	12-Jul-17	7.61 - 7.72	15.3	1642 - 1646	1067.3 - 1069.9	6.41 - 6.53	40 - 54.1	240	11.8 - 18.5
		27-Jul-17	7.67 - 7.73	17.4	1435 - 1436	932.75 - 933.4	6.5 - 7.2	-133.5 - -129	66.5 - 71	2.8 - 4
		11-Aug-17	7.76 - 7.86	13.7 - 13.8	1202	781.3	6.4 - 7.8	-146 - -137	54 - 63	0.5 - 2.3
		23-Aug-17	7.59 - 7.61	15.7 - 15.8	1176	764.4	5.17 - 5.3	86.7 - 137	286.7 - 337	8.2 - 20
		08-Sep-17	7.42	20.3	1210	786.5	3.21	90.8	290.8	3.8
		08-Sep-17	7.38	19.5	1210	786.5	2.59	72	272	4.3
		19-Sep-17	7.64	22.1	1243	807.95	5.08	99.3	299.3	4.8
		19-Sep-17	7.45	21.2	1249	811.85	3.87	-27.3	172.7	74
		04-Oct-17	7.84 - 7.85	16.2	1160	754	7.05 - 7.6	80.8 - 81.7	280.8 - 281.7	4.7 - 5.8
		18-Oct-17	7.72 - 7.79	20.2 - 20.3	1178 - 1779	765.7 - 1156.35	6.93 - 7.31	94.1 - 96.2	294.1 - 296.2	2.9 - 3.6
		02-Nov-17	8.28 - 8.31	24.7 - 24.9	1222 - 1223	794.3 - 794.95	9.71 - 9.98	24.8 - 32.9	224.8 - 232.9	6.7 - 14
		17-Nov-17	7.67	23.6	1357	882.05	1.46	-81.8	118.2	5
		01-Dec-17	10.42	18.9	1354	880.1	11.68	-92.5	107.5	130
		01-Dec-17	9.96	18.8	1336	868.4	8.27	-105.5	94.5	96
		13-Dec-17	9.97	26.4	1477	960.05	19.52	-23	177	21.1
		13-Dec-17	9.96	26.4	1476	959.4	1935	-21.5	178.5	22
		27-Dec-17	8.84	25.9	1653	1074.45	8.04	-9.8	190.2	12.5
		27-Dec-17	8.69	25.9	1653	1074.45	5.8	-83	117	34.5
		11-Jan-18	8.47	26	1972	1281.8	8.43	30.9	230.9	20
		24-Jan-18	8.4	26.7	1707	1109.55	6.36	46.3	246.3	-
		24-Jan-18	8.41	26.4	1707	1109.55	6.33	46.9	246.9	-
		08-Feb-18	8.92	25.94	1962.8	1275.82	11.31	43.3	243.3	-
		08-Feb-18	8.96	25.67	2960.6	1924.39	11.61	37.3	237.3	-
		23-Feb-18	8.92	25.2	2227	1447.55	8.71	-11.6	188.4	-
		23-Feb-18	8.26	24.6	2080	1352	0.33	-190.1	9.90000000000001	-
		09-Mar-18	8.93	27.8	2533	1646.45	10.65	21.2	221.2	-

Table 3a
Surface Water Field Parameters
Roe Highway Extenion - WMMP
Main Roads Western Australia

			Field							
			pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)	Turbidity
			pH Units	°C	µS/cm	mg/L	mg/L	mV	mV	NTU
BR8 Surface Water - Guideline			7-8.5							10-100
BR8 Surface Water Bibra Lake Trigger			7.5-8.9		1499-6393	1.08-4.3				4.1-31
BR8 Surface Water - Frog Swamp			5.7-6.9		737-8130	0.522-723				1.5-5.1
BR8 Surface Water - North Lake			5.82-6.98		1711-4040	1.25-3.55				16-35
BR8 Surface Water - Roe Drain			6.04-6.57		400-700	0.283-0.641				9.6-148.2
BR8 Surface Water - Roe Swamp			5.2-6.7		344-451	0.283-0.641				8.98-1078
Zone	**Location**	**Sample Date**								
		09-Mar-18	8.88	27.7	2531	1645.15	3.55	8.2	208.2	-
		23-Mar-18	8.82	25.2	2851	1853.15	11.31	11.8	211.8	10.8
		23-Mar-18	8.9	24.7	2782	1808.3	8.17	-77.6	122.4	30.6
		04-Apr-18	8.97	27.4	3094	2011.1	11.21	-131.2	68.8	-
		19-Apr-18	8.52	18.1	3195	2076.75	7.16	-46.9	153.1	-
		16-May-18	8.16	18.83	2930	1904.5	3.1	-157.6	42.4	-
		31-May-18	8.25	14	2235	1452.75	9.01	-18.7	181.3	10.3
		15-Jun-18	8.05	14.4	1773	1152.45	7.3	28.6	228.6	1.5
		28-Jun-18	7.77	13.9	1570	1020.5	5.11	67.1	267.1	17.5
Frog Swamp	FS2	27-Jul-17	5.63	14.8	827	537.55	2.66	155	355	12
		11-Aug-17	6.3 - 6.32	12.4 - 12.8	645 - 653	419.25 - 424.45	2.84 - 4.13	-205 - -187	-5 - 13	2.8 - 8.8
		23-Aug-17	6.23	13.6 - 14	734 - 739	477.1 - 480.35	0.83 - 1.14	107 - 108	307 - 308	17.8 - 123
		08-Sep-17	6.57	17.4	772	501.8	0.92	-6.4	193.6	5.8
		08-Sep-17	6.48	15.9	772	501.8	0.4	-88	112	246
		19-Sep-17	6.62	17.7	799	519.35	0.59	-21.4	178.6	8.7
		19-Sep-17	6.6	16.4	800	520	0.16	-43	157	23
		04-Oct-17	6.61 - 6.63	13.7 - 13.8	718	466.7	0.84 - 1.08	25.5 - 28.2	225.5 - 228.2	3.6 - 20
		23-Oct-17	6.82	22.7	725	471.25	1.9	-30.7	169.3	36
		02-Nov-17	6.82	25	743	482.95	2.47	-50	150	13.6
		15-Nov-17	6.72	21.9	825	536.25	0.67	-89.5	110.5	151
		01-Dec-17	7.24	17.7	993	645.45	0.39	-53.6	146.4	78
		13-Dec-17	7.28	29.6	1334	867.1	3.85	-65.7	134.3	564
Frog Swamp	FS4A	11-Aug-17	6.32	12.7	657	427.05	4.08	-131	69	11.5
		23-Aug-17	6.25	13.9	736	478.4	1.13	98	298	14
		08-Sep-17	6.64	18.2	773	502.45	2.02	-65.1	134.9	1400
		19-Sep-17	6.65	18.1	800	520	0.33	-29	171	1200
		04-Oct-17	6.7	13.2	723	469.95	1.54	20.3	220.3	17.4
		23-Oct-17	6.66 - 6.78	19.3 - 22	722	469.3	0.32 - 1.76	-68 - -19	132 - 181	23 - 80
		02-Nov-17	6.68 - 6.8	20.3 - 24.2	740	481	0.3 - 1.22	-54 - -27	146 - 173	15 - 195
		15-Nov-17	6.81	23.1	830	539.5	1.6	-37.5	162.5	17.6
		01-Dec-17	7.06	18	997	648.05	0.39	-89.5	110.5	800
North Lake	A1	13-Jul-17	3.28	15.1	8048	5231.2	4.32	500.9	700.9	31.5
		27-Jul-17	3.36	18.8	6700	4355	5.1	455	655	12,800
		11-Aug-17	6.13 - 6.26	15.1 - 15.2	2826 - 4742	1836.9 - 3082.3	0.83 - 2.95	-215 - -176	-15 - 24	23.5 - 27
		23-Aug-17	6.72 - 6.92	15.8	2556 - 2718	1661.4 - 1766.7	0.15 - 0.2	-155 - -153	45 - 47	20.4 - 31
		08-Sep-17	7.21	17.1	1609	1045.85	0.4	-187	13	49
		08-Sep-17	7.07	16.7	1653	1074.45	0.25	-210	-10	330
		26-Sep-17	7.33	13.7	1282	833.3	0.29	-171	29	37
		26-Sep-17	7.32	13.8	1287	836.55	0.22	-182	18	30
		04-Oct-17	7.25 - 7.3	14.8 - 14.9	1178 - 1204	765.7 - 782.6	0.2 - 0.42	-108.2 - 84.5	91.8 - 284.5	20.7 - 25.4
		23-Oct-17	7.18	20.9	1127	732.55	0.2	-150.5	49.5	27.7
		02-Nov-17	7.01 - 7.26	20.1 - 23.1	1218 - 1220	791.7 - 793	0.25 - 14	-122 - -106.5	78 - 93.5	-0.3 - 272.4
		15-Nov-17	7.3	23.2	1385	900.25	0.55	-50.1	149.9	292
		15-Nov-17	7.16	21.1	1373	892.45	0.17	-96	104	-0.1
		01-Dec-17	7.36	19	1580	1027	0.61	-46.8	153.2	33
		01-Dec-17	7.34	19	1578	1025.7	0.32	-81	119	4.2
		13-Dec-17	7.51	27.1	1786	1160.9	2.99	-114.7	85.3	37.1
		27-Dec-17	7.25	26	2012	1307.8	1.27	-120	80	30
		16-Jan-18	6.96	21.3	2600	1690	2.41	-88.4	111.6	72.7
		16-Jan-18	6.77	21.3	2749	1786.85	1.66	-101.2	98.8	77.7
		24-Jan-18	7.37	25.9	2286	1485.9	4.13	36.1	236.1	-
		24-Jan-18	7.06	25	2306	1498.9	0.82	-115.8	84.2	-
		07-Feb-18	6.73	23.72	2723.2	1770.08	2.89	-63.1	136.9	-
		23-Feb-18	6.74	24.9	3916	2545.4	3.6	-78	122	-
North Lake	A1E	11-Aug-17	6.59	12.4	1305	848.25	0.73	-278	-78	96.8
		23-Aug-17	6.69 - 6.7	14.4 - 15.3	1114 - 1127	724.1 - 732.55	0.13 - 0.19	-231 - -222	-31 - -22	7.9 - 85.2
		08-Sep-17	6.87	17.4	1198	778.7	0.15	-199.5	0.5	33.7
		08-Sep-17	5.98	16.2	1242	807.3	0.12	-165	35	5.2
		26-Sep-17	7.21	14.6	1118	726.7	0.23	-122.4	77.6	34.7
		26-Sep-17	6.86	14.5	1118	726.7	0.19	-119.7	80.3	2.2
		04-Oct-17	7.14 - 7.2	13.8 - 13.9	1090 - 1094	708.5 - 711.1	0.23 - 0.34	-67.5 - -57.8	132.5 - 142.2	37.9 - 107.3
		23-Oct-17	6.93 - 7.3	20.7 - 24.1	1201 - 1229	780.65 - 798.85	0.21 - 1.07	-91.7 - -59.1	108.3 - 140.9	11.6 - 152.3
		15-Nov-17	7.03	22.9	1369	889.85	0.16	-120.9	79.1	0.2
		01-Dec-17	7.38	18	1579	1026.35	0.52	-74.6	125.4	653.3
		13-Dec-17	7.77	29.1	1778	1155.7	7.95	-47.3	152.7	78.2
		27-Dec-17	7.45	26.6	1980	1287	2.71	-60.7	139.3	307.1
		16-Jan-18	7.36	20.8	1194	776.1	5.62	-19.9	180.1	101.8
		24-Jan-18	7.53	26.8	1800	1170	6.45	-9	191	-
		07-Feb-18	8.1	25	2179.1	1416.415	11.91	14.8	214.8	-
		23-Feb-18	7.76	27.5	2879	1871.35	4.4	-129.5	70.5	-
North Lake	A1N	11-Aug-17	6.62	13.8	982	638.3	0.68	-271	-71	42
		23-Aug-17	6.6	13.3	1085	705.25	0.18	-135	65	160
		08-Sep-17	6.74	19.5	1218	791.7	0.24	-170	30	51
		26-Sep-17	7.17	13.8	1106	718.9	0.2	-141.4	58.6	210
		04-Oct-17	7.32	13.6	1103	716.95	1.16	-62.1	137.9	54.7
		23-Oct-17	7.28	25	1191	774.15	0.63	-55	145	19.5
		02-Nov-17	7.37	28.8	1212	787.8	3.81	-4.8	195.2	23.4
		15-Nov-17	6.63	25.9	1332	865.8	0.23	-118.3	81.7	157.3
		01-Dec-17	7.58	17.3	1583	1028.95	1.23	-2.3	197.7	226.2
		13-Dec-17	7.4	32.8	1809	1175.85	2.14	-43.3	156.7	44.9
		27-Dec-17	7.96	31.7	2028	1318.2	13.35	-39.5	160.5	28
		16-Jan-18	6.63	21.4	1425	926.25	6.65	16.8	216.8	113.9
		24-Jan-18	7.1	29.2	1823	1184.95	6.5	-15.3	184.7	-
		07-Feb-18	7.25	28.61	2373.2	1542.58	9.26	-12.7	187.3	-
North Lake	NLWS-N2	13-Jul-17	3.29	15.2	8143	5292.95	7.57	483.9	683.9	4
		27-Jul-17	3.3	19.2	7441	4836.65	7.98	477.6	677.6	12.2
		11-Aug-17	6.02	15.7	3130	2034.5	5.38	-148	52	62
		23-Aug-17	7.05 - 7.06	15.6 - 16.2	2339 - 2807	1520.35 - 1824.55	0.16 - 0.34	-147 - -127	53 - 73	36 - 52
		08-Sep-17	7.29	17	1602	1041.3	0.18	-190	10	29.8
		08-Sep-17	7.12	16.1	1830	1189.5	0.13	-217	-17	60
		26-Sep-17	7.42	13.7	1299	844.35	0.17	-187	13	29.6
		26-Sep-17	7.44	13.7	1306	848.9	0.13	-217	-17	43.4
		04-Oct-17	7.38 - 7.39	14.9	1199	779.35	0.17 - 0.31	-115.5 - -105.5	84.5 - 94.5	21.7 - 24.4
		23-Oct-17	7.28 - 7.3	19.2 - 21.4	1142 - 1204	742.3 - 782.6	0.15 - 0.22	-115 - -82	85 - 118	18.9 - 23.1
		02-Nov-17	7.18 - 7.33	19.4 - 25.8	1212 - 1224	787.8 - 795.6	0.33 - 4.57	-49.4 - -47.8	150.6 - 152.2	10.4 - 12.1
		15-Nov-17	7.28	21.1	1386	900.9	0.6	-44.1	155.9	6.8
		15-Nov-17	7.23	20.6	1390	903.5	0.5	-47.6	152.4	6.9
		01-Dec-17	7.43	18.9	1584	1029.6	1.19	-28.7	171.3	19.6
		01-Dec-17	7.44	19	1584	1029.6	1.1	-62.2	137.8	16.5
		13-Dec-17	7.7	28.1	1775	1153.75	4.76	-47.5	152.5	19.9

Table 3a
Surface Water Field Parameters
Roe Highway Extenion - WMMP
Main Roads Western Australia

			Field							
			pH (Field)	Temperature	Electrical conductivity (field)	TDS (Field)	DO	Redox Potential (Field)	Redox Potential (Corrected)	Turbidity
			pH Units	°C	µS/cm	mg/L	mg/L	mV	mV	NTU
BR8 Surface Water - Guideline			7-8.5							10-100
BR8 Surface Water Bibra Lake Trigger			7.5-8.9		1499-6393	1.08-4.3				4.1-31
BR8 Surface Water - Frog Swamp			5.7-6.9		737-8130	0.522-723				1.5-5.1
BR8 Surface Water - North Lake			5.82-6.98		1711-4040	1.25-3.55				16-35
BR8 Surface Water - Roe Drain			6.04-6.57		400-700	0.283-0.641				9.6-148.2
BR8 Surface Water - Roe Swamp			5.2-6.7		344-451	0.283-0.641				8.98-1078
Zone	**Location**	**Sample Date**								
		13-Dec-17	7.52	24.1	1776	1154.4	0.3	-66.1	133.9	20.8
		27-Dec-17	7.4	25.6	1995	1296.75	2.65	8.6	208.6	22.5
		27-Dec-17	7.28	22.8	1992	1294.8	0.45	-61.3	138.7	-0.1
		16-Jan-18	7.43	21.8	2279	1481.35	7.45	46	246	60.4
		16-Jan-18	7.23	20.4	2333	1516.45	3.73	22.5	222.5	72.6
		24-Jan-18	7.26	27.6	2293	1490.45	4.81	6.8	206.8	-
		24-Jan-18	7.17	25.4	2289	1487.85	1.71	-4	196	-
		07-Feb-18	7.16	25.17	2664.9	1732.185	5.07	-19.1	180.9	-
		23-Feb-18	6.98	22.9	3653	2374.45	0.63	-47.9	152.1	-
		08-Mar-18	7.13	26.1	4822	3134.3	4.33	1.3	201.3	-
Roe Drain	RD1	13-Jul-17	6.79	15.3	948	616.2	1.18	-128.9	71.1	2.3
		27-Jul-17	6.48	15.7	860	559	0.95	8	208	2.8
		11-Aug-17	6.73	13	741	481.65	1.4	-127	73	0.5
		23-Aug-17	6.56	14.3	857	557.05	0.37	58	258	143
		08-Sep-17	6.71	16.3	752	488.8	0.25	16	216	26.5
		19-Sep-17	6.88	16.8	682	443.3	0.27	-136	64	630
		04-Oct-17	6.5	14.2	784	509.6	0.56	72.3	272.3	3
		23-Oct-17	6.62	18	677	440.05	0.52	-47.3	152.7	92
		02-Nov-17	6.75	18.2	630	409.5	0.38	-87	113	886
		15-Nov-17	6.44	18.2	710	461.5	3.89	-49.7	150.3	54.5
Roe Drain	RD1A	13-Jul-17	6.65	15.3	866	562.9	1.04	-143.5	56.5	33.2
		11-Aug-17	6.57	13.1	731	475.15	0.9	-208	-8	31
		23-Aug-17	6.55	14.3	857	557.05	0.47	58	258	200
		08-Sep-17	6.62	16.6	729	473.85	0.28	53	253	400
		19-Sep-17	6.58	16.6	706	458.9	0.25	-34.5	165.5	370
		04-Oct-17	6.6	14.3	768	499.2	0.33	-5.4	194.6	13.5
		23-Oct-17	6.6	18	670	435.5	0.32	-60	140	103
		02-Nov-17	6.55	17.8	701	455.65	0.31	-64.5	135.5	180
Roe Swamp	A3	11-Aug-17	6.08	11	347	225.55	1.17	-169	31	11
		23-Aug-17	5.95	11.8	351	228.15	0.29	60	260	157
		08-Sep-17	6.01	13	370	240.5	0.51	-74	126	180
		26-Sep-17	6.33	12.2	358	232.7	0.58	-52.1	147.9	285
		23-Oct-17	6.11	16.3	390	253.5	0.36	-58.1	141.9	382
		02-Nov-17	6.41	19.1	382.1	248.365	2.82	-46.3	153.7	14.5
		15-Nov-17	6.55	18.9	409.9	266.435	0.66	3.1	203.1	44.1
Roe Swamp	S1	27-Jul-17	6.41	14.1	365.7	237.705	1.49	-104	96	10
		11-Aug-17	6.45	10.9	312	202.8	1.1	-196	4	5.3
		23-Aug-17	6.26	11.8	329	213.85	0.56	119	319	119
		08-Sep-17	6.37	14.4	346	224.9	0.42	-51	149	700
		26-Sep-17	6.81	11.9	350	227.5	0.94	-102	98	75
		04-Oct-17	6.48	11.5	355	230.75	1.33	92.1	292.1	15.5
		23-Oct-17	6.61	18.1	383	248.95	1.88	-1.6	198.4	165
		02-Nov-17	6.59	19.2	393	255.45	0.61	-38.5	161.5	1052
		15-Nov-17	6.74	20.5	429.9	279.435	0.91	55.4	255.4	55.7
		01-Dec-17	7.13	15.4	452.4	294.06	0.6	-69.6	130.4	852

Table 3b
Bibra Lake Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

	Field ID	A2_270717	A2_230817	A2_190917	A2_181017	A2	A2	A2	A2	A2	A2	A2_31_05_18	A2_28_06_18	A2S_270717	A2S_230817	A2S_190917	A2S_181017	A2S	A2S	A2S	A2S	A2S	A2S	A2S_31_05_18	A2S_28_06_18
	Sample Date	27-Jul-17	23-Aug-17	19-Sep-17	18-Oct-17	17-Nov-17	13-Dec-17	11-Jan-18	08-Feb-18	09-Mar-18	04-Apr-18	31-May-18	28-Jun-18	27-Jul-17	23-Aug-17	19-Sep-17	18-Oct-17	17-Nov-17	13-Dec-17	11-Jan-18	08-Feb-18	09-Mar-18	04-Apr-18	31-May-18	28-Jun-18
	Lab Report No.	EP1708050	EP1709130	EP1710339	EP1711669	EP1712990	EP1714152	EM1801446	EP1802224	EP1803361	EP1804348	EP1806724	EP1807774	EP1708050	EP1709130	EP1710339	EP1711669	EP1712990	EP1714152	EM1801446	EP1802224	EP1803361	EP1804348	EP1806724	EP1807774
	Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**ANZECC Trigger**	**BAR Bibra Lake Trigger**																						
Total Petroleum Hydrocarbons																										
C6-C9 fraction	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	<100	<100	<100	**120**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**110**	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50			<50	<50	<50	<50	**120**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**110**	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																										
C6-C10 fraction	µg/L	20		**25**	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		**61**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100		**406**	<100	<100	**110**	<100	<100	<100	<100	**120**	<100	<100	<100	<100	<100	<100	<100	**140**	<100	<100	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100		**100**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	<100	**110**	<100	<100	<100	<100	**120**	<100	<100	<100	<100	<100	<100	<100	**140**	<100	<100	<100	<100	<100	<100
BTEXN																										
Benzene	µg/L	1	**950**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		**1**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2		**1**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**200**	**2**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		**5**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																										
Aluminium	µg/L	10			**140**	**60**	**50**	**40**	**70**	**160**	**100**	**70**	**70**	**70**	**120**	**30**	**70**	**60**	**80**	**30**	**60**	**110**	**170**	**70**	**70**	**140**	**50**	**40**
Aluminium (Filtered)	µg/L	10		**67**	**40**	**40**	**20**	**20**	**10**	**80**	**30**	**50**	**40**	**60**	**30**	**20**	**30**	**60**	**20**	**20**	**10**	**90**	**30**	**50**	**50**	**50**	**20**	**20**
Arsenic	µg/L	1			**1**	**2**	-	-	-	-	-	-	-	-	-	-	**2**	**2**	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	µg/L	1	**13**	**10**	**2**	**1**	**2**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**
Cadmium	µg/L	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	µg/L	0.1	**0.2**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	1	**1**		<1	<1	<1	<1	**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1
Chromium (Filtered)	µg/L	1	**1**	**0.9**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	ug/L	1			<1	**1**	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	ug/L	1	**1.4**	**0.4**	<1	<1	**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/L	50		**2540**	**680**	**440**	**400**	**300**	**300**	**440**	**310**	**130**	**120**	**140**	**350**	**180**	**390**	**550**	**440**	**300**	**300**	**190**	**420**	**120**	**140**	**340**	**130**	**240**
Iron (Filtered)	ug/L	50			**240**	**260**	**300**	**230**	**120**	**70**	**60**	**60**	<50	**70**	**60**	**130**	**240**	**310**	**280**	**230**	**120**	**80**	**60**	**60**	<50	**140**	**60**	**150**
Lead	ug/L	1			**1**	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	ug/L	1	**3.4**	**1.1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1			**33**	**30**	**44**	**22**	**44**	**56**	**48**	**35**	**48**	**41**	**26**	**36**	**22**	**32**	**46**	**28**	**44**	**43**	**51**	**33**	**41**	**42**	**18**	**43**
Manganese (Filtered)	ug/L	1	**1900**	**49**	**12**	**28**	**37**	**12**	**5**	**11**	**2**	**6**	**14**	**17**	**4**	**30**	**20**	**31**	**40**	**24**	**6**	**11**	**2**	**6**	**12**	**14**	**3**	**35**
Nickel	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel (Filtered)	ug/L	1	**11**	**1.3**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Selenium	ug/L	0.2			<10	<10	<2	<0.2	**0.5**	**0.4**	**0.4**	<2	<2	<2	<2	<2	<10	<10	<2	**0.2**	**0.3**	**0.4**	**0.4**	<2	<2	<2	<2	<2
Selenium (Filtered)	ug/L	0.2	**11**	**0.5**	<10	<10	<2	<0.2	**0.3**	<0.2	**0.2**	<2	<2	<2	<2	<2	<10	<10	<2	<0.2	**0.2**	<0.2	**0.3**	<2	<2	<2	<2	<2
Zinc	ug/L	5			<5	**5**	**30**	<5	<5	**5**	<5	<5	<5	**11**	<5	<5	<5	<5	**6**	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc (Filtered)	ug/L	5	**8**	**2**	<5	<5	**13**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**8**	**8**	<5	<5	<5	<5	<5	<5	<5	<5	<5
Nutrients																										
Ammonia (as N)	mg/L	0.01	**0.04**	**0.302**	**0.37**	**0.61**	**0.48**	**0.13**	**0.03**	<0.01	**0.13**	**0.01**	<0.01	**0.07**	<0.01	**0.38**	**0.36**	**0.67**	**0.47**	**0.15**	<0.01	<0.01	**0.03**	**0.01**	<0.01	**0.06**	<0.01	**0.55**
Nitrate (as N)	mg/L	0.01	**0.1**	**0.099**	**0.06**	**0.23**	**0.24**	**0.18**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.03**	**0.05**	**0.21**	**0.26**	**0.18**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**
Nitrite (as N)	mg/L	0.01	**0.1**	**0.099**	**0.03**	**0.1**	**0.08**	**0.04**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	**0.03**	**0.09**	**0.08**	**0.03**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		**15**	**2.5**	**2**	**2.6**	**1.6**	**2**	**5.5**	**3.6**	**3**	**3.6**	**3.8**	**2.8**	**2**	**2.3**	**2.1**	**2.5**	**1.4**	**1.9**	**5.2**	**3.2**	**2.8**	**3.5**	**4.3**	**2.7**	**2.4**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.1**	**0.099**	**0.09**	**0.33**	**0.32**	**0.22**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01	**0.03**	**0.08**	**0.3**	**0.36**	**0.21**	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	**0.02**
Total Nitrogen (as N)	mg/L	0.1	**1.5**	**15**	**2.6**	**2.3**	**2.9**	**1.8**	**2**	**5.5**	**3.6**	**3**	**3.6**	**3.8**	**2.8**	**2**	**2.4**	**2.4**	**2.9**	**1.6**	**1.9**	**5.2**	**3.2**	**2.8**	**3.5**	**4.3**	**2.7**	**2.4**
Reactive Phosphorus (as P)	mg/L	0.01			**0.04**	**0.12**	**0.22**	**0.2**	**0.23**	**0.18**	**0.03**	<0.01	<0.01	<0.01	<0.01	**0.03**	**0.04**	**0.12**	**0.22**	**0.2**	**0.22**	**0.18**	**0.03**	<0.01	<0.01	<0.01	<0.01	**0.05**
Total Phosphorus	mg/L	0.01	**0.06**	**0.428**	**0.17**	**0.18**	**0.25**	**0.23**	**0.34**	**0.76**	**0.36**	**0.15**	**0.1**	**0.08**	**0.09**	**0.08**	**0.09**	**0.2**	**0.24**	**0.23**	**0.36**	**0.68**	**0.38**	**0.1**	**0.11**	**0.13**	**0.05**	**0.1**
Biological																										
Chlorophyll a	mg/m3	1		**160**	**10**	**3**	**2**	**2**	**25**	**121**	**17**	**73**	**19**	**19**	**18**	<1	**4**	**3**	**4**	**2**	**4**	**127**	**25**	**25**	**20**	**32**	**12**	**1**

ANZECC Trigger
BAR Bibra Lake Trigger

Table 3b
Bibra Lake Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

					Field ID	BLNS-B1_270717	WQA02_270717	BLNS-B1_230817	WQA02_230817	BLNS-B1_190917	WQA02_190917	BLNS-B1_181017	WQA02_181017	BLNS-B1	WQA02_151117	BLNS-B1	WQA02_131217	BLNS-B1	WQA02	BLNS-B1	WQA02_080218	BLNS-B1	WQA02_090318	BLNS-B1	WAQ02_040418	BLNS-B1_31_05_18	WQA02_31_05_18	BLNS-B1_28_06_18	WQA02_28_06_18
					Sample Date	27-Jul-17	27-Jul-17	23-Aug-17	23-Aug-17	19-Sep-17	19-Sep-17	18-Oct-17	18-Oct-17	17-Nov-17	17-Nov-17	13-Dec-17	13-Dec-17	11-Jan-18	11-Jan-18	08-Feb-18	08-Feb-18	09-Mar-18	09-Mar-18	04-Apr-18	04-Apr-18	31-May-18	31-May-18	28-Jun-18	28-Jun-18
					Lab Report No.	EP1708050	EP1708050	EP1709130	EP1709130	EP1710339	EP1710339	EP1711669	EP1711669	EP1712990	EP1712990	EP1714152	EP1714152	EM1801446	EM1801446	EP1802224	EP1802224	EP1803361	EP1803361	EP1804348	EP1804348	EP1806724	EP1806724	EP1807774	EP1807774
					Type	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate	Normal	Duplicate
COPC Group	**Units**	**LOR**	**ANZECC Trigger**	**BAR Bibra Lake Trigger**																									
Total Petroleum Hydrocarbons																													
C6-C9 fraction	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C36 fraction (sum)	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons																													
C6-C10 fraction	µg/L	20		**25**		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		**61**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100		**406**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100
>C34-C40 fraction	µg/L	100		**100**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100	<100	**100**	<100	<100	<100	<100
BTEXN																													
Benzene	µg/L	1	**950**	**1**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		**1**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2		**1**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**200**	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		**5**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																													
Aluminium	µg/L	10				**80**	**80**	**50**	**50**	**40**	**40**	**40**	**40**	**50**	**50**	**100**	**100**	**100**	**100**	**60**	**60**	**80**	**70**	**350**	**110**	**50**	**60**	**40**	**50**
Aluminium (Filtered)	µg/L	10		**67**		**30**	**40**	**40**	**40**	**20**	**20**	**20**	**20**	**20**	**20**	**80**	**90**	**40**	**30**	**50**	**50**	**50**	**50**	**60**	**60**	**30**	**20**	**20**	**20**
Arsenic	µg/L	1				**2**	**1**	**2**	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	µg/L	1	**13**	**10**		**1**	**1**	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**4**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**2**
Cadmium	µg/L	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	µg/L	0.1	**0.2**	**0.1**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	1	**1**			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1
Chromium (Filtered)	µg/L	1	**1**	**0.9**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	1	-	-		<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	µg/L	1	**1.4**	**0.4**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	µg/L	50		**2540**		**450**	**450**	**480**	**480**	**390**	**390**	**310**	**310**	**290**	**270**	**180**	**190**	**310**	**280**	**90**	**100**	**140**	**130**	**830**	**280**	**150**	**160**	**220**	**220**
Iron (Filtered)	µg/L	50				**240**	**240**	**270**	**260**	**270**	**290**	**240**	**240**	**130**	**120**	**70**	**70**	**80**	**60**	<50	<50	**50**	<50	**70**	**80**	**60**	**60**	**140**	**140**
Lead	µg/L	1				<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	µg/L	1	**3.4**	**1.1**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	1				**23**	**23**	**32**	**34**	**43**	**42**	**27**	**28**	**42**	**41**	**42**	**43**	**45**	**46**	**32**	**32**	**41**	**38**	**47**	**41**	**18**	**20**	**40**	**40**
Manganese (Filtered)	µg/L	1	**1900**	**49**		**21**	**21**	**33**	**32**	**41**	**40**	**25**	**25**	**5**	**5**	**11**	**11**	**2**	**3**	**6**	**7**	**15**	**15**	**14**	**15**	**3**	**4**	**36**	**34**
Nickel	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel (Filtered)	µg/L	1	**11**	**1.3**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1
Selenium	µg/L	0.2				<10	<10	<10	<10	<2	<2	**0.3**	<0.2	**0.3**	**0.3**	**0.4**	**0.4**	**0.3**	**0.4**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Selenium (Filtered)	µg/L	0.2	**11**	**0.5**		<10	<10	<10	<10	<2	<2	<0.2	<0.2	<0.2	**0.2**	<0.2	<0.2	**0.3**	**0.4**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Zinc	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**6**	<5	<5	**14**	<5	**6**	<5	<5	<5	<5	<5
Zinc (Filtered)	µg/L	5	**8**	**2**		<5	**9**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Nutrients																													
Ammonia (as N)	mg/L	0.01	**0.04**	**0.302**		**0.33**	**0.35**	**0.7**	**0.69**	**0.47**	**0.46**	**0.16**	**0.16**	<0.01	<0.01	<0.01	<0.01	**0.06**	**0.04**	**0.01**	<0.01	<0.01	<0.01	**0.07**	**0.09**	<0.01	<0.01	**0.56**	**0.53**
Nitrate (as N)	mg/L	0.01	**0.1**	**0.099**		**0.05**	**0.05**	**0.23**	**0.22**	**0.29**	**0.26**	**0.18**	**0.19**	<0.01	<0.01	<0.01	<0.01	**0.01**	**0.01**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	**0.02**	**0.02**	**0.04**	**0.05**
Nitrite (as N)	mg/L	0.01	**0.1**	**0.099**		**0.03**	**0.03**	**0.09**	**0.09**	**0.08**	**0.09**	**0.04**	**0.03**	<0.01	<0.01	<0.01	<0.01	**0.01**	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		**15**		**2.1**	**2.3**	**2.1**	**2**	**2.4**	**2.3**	**1.5**	**1.4**	**2**	**1.8**	**5**	**4.7**	**2.9**	**2.9**	**2.9**	**2.7**	**3.5**	**3.6**	**5.1**	**4**	**2.7**	**2.6**	**2.3**	**2.4**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.1**	**0.099**		**0.08**	**0.08**	**0.32**	**0.31**	**0.37**	**0.35**	**0.22**	**0.22**	<0.01	<0.01	<0.01	<0.01	**0.02**	**0.02**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	**0.02**	**0.02**	**0.04**	**0.05**
Total Nitrogen (as N)	mg/L	0.1	**1.5**	**15**		**2.2**	**2.4**	**2.4**	**2.3**	**2.8**	**2.6**	**1.7**	**1.6**	**2**	**1.8**	**5**	**4.7**	**2.9**	**2.9**	**2.9**	**2.7**	**3.5**	**3.6**	**5.1**	**4**	**2.7**	**2.6**	**2.3**	**2.4**
Reactive Phosphorus (as P)	mg/L	0.01				**0.04**	**0.04**	**0.12**	**0.12**	**0.23**	**0.22**	**0.2**	**0.2**	**0.23**	**0.23**	**0.18**	**0.18**	**0.04**	**0.03**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.04**	**0.04**
Total Phosphorus	mg/L	0.01	**0.06**	**0.428**		**0.09**	**0.09**	**0.19**	**0.18**	**0.24**	**0.25**	**0.24**	**0.24**	**0.32**	**0.31**	**0.7**	**0.64**	**0.3**	**0.32**	**0.1**	**0.08**	**0.13**	**0.13**	**0.18**	**0.09**	**0.06**	**0.06**	**0.09**	**0.1**
Biological																													
Chlorophyll a	mg/m3	1		**160**		**6**	**5**	**2**	**1**	**2**	**3**	**3**	**3**	**18**	**13**	**139**	**131**	**25**	**26**	**26**	**25**	**25**	**24**	**24**	**50**	**30**	**20**	**1**	<1

ANZECC Trigger
BAR Bibra Lake Trigger

Table 3c
North Lake Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

				Field ID	A1_270717	A1_230817	A1_260917	A1_231017	A1_151117	A1	A1	A1	A1E_230817	A1E_260917	A1E_231017	A1E_151117	A1E	A1E	A1E	A1N_230817	A1N_260917	A1N_231017	A1N_151117	A1N	A1N	A1N
				Sample Date	27-Jul-17	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17	13-Dec-17	16-Jan-18	07-Feb-18	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17	13-Dec-17	16-Jan-18	07-Feb-18	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17	13-Dec-17	16-Jan-18	07-Feb-18
				Lab Report No.	EP1708050	EP1709130	EP1710595	EP1711878	EP1712847	EP1714152	EP1801308	EP1802093	EP1709130	EP1710595	EP1711878	EP1712847	EP1714152	EP1801308	EP1802093	EP1709130	EP1710595	EP1711878	EP1712847	EP1714152	EP1801308	EP1802093
COPC Group	**Units**	**LOR**	**ANZECC Guidline**	**BAR Trigger**																						
Total Petroleum Hydrocarbons																										
C6-C9 fraction	µg/L	20			<20	<20	**70**	<20	<20	<20	<20	<20	<20	**50**	<20	<20	<20	<20	<20	<20	**30**	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	**100**	**170**	<50	<50	<50	<50	<50	**140**	<50	<50	<50	<50	<50	<50	**140**	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	**470**	**110**	<100	**350**	<100	**170**	**160**	<100	<100	<100	**140**	**100**	**110**	**240**	<100	<100	<100	<100	**130**	**130**	**280**
C29-C36 fraction	µg/L	50			<50	**660**	**260**	<50	**190**	<50	**60**	**90**	**420**	**250**	**60**	**80**	**90**	**60**	**110**	**700**	**260**	<50	**70**	**60**	**90**	**180**
C10-C36 fraction (sum)	µg/L	50			<50	**1230**	**540**	<50	**540**	<50	**230**	**250**	**560**	**250**	**60**	**220**	**190**	**170**	**350**	**840**	**260**	<50	**70**	**190**	**220**	**460**
Total Recoverable Hydrocarbons																										
C6-C10 fraction	µg/L	20		**25**	<20	<20	**40**	<20	<20	<20	<20	<20	<20	**40**	<20	<20	<20	<20	<20	<20	**30**	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	**30**	<20	<20	<20	<20	<20	<20	**20**	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		**25**	<100	**120**	**160**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**110**	<100	<100	<100	<100	<100	<100
>C10-C16 fraction (minus Naphthalene)(F2)	µg/L	100			<100	**120**	**160**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**110**	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100		**828**	<100	**970**	**330**	<100	**460**	**110**	**230**	**220**	**420**	**310**	**110**	**190**	**170**	**170**	**310**	**700**	**300**	<100	**140**	**170**	**210**	**410**
>C34-C40 fraction	µg/L	100		**344**	<100	**260**	<100	<100	<100	<100	<100	<100	**140**	**110**	<100	<100	<100	<100	<100	**210**	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	**1350**	**490**	<100	**460**	**110**	**230**	**220**	**560**	**420**	**110**	**190**	**170**	**170**	**310**	**1020**	**300**	<100	**140**	**170**	**210**	**410**
BTEXN																										
Benzene	µg/L	1	**950**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		**1**	<2	<2	**9**	<2	<2	<2	<2	<2	<2	**17**	**11**	<2	<2	<2	<2	<2	**18**	**2**	**2**	<2	<2	<2
Ethylbenzene	µg/L	2		**1**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**200**	**2**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		**5**	<1	<1	**9**	<1	<1	<1	<1	<1	<1	**17**	**11**	<1	<1	<1	<1	<1	**18**	**2**	**2**	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																										
Aluminium	ug/L	10			**1190**	**80**	**100**	**70**	**80**	**60**	**70**	**100**	**50**	**170**	**160**	**100**	**140**	**50**	**130**	**90**	**120**	**170**	**270**	**250**	**1360**	**1360**
Aluminium (Filtered)	ug/L	10		**20.6**	**1180**	**40**	**70**	**60**	**70**	**50**	**40**	**60**	**40**	**60**	**60**	**80**	**30**	**20**	**30**	**40**	**60**	**70**	**70**	**50**	**50**	**110**
Arsenic	ug/L	1			**4**	**5**	-	-	-	-	-	-	**3**	-	-	-	-	-	-	**4**	-	-	-	-	-	-
Arsenic (Filtered)	ug/L	1	**13**	**4**	**2**	**3**	**4**	**4**	**4**	**5**	**3**	**5**	**2**	**4**	**4**	**4**	**5**	**3**	**4**	**3**	**3**	**4**	**5**	**5**	**3**	**5**
Cadmium	ug/L	0.1			**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	ug/L	0.1	**0.2**	**0.4**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1	**1**		**3**	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**1**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**3**	**3**	**6**	**4**
Chromium (Filtered)	ug/L	1	**1**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**2**
Copper	ug/L	1			**6**	**1**	-	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-	-	-	-
Copper (Filtered)	ug/L	1	**1.4**	**3.7**	**3**	<1	<1	<1	<1	**5**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1
Iron	ug/L	50		**13,600**	**15,700**	**19,400**	**2180**	**4270**	**4460**	**3730**	**8310**	**7080**	**2670**	**3900**	**9910**	**5730**	**8940**	**4360**	**6010**	**3370**	**2680**	**5330**	**6280**	**5370**	**15,500**	**11,500**
Iron (Filtered)	ug/L	50			**8730**	**15,000**	**580**	**3440**	**4070**	**2760**	**3780**	**4050**	**230**	**2370**	**6250**	**5070**	**4470**	**2150**	**2520**	**690**	**2180**	**4570**	**4910**	**3210**	**3120**	**3360**
Lead	ug/L	1			**15**	**2**	-	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-	-	-	-
Lead (Filtered)	ug/L	1	**3.4**	**6.6**	**10**	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	**1**	**4**
Manganese	ug/L	1			**738**	**1140**	**514**	**255**	**273**	**255**	**242**	**391**	**539**	**384**	**272**	**261**	**259**	**155**	**202**	**777**	**390**	**258**	**270**	**228**	**269**	**230**
Manganese (Filtered)	ug/L	1	**1900**	**818**	**801**	**1160**	**452**	**260**	**261**	**239**	**199**	**351**	**554**	**331**	**268**	**246**	**190**	**128**	**142**	**777**	**342**	**262**	**243**	**178**	**201**	**180**
Nickel	ug/L	1			**8**	**1**	**1**	<1	<1	<1	**1**	**1**	<1	<1	<1	<1	**2**	<1	**1**	<1	<1	<1	**1**	**2**	**2**	**2**
Nickel (Filtered)	ug/L	1	**11**	**5.8**	**7**	**1**	<1	<1	<1	**2**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1**	<1	**1**
Selenium	ug/L	0.2			<10	<10	**0.3**	**0.2**	**0.4**	**0.5**	**0.6**	<2	<10	**0.3**	**0.2**	**0.3**	**0.5**	**0.4**	<2	<10	**0.3**	**0.3**	**0.4**	**0.5**	**0.9**	<2
Selenium (Filtered)	ug/L	0.2	**11**	**1**	<10	<10	**0.2**	**0.3**	**0.2**	<0.2	**0.6**	<2	<10	<0.2	**0.4**	**0.3**	<0.2	**0.4**	<2	<10	<0.2	**0.3**	**0.2**	<0.2	**0.3**	<2
Zinc	ug/L	5			**74**	**10**	**12**	<5	**6**	**11**	**7**	**6**	<5	**8**	**10**	**7**	**16**	**6**	**6**	<5	**5**	<5	**10**	**84**	**40**	**62**
Zinc (Filtered)	ug/L	5	**8**	**88**	**80**	<5	**6**	<5	<5	**6**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**31**	**6**	<5
Nutrients																										
Ammonia (as N)	mg/L	0.01	**0.04**	**1.72**	**0.1**	<0.01	**0.08**	**0.19**	**0.37**	**0.04**	**0.05**	**0.05**	<0.01	**0.21**	**0.59**	**0.56**	**0.05**	**0.25**	**0.05**	<0.01	**0.09**	**0.46**	**0.38**	**0.08**	**0.19**	**0.07**
Nitrate (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.02	<0.01	<0.01	**0.02**	<0.01	<0.02	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	**0.01**	<0.01
Nitrite (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		**7.22**	**3**	**3.8**	**4.6**	**3.1**	**3.5**	**4.3**	**3.6**	**6.2**	**2.6**	**5.1**	**5.9**	**3.6**	**5.9**	**2.7**	**7.6**	**2.9**	**4.5**	**4.1**	**4.5**	**5**	**5**	**11.3**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.02	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	**0.01**	<0.01
Total Nitrogen (as N)	mg/L	0.1	**1.5**	**7.22**	**3**	**3.8**	**4.6**	**3.1**	**3.5**	**4.3**	**3.6**	**6.2**	**2.6**	**5.1**	**5.9**	**3.6**	**5.9**	**2.7**	**7.6**	**2.9**	**4.5**	**4.1**	**4.5**	**5**	**5**	**11.3**
Reactive Phosphorus (as P)	mg/L	0.01			**0.02**	**0.41**	**1.3**	**0.87**	**1.23**	**0.47**	**0.07**	**0.1**	**1.23**	**1.06**	**1.1**	**1.26**	**0.34**	**0.08**	**0.07**	**1.85**	**1.06**	**1.06**	**1.22**	**0.22**	**0.1**	**0.03**
Total Phosphorus	mg/L	0.01	**0.06**	**0.754**	**0.32**	**1.12**	**1.55**	**1.09**	**1.29**	**0.89**	**0.4**	**0.55**	**1.38**	**1.48**	**1.56**	**1.18**	**0.99**	**0.47**	**0.82**	**1.98**	**1.42**	**1.19**	**1.41**	**0.61**	**0.7**	**0.95**
Biological																										
Chlorophyll a	mg/m3	1		**440**	**44**	**95**	**19**	**5**	**22**	**95**	**63**	**153**	**9**	**10**	**5**	**47**	**131**	**83**	**95**	**10**	**24**	**9**	**18**	**74**	**117**	**80**

Table 3c
North Lake Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

Field ID					NLWS-N2 270717	NLWS-N2 230817	NLWS-N2 260917	NLWS-N2 231017	NLWS-N2 151117	NLWS-N2	NLWS-N2	NLWS-N2	NLWS-N2
Sample Date					27-Jul-17	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17	13-Dec-17	16-Jan-18	07-Feb-18	09-Mar-18
Lab Report No.					EP1708050	EP1709130	EP1710595	EP1711878	EP1712847	EP1714152	EP1801308	EP1802093	EP1803361
COPC Group	**Units**	**LOR**	**ANZECC Guidline**	**BAR Trigger**									
Total Petroleum Hydrocarbons													
C6-C9 fraction	µg/L	20			<20	<20	**60**	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	<50	**140**	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100			<100	**170**	**120**	<100	<100	<100	**160**	**400**	**180**
C29-C36 fraction	µg/L	50			<50	**370**	**280**	<50	**60**	<50	**80**	**190**	<50
C10-C36 fraction (sum)	µg/L	50			<50	**540**	**540**	<50	**60**	<50	**240**	**590**	**180**
Total Recoverable Hydrocarbons													
C6-C10 fraction	µg/L	20		**25**	<20	<20	**40**	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	**30**	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		**25**	<100	<100	**140**	<100	<100	<100	<100	<100	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	**140**	<100	<100	<100	<100	<100	<100
>C16-C34 fraction	µg/L	100		**828**	<100	**460**	**360**	<100	**130**	<100	**220**	**550**	**200**
>C34-C40 fraction	µg/L	100		**344**	<100	**160**	<100	<100	<100	<100	<100	<100	<100
>C10-C40 fraction (sum)	µg/L	100			<100	**620**	**500**	<100	**130**	<100	**220**	**550**	**200**
BTEXN													
Benzene	µg/L	1	**950**	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		**1**	<2	<2	**9**	**2**	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2		**1**	<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**200**	**2**	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		**5**	<1	<1	**9**	**2**	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals													
Aluminium	ug/L	10			**1370**	**100**	**90**	**70**	**80**	**60**	**70**	**120**	**30**
Aluminium (Filtered)	ug/L	10		**20.6**	**1400**	**40**	**70**	**60**	**70**	**50**	**40**	**50**	**10**
Arsenic	ug/L	1			**1**	**4**	-	-	-	-	-	-	-
Arsenic (Filtered)	ug/L	1	**13**	**4**	**1**	**4**	**4**	**4**	**5**	**5**	**3**	**6**	**3**
Cadmium	ug/L	0.1			**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	ug/L	0.1	**0.2**	**0.4**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1	**1**		**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**
Chromium (Filtered)	ug/L	1	**1**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Copper	ug/L	1			**4**	**2**	-	-	-	-	-	-	-
Copper (Filtered)	ug/L	1	**1.4**	**3.7**	**4**	<1	<1	<1	<1	**9**	<1	<1	<1
Iron	ug/L	50		**13,600**	**11,000**	**18,600**	**1880**	**4220**	**4520**	**3310**	**8090**	**8450**	**7310**
Iron (Filtered)	ug/L	50			**9970**	**11,100**	**1060**	**3910**	**4120**	**2710**	**3750**	**3890**	**1040**
Lead	ug/L	1			**12**	**1**	-	-	-	-	-	-	-
Lead (Filtered)	ug/L	1	**3.4**	**6.6**	**12**	<1	<1	<1	<1	<1	<1	**1**	<1
Manganese	ug/L	1			**736**	**1120**	**498**	**257**	**275**	**279**	**254**	**389**	**478**
Manganese (Filtered)	ug/L	1	**1900**	**818**	**818**	**1090**	**450**	**267**	**257**	**260**	**210**	**338**	**490**
Nickel	ug/L	1			**9**	**1**	<1	<1	<1	<1	**1**	**1**	**1**
Nickel (Filtered)	ug/L	1	**11**	**5.8**	**8**	<1	<1	<1	<1	<1	**1**	**1**	**1**
Selenium	ug/L	0.2			<10	<10	**0.4**	**0.2**	**0.4**	**0.4**	**0.6**	<2	<2
Selenium (Filtered)	ug/L	0.2	**11**	**1**	<10	<10	**0.2**	**0.3**	**0.3**	<0.2	**0.5**	<2	<2
Zinc	ug/L	5			**71**	**14**	**8**	<5	**6**	**6**	**8**	**11**	<5
Zinc (Filtered)	ug/L	5	**8**	**88**	**73**	**5**	**9**	<5	<5	<5	<5	<5	<5
Nutrients													
Ammonia (as N)	mg/L	0.01	**0.04**	**1.72**	**0.08**	**0.1**	<0.01	**0.35**	**0.42**	**0.14**	**0.06**	**0.05**	**0.02**
Nitrate (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		**7.22**	**1.6**	**6.4**	**4.2**	**3.2**	**3.7**	**4**	**3.2**	**8.3**	**6.1**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.1**	**0.0194**	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen (as N)	mg/L	0.1	**1.5**	**7.22**	**1.6**	**6.4**	**4.2**	**3.2**	**3.7**	**4**	**3.2**	**8.3**	**6.1**
Reactive Phosphorus (as P)	mg/L	0.01			<0.01	**1.1**	**1.29**	**1.04**	**1.24**	**0.52**	**0.08**	**0.14**	<0.01
Total Phosphorus	mg/L	0.01	**0.06**	**0.754**	**0.04**	**2.03**	**1.48**	**1.17**	**1.36**	**0.77**	**0.92**	**1**	**0.17**
Biological													
Chlorophyll a	mg/m3	1		**440**	**11**	**19**	**6**	**6**	**23**	**89**	**82**	**308**	**68**

Table 3d
Roe Drain Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

				Location	**RD1**					**RD1A**			
				Sample Date	27-Jul-17	23-Aug-17	19-Sep-17	23-Oct-17	15-Nov-17	23-Aug-17	19-Sep-17	23-Oct-17
				Field ID	RD1_270717	RD1_230817	RD1_190917	RD1_231017	RD1_151117	RD1A_230817	RD1A_190917	RD1A_231017
				Lab Report No.	EP1708050	EP1709130	EP1710339	EP1711878	EP1712847	EP1709130	EP1710339	EP1711878
				Sample_Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**ANZECC Guideline**	**BAR Roe Drain Trigger**								
Total Petroleum Hydrocarbons												
C6-C9 fraction	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20
C10-C14 fraction	µg/L	50			<50	<50	<50	90	720	<50	100	<50
C15-C28 fraction	µg/L	100			140	<100	<100	380	1310	<100	350	<100
C29-C36 fraction	µg/L	50			240	120	<50	100	1310	<50	260	<50
C10-C36 fraction (sum)	µg/L	50			380	120	<50	570	3340	<50	710	<50
Total Recoverable Hydrocarbons												
C6-C10 fraction	µg/L	20		25	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 fraction (minus BTEX)(F1)	µg/L	20			<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		60	<100	<100	<100	260	320	<100	120	<100
>C10-C16 (minus Naphthalene)(F2)	µg/L	100			<100	<100	<100	260	320	<100	120	<100
>C16-C34 fraction	µg/L	100		940	300	150	<100	260	2160	<100	490	<100
>C34-C40 fraction	µg/L	100		426	160	<100	<100	<100	2200	<100	130	<100
>C10-C40 fraction (sum)	µg/L	100			460	150	<100	520	4680	<100	740	<100
BTEXN												
Benzene	µg/L	1	950	1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		1	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2		1	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2			<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	200	2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		5	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (VOC)	µg/L	5			<5	<5	<5	<5	<5	<5	<5	<5
Metals												
Aluminium	ug/L	10			2960	920	390	2550	860	310	2370	360
Aluminium (Filtered)	ug/L	10		110	240	250	180	260	140	270	170	260
Arsenic	ug/L	1			2	2	-	-	-	1	-	-
Arsenic (Filtered)	ug/L	1	13	0.9	<1	<1	<1	1	<1	<1	<1	<1
Cadmium	ug/L	0.1			<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	ug/L	0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1	1		10	4	1	5	5	2	7	2
Chromium (Filtered)	ug/L	1	1	1.1	1	1	1	1	<1	1	<1	1
Copper	ug/L	1			46	14	-	-	-	<1	-	-
Copper (Filtered)	ug/L	1	1.4	2.9	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/L	50		3900	4070	1600	660	14,200	5710	860	5170	800
Iron (Filtered)	ug/L	50			730	620	410	500	420	630	410	580
Lead	ug/L	1			55	13	-	-	-	<1	-	-
Lead (Filtered)	ug/L	1	3.4	2.9	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1			45	24	17	774	176	15	31	13
Manganese (Filtered)	ug/L	1	1900	36	18	17	8	14	53	16	10	13
Nickel	ug/L	1			5	2	<1	33	9	<1	3	2
Nickel (Filtered)	ug/L	1	11	1.3	<1	<1	<1	<1	<1	<1	<1	<1
Selenium	ug/L	0.2			<10	<10	<2	0.9	1	<10	<2	0.5
Selenium (Filtered)	ug/L	0.2	5	1	<10	<10	<2	0.4	0.5	<10	<2	0.5
Zinc	ug/L	5			314	98	22	2440	363	9	126	<5
Zinc (Filtered)	ug/L	5	8	27	9	6	5	10	11	8	6	<5
Nutrients												
Ammonia (as N)	mg/L	0.01	0.04	0.168	0.21	0.08	0.07	0.07	0.12	0.07	0.09	0.06
Nitrate (as N)	mg/L	0.01	0.1	0.0866	0.03	0.1	0.18	0.03	0.04	0.06	0.08	0.02
Nitrite (as N)	mg/L	0.01	0.1	0.0866	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.03	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		3.04	3.6	2.2	1.6	4.1	8.2	1.6	3.7	1.7
Nitrate & Nitrite (as N)	mg/L	0.01	0.1	0.0866	0.04	0.1	0.2	0.03	0.04	0.06	0.11	0.02
Total Nitrogen (as N)	mg/L	0.1	1.5	3.06	3.6	2.3	1.8	4.1	8.2	1.7	3.8	1.7
Reactive Phosphorus (as P)	mg/L	0.01			0.69	0.69	0.15	0.27	0.16	0.68	0.12	0.29
Total Phosphorus	mg/L	0.01	0.06	0.968	0.94	0.81	0.21	1.3	3.09	0.75	0.61	0.32
Biological												
Chlorophyll a	mg/m3	1	30	79.4	6	5	3	52	46	<1	23	7

Table 3e
Roe Swamp Analytical Results
Roe Highway Extension - WMMP
Main Roads Western Australia

					Location	A3				S1				
					Sample Date	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17	27-Jul-17	23-Aug-17	26-Sep-17	23-Oct-17	15-Nov-17
					Field ID	A3_230817	A3_260917	A3_231017	A3_151117	S1_270717	S1_230817	S1_260917	S1_231017	S1_151117
					Lab Report No.	EP1709130	EP1710595	EP1711878	EP1712847	EP1708050	EP1709130	EP1710595	EP1711878	EP1712847
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
COPC Group	**Units**	**LOR**	**ANZECC Gudieline**	**BAR Roe Swamp Trigger**										
Total Petroleum Hydrocarbons														
C6-C9 fraction	µg/L	20				<20	**20**	**20**	**30**	<20	<20	<20	<20	**20**
C10-C14 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	µg/L	100				<100	<100	<100	<100	<100	<100	<100	**170**	**260**
C29-C36 fraction	µg/L	50				<50	<50	<50	<50	<50	<50	<50	<50	**170**
C10-C36 fraction (sum)	µg/L	50				<50	<50	<50	<50	<50	<50	<50	**170**	**430**
Total Recoverable Hydrocarbons														
C6-C10 fraction	µg/L	20		**25**		<20	<20	**20**	**40**	<20	<20	<20	<20	**30**
C6-C10 fraction (minus BTEX)(F1)	µg/L	20				<20	<20	<20	**20**	<20	<20	<20	<20	<20
>C10-C16 fraction	µg/L	100		**91**		<100	<100	<100	<100	<100	<100	<100	**130**	**140**
>C10-C16 (minus Naphthalene)(F2)	µg/L	100				<100	<100	<100	<100	<100	<100	<100	**130**	**140**
>C16-C34 fraction	µg/L	100		**100**		<100	<100	<100	**110**	<100	<100	<100	<100	**260**
>C34-C40 fraction	µg/L	100		**100**		<100	<100	<100	<100	<100	<100	<100	<100	**210**
>C10-C40 fraction (sum)	µg/L	100				<100	<100	<100	**110**	<100	<100	<100	**130**	**610**
BTEXN														
Benzene	µg/L	1	**950**	**1**		<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2		**1**		<2	**9**	**17**	**17**	**5**	<2	**3**	**7**	**14**
Ethylbenzene	µg/L	2		**1**		<2	<2	<2	<2	<2	<2	<2	<2	<2
m&p-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/L	2				<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Xylenes	µg/L	2	**200**	**2**		<2	<2	<2	<2	<2	<2	<2	<2	<2
Total BTEX	µg/L	1		**5**		<1	**9**	**17**	**17**	**5**	<1	**3**	**7**	**14**
Naphthalene (VOC)	µg/L	5				<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals														
Aluminium	ug/L	10				**330**	**460**	**340**	**270**	**210**	**170**	**180**	**350**	**230**
Aluminium (Filtered)	ug/L	10		**284**		**260**	**240**	**210**	**200**	**220**	**140**	**110**	**100**	**90**
Arsenic	ug/L	1				**1**	-	-	-	**2**	**1**	-	-	-
Arsenic (Filtered)	ug/L	1	**13**	**2.5**		**1**	**1**	**1**	**1**	**2**	<1	<1	<1	<1
Cadmium	ug/L	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Filtered)	ug/L	0.1	**0.2**	**0.1**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1	**1**			**2**	**2**	**1**	**1**	<1	**1**	**1**	**1**	**1**
Chromium (Filtered)	ug/L	1	**1**	**1.4**		**1**	**1**	**1**	**1**	<1	<1	<1	**1**	<1
Copper	ug/L	1				<1	-	-	-	<1	<1	-	-	-
Copper (Filtered)	ug/L	1	**1.4**	**1.1**		<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/L	50		**880**		**1090**	**1470**	**1300**	**2770**	**390**	**590**	**640**	**1190**	**1020**
Iron (Filtered)	ug/L	50				**750**	**980**	**810**	**1160**	**400**	**410**	**500**	**500**	**570**
Lead	ug/L	1				**1**	-	-	-	<1	<1	-	-	-
Lead (Filtered)	ug/L	1	**3.4**	**0.9**		<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	ug/L	1				**38**	**42**	**31**	**52**	**23**	**22**	**31**	**41**	**36**
Manganese (Filtered)	ug/L	1	**1900**	**16.8**		**36**	**32**	**20**	**32**	**26**	**20**	**22**	**18**	**30**
Nickel	ug/L	1				**1**	**2**	**1**	**1**	**1**	<1	<1	**1**	**1**
Nickel (Filtered)	ug/L	1	**11**	**1**		**1**	**1**	<1	**1**	<1	<1	<1	<1	<1
Selenium	ug/L	0.2				<10	**0.3**	<0.2	**0.3**	<10	<10	**0.2**	**0.3**	**0.4**
Selenium (Filtered)	ug/L	0.2	**5**	**1**		<10	<0.2	<0.2	<0.2	<10	<10	<0.2	<0.2	**0.2**
Zinc	ug/L	5				**10**	**18**	**8**	**9**	<5	**8**	**7**	**24**	**20**
Zinc (Filtered)	ug/L	5	**8**	**14**		**5**	**6**	<5	<5	**5**	<5	**6**	<5	<5
Nutrients														
Ammonia (as N)	mg/L	0.01	**0.04**	**0.09**		**0.02**	**0.05**	<0.01	<0.01	**0.07**	<0.01	<0.01	**0.04**	**0.02**
Nitrate (as N)	mg/L	0.01	**0.1**	**0.0244**		<0.01	<0.01	<0.02	**0.02**	<0.01	<0.01	<0.01	**0.01**	**0.02**
Nitrite (as N)	mg/L	0.01	**0.1**	**0.0244**		<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1		**2.86**		**1.5**	**3.7**	**2.8**	**1.7**	**1.7**	**1.2**	**1.3**	**6.6**	**2.1**
Nitrate & Nitrite (as N)	mg/L	0.01	**0.1**	**0.0244**		<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	**0.01**	**0.02**
Total Nitrogen (as N)	mg/L	0.1	**1.5**	**2.86**		**1.5**	**3.7**	**2.8**	**1.7**	**1.7**	**1.2**	**1.3**	**6.6**	**2.1**
Reactive Phosphorus (as P)	mg/L	0.01				<0.01	**0.01**	<0.01	<0.01	**0.07**	**0.11**	**0.11**	**0.07**	**0.04**
Total Phosphorus	mg/L	0.01	**0.06**	**0.222**		**0.12**	**0.19**	**0.14**	**0.06**	**0.13**	**0.22**	**0.17**	**0.6**	**0.22**
Biological														
Chlorophyll a	mg/m3	1	**30**	**9.3**		<1	**2**	**1**	**1**	**1**	<1	<1	**6**	**10**

Appendix B: Field Sheets

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	GW-D3
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12-7-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 12-7-17	Bore Radius (mm):	Chem Kit Serial No.: 15Q103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.21	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.18	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/~~stick up~~):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	c µs/cm	Odour, Colour, Turbidity
10:30	0			1.88	352.8	5.58	-223.9	20.3	321.9	clear, nil odour
10:33	0.7L			1.26	327.3	5.51	-256.4	20.6	299.7	
10:36	1.3L			1.42	323.2	5.52	-248.1	20.7	296.4	
10:39	1.8L			1.65	316.8	5.52	-235.8	20.8	290.5	
10:41				1.98	314.1	5.54	-225.3	20.8	289.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
12-7-17			
Project Manager Signature	Date	Distribution: Project Central File	

AECOM

FQM - Groundwater Sampling and Purging Record

Surface Water

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	BL Jetty
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	13/7/17

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103503	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C~~ SpC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
8:47				7.90	1608	7.89	-31.1	15.6°C	1319 17.2 clear,
									Too shallow to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

TW	13/7/17		
Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	A2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	13/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
8:52				7.83	1615	8.0	-35.4	15.7	1328 / 1.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	NA	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	RD1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	13/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISG103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C / NTU
9:04	20cm			1.18	948	6.79	-128.9	15.3	772 / 2.3
									Algae, polluted
									Not deep enough to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

AECOM

FQM - Groundwater Sampling and Purging Record

Surface Water

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	RD1A
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	13/7/17

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISG103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:06				1.04	866	6.65	-143.5	15.3	C 706 NTU 33.2 Slightly turbid.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	~~x 60 mL metals (HNO_3)~~	N/A
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	13/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	GW-D7
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12-7-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12-7-17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): ~~3.91~~	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.67	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time: 8:42	Hydrasleeve out
	Key Type (if applicable): N/A	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:42	0			1.53	2230	6.78	-222	19.3	C 20.12 Milky
8:45	1		0.3l/min	0.88	2235	6.87	-266	19.7	2009 Metallic smell
8:48	2		"	0.73	2210	6.90	-295	19.7	1986
8:51	3		"	0.68	2176	6.91	-303	19.8	1960
8:54	3.8		"	0.73	2161	6.92	-293	19.7	1943
8:57	4.5		"	0.78	2132	6.92	-274	19.8	1921
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
N/A			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Tim W Checker Name and Signature	12/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	D-8
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.55	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.29	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☑ Other (specify) CO_2	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:52	0			3.55	310.4	5.25	-156.5	17.8	Slightly turbid, sulphur odour, milky.
7:55	0.3L			1.31	360.1	5.13	-199.0	18.9	
7:59	1.0L			0.91	375.9	5.14	-188.1	19.4	
8:03	1.5L			0.71	388.1	5.22	-228.5	19.6	
8:07	2.3L			0.89	389.7	5.19	-254.6	19.5	
8:11	3.0L			0.69	394.1	5.18	-265.2	19.6	
8:15	3.5L			0.57	398.7	5.20	-272.7	19.5	
8:19	4.1L			0.62	400.0	5.17	-281.5	19.6	
8:23	4.7L			0.59	402.6	5.18	-289.1	19.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
12/7/17			
Project Manager Signature	**Date**	**Distribution:** Project Central File	

AECOM

FQM - Groundwater Sampling and Purging Record

						Bore ID:	GW-T3E-A
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 3.17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.98	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): N/A	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:29	0		0.3l/min	3.02	950	5.94	-115	19	832	Slight sulfur odour, clear
9:32	1		"	0.90	892	5.41	-271	19.3	795	
9:35	2		"	0.82	891	5.34	-284	19.4	795	
9:38	2.8		"	0.86	889	5.32	-286	19.4	794	
9:41			"	0.76	886	529	-291	19.4	791	
9:44			"							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Tim W Checker Name and Signature	12/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	GW-D5.
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12.7.17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.90m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.96m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10.01	0		0.3l/min	1.90	981	5.58	-261.2	18.1	854.	Turbid, Sulfur odour.
10.04	1		~1	0.79	978	5.29	-284	18.2	852	
10.07			~1	0.68	974	5.26	-288	18.3	849	
10:10.	2.3		~1	0.63	973	5.27	-293	18.3	848.	
10:13	3		~1	0.57	970	5.28	-299	18.3	846	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12-7-17 Date	TIM W Checker Name and Signature	12.7.17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	T2F.
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12-7-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12-7-17	Bore Radius (mm):	Chem Kit Serial No.: ISG103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.11	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.17	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): S	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:37	0		0.3l/min	3.95	853	6.10	-233	19.6	769	Slight sulfur odour, clear
10:40	0.6			0.73	868	5.95	-262	19.4	774.	
10:43	1.5			0.59	877	5.92	-299	19.3	782.	
10:46	2.2			0.54	889	5.91	-312.3	19.3	792.	
10:49	3			0.53	891	5.90	-322.7	19.2	791.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	T3C
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	12/7/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 0.18m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14m	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:11	0			6.77	429.6	5.66	-178.6	17.6	C 382.4 Slight sulphur odour, clear
1:14	0.6L			1.58	486.1	5.38	-245.4	17.7	408.1
1:17	1.4L			0.98	401.4	5.37	-265.7	17.8	343.7
1:20	2.7L			0.89	387.9	5.34	-275.8	17.9	334.6
1:23	3.3L			0.87	384.4	5.33	-276.0	17.9	332.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	T33
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15Q103503	☐ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.82	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.86	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): (S)	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): (Y)	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:39	0			2.53	194.7	6.01	-274.7	20.1	170.1 C cloudy, very slight sulphur smell
12:42	1 L			0.72	163.0	5.93	-316.5	20.2	147.9
12:45	1.8 L			0.61	154.8	5.95	-328.8	20.2	138.4
12:48	2.5 L			0.57	140.1	5.96	-338.9	20.3	127.2
12:51	3.0 L			0.56	138.1	5.94	-338.7	20.3	125.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	A1
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	13/7/17

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
8:25				4.32	8048	3.28	500.9	15.1°C	6518	31.5	clear
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)		x 60 mL Ferrous		~~x 60 mL metals~~ (HNO_3)		N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	**Date** 13/7/17	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	NLWS-N2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	13/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU	Odour, Colour, Turbidity
8:21				7.57	8143	3.29	483.9	15.2°C	6617 / 4.0	
										Only 500mm water
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	~~x 60 mL metals (HNO_3)~~	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	~~x 100 mL Amber~~	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	T4C
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103503	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.83	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.83.	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
3:12	0			2.76	505	5.83	-229.3	20.0	456.3 very weak odour, cloudy.
3:15	1.2L			0.74	496.4	5.95	-304.6	20.0	447.8
3:18	2.2L			0.62	491.7	5.93	-319.7	19.9	444.0
3:21	2.7L			0.56	490.8	5.92	-329.9	19.9	443.2
3:24	3.3			0.56	490.6	5.92	-331.2	19.9	443.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Bore ID:	T4B
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	12/7/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.97	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.14	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:54	0			3.20	617	5.11	-166.6	18.7	C 547 Slightly turbid, sulphur odour
2:57	0.7L			0.81	570	5.14	-244.4	18.8	485.3
3:00	1.6L			0.59	464.6	5.28	-283.0	19.0	410.0
3:03	2.4L			0.53	462.4	5.29	-299.8	19.0	409.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Bore ID:	GW-D4
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.49m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.89	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:30	0		0.3/min	5.47	256.4	6.34	-178.2	17.5	C 219.3
14:33	0.9			5.17	254	6.28	-171	17.6	218
14:36	1.8			4.93	251.5	6.26	-172	17.8	216.5
14:39	3.1			4.68	248.7	[illegible]	-173.3	17.9	214.6 pH 6.24
14:42	4.0			4.42	245.5	6.22	-172.4	17.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

(R) Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Bore ID:	BH 10
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	12/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/7/17	Bore Radius (mm):	Chem Kit Serial No.: 156103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.69	Screen Interval (m):	Chem Kit Model: YSI PRO DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.61	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:35	0			3.52	579	5.99	-193.9	18.4	C 507 slight 'earthy' odour, turbid,
1:37	0.8L			2.52	588	6.00	-196.1	18.5	516 brown stain
1:40	1.8L			2.34	585	5.99	-192.6	18.6	513
1:43				2.25	576	5.99	-192.3	18.5	505
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	12/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	BLNS - B1
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
8:39	20cm			6.53	1642	7.61	54.1	15.3	1337 18.5
8:42	50cm			6.41	1646	7.72	40.0	15.3	1340 11.8
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

* Surface Water *

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	425
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	

Well Development or Well Sampling Event? (circle

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ **Low Flow** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTu | C Odour, Colour, Turbidity
8:38				6.61	1675	7.09	120.3	15.3	8.1 | 1347
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	South - S1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
15:27	15m			1.49	365.7	6.41	-104	14.1	290 Tanin stained
									10 Heavy with vegetation not deep enough to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

* Surface Water *

						Bore ID:	RD1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
15:09	15cm			0.95	860	6.48	8.0	15.7	707	2.8	Not deep enough to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 27/7/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

* Surface Water *

						Bore ID:	FS2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
14:58				2.66	827	5.63	155	14.8	667 12	Only 15cm deep at Stable, not deep enough to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	A1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
14:30				5.7	6700	3.36	455	17.8	5884 / 12800
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	NLW3-N1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
14:37	30cm			7.98	7441	3.3	477.6	19.2	6616	12.2	Not deep enough to profile. Vegetation need to state
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

* Surface Water *

						Bore ID:	A25
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:39				7.35	1435	7.8	-125	17.4	C 1227 NTU 3.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	BLNS-B1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
13:41	20cm			7.2	1436	7.73	-189	17.4	1227	2.8
	50cm			6.5	1435	7.67	-133.5	17.4	1226	4.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	BL Jetty
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C	2NTU
13:20	@15cm			7.77	1435	7.19	-124.2	17.9	1240	2.8
13:24	@30cm			7.71	1433	7.70	-124.9	17.8	1236	16
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

[signature]	27/7/17		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	A2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:27				8.03	1438	7.79	-128	18.5	C 1263 NTU 6.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 27/7/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-TSE-A
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103363	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.17	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.66	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:46	0		0.3l/min	1.38	728	5.39	-241.3	19.5	649	Clear, strong sulfur odour.
11:49	1.2			0.58	729	5.25	-289.3	19.4	651	
11:52	2.1			0.57	730	5.25	-295	19.4	653	
11:55	2.8			0.57	729	5.24	-302	19.5	652.	
11:58	3.5.			0.56	731	5.23	-305.2	19.4	652	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Tim W Checker Name and Signature	27/7/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Bore ID:	T2F
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☐ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.925	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12:06	0		0.3l/min	1.47	881	5.85	-226	19.1	782	Clear, Sulphur odour
12:09	0.9			0.70	899	5.84	-300	19.2	797	"
12:12	1.8			0.59	917	5.84	-317	19.2	815	"
12:15	2.7			054	920	5.84	-327	19.2	818	"
12:18	3.5			0.54	920	5.83	-332.1	19.1	817	"
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Tim W Checker Name and Signature	27/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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						Bore ID:	GW-D5
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.78	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.96	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): G	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
.	Key Type (if applicable): —	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12·29	0		0.3/min	1·29	1014	5·23	-207	18·2	886	Slightly turbid.
12·32	1			0·54	1017	5·27	-268·4	18·6	891	
12·35	2			0·48	1016	5.26	-290·3	18·6	891	
12·38	3			0·47	1015	5·26	-299·1	18·5	889	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Tim W Checker Name and Signature	27/7/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	BH12
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	27/7/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.43	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	CO2. Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.69	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:00	0		0.3/min.	7.48	223.3	4.80	-26.9	18.6	195.6	Cloudy, yellow stain, milky.
10:03	1		-	8.41	206.3	4.89	-58.8	19.4	184.2	
10:06	1.8			8.63	200.3	4.93	-67	19.6	179.2	
10:09	2.6			8.77	196.8	4.97	-70.5	19.8	177.4	
10:12	3.2			8.88	192.4	5.11	-72.9	19.7	172.9.	
10:15	4			9.01	190.7	5.20	-73.7	19.5	170.3.	
10:18.	5.			9.11	188.4	5.38	-78.9	19.6	168.8	
10:21.	5.8.			9.06	189.8	5.29	-79.3	19.7	170.6.	
10:24.	6.3.			9.04.	190.2	5.26	-79.6	19.7	170.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/7/17 Date	Tim W Checker Name and Signature	27/07/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-D3
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISG103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.11	Screen Interval (m):	Chem Kit Model: YSI Pro DSD	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.17	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): –	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:15	0		0.3	1.70	354.7	5.36	-194.7	20 -	322.5. No odour, clear.
11:18	~1L		0.3	1.13	342.2	5.42	-258.3	20.2	311.5
11:21	2		1	1.35	338.9	5.46	-248.3	20.2	306.4
11:24	2.8		1	1.54	333.2	5.47	-241.5	20.2	302.7
11:27	3.6		1	1.60	336.9	5.46	-236.9	20.3	306.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Checker Name and Signature	26/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-104.
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26.7.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.39	Screen Interval (m):	Chem Kit Model: YSI ProDSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.92	Casing Radius (mm):	**Corrected Redox:** Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): —	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:45	0		0.3/min	5.20	211.3	6.32	-151.9	18.3	183.4 Slightly cloudy, no odour.
11:48	1		~1	4.85	207~	6.28	-147.7	18.2	180.1
11:51	2			4.52	206.2	6.25	-151.8	18.2	179.5
11:54	3			4.37	205.1	6.23	-154.6	18.2	178.5
11:57	3.8			4.13	203.6	6.21	-158~	18.2	177.4
12—	4.9			3.86	202.5	6.19	-165.1	18.4	177.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Tim W Checker Name and Signature	26.7.17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	T4B
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	26.7.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/7/17	Bore Radius (mm):	Chem Kit Serial No.: YSI ProDSS	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.86	Screen Interval (m):	Chem Kit Model: 15E103303	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.13	Casing Radius (mm):	**Corrected Redox:** Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): N/A.	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
1:39	0		0.3l/m	0.97	438	5.20	-297	18.8	385 Milky, turbid, sulfur odour.
1:42	1.2			0.72	437.2	5.23	-331.6	18.7	384
1:45	2.2			0.63	436.1	5.22	-336	18.7	383
1:48	3.1			0.58	435.6	5.22	-337	18.8	383
1:51	4			0.56	435.4	5.21	-337.5	18.8	384
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA03 -260717	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Checker Name and Signature: TW	26/7/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Bore ID:	T4C
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G10 3303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.75	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.83.	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:04	0		0.3	1.64	495.2	5.85	-264.4	20 —	447.4. Slight Sulfur odour
2:07	1.2			0.71	483	5.90	-330.5	19.9	434. Very light cloudy
2:10	2.4.			0.56	479	5.87	-335.9	19.8	432. appearance.
2:13	3			0.52	479	5.87	-332	19.8	431.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Checker Name and Signature	26/7/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	T3C,
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/7/17	Bore Radius (mm):	Chem Kit Serial No.: 156103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:48	0		0.3l/m	2.71	390.4	5.56	-106.7	16.6	329	Slightly cloudy, slight sulfur
10:51	1.1			1.34	362.7	5.31	-232.6	17.1	306.7.	" "
10:54	2.3			0.73	356.7	5.27	-295.	17.2	304.1	"
10:57	2.9			0.62	358.3	5.26	-303	17.1	304.3	"
11:00.	3.5			0.58	358.9	5.25	-308.5	17.1	305.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Tim W Checker Name and Signature	26/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Bore ID:	T3B
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/7/17	Bore Radius (mm):	Chem Kit Serial No.: EG103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.72	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time: -	Hydrasleeve out
	Key Type (if applicable): —	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:12	0		0.3/min	1.55	180	6.17	-199	19.3	157 Cloudy/Milky
10:15	1.6			0.95	148	5.98	-284	19.6	133.5
10:18	2			0.76	138	5.95	-322.3	19.8	124
10:21	2.9			0.67	136.7	5.92	-329	19.8	123
10:24	3.7			0.62	137	5.90	-333	19.8	123.4
Acceptable Parameter Range:			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Tim W Checker Name and Signature	26/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	BH10.
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	26/7/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: W58	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.58	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.62	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:50	0		0.3/m	3.46	703	6.60	-141	17.7	610	Weak coffee colour
9:53	1L			2.94	685	5.53	-149	17.8	591	
9:56	1.9			2.84	681	5.52	-150	17.8	588	
9:59	3.1			2.81	671	5.52	-148	17.8	579	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Tim W Checker Name and Signature	26/7/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-D7
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISG103303	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.75	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.48	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.P.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:12	0		0.3L/m	0.89	2005	6.92	-169	19.5	1768	Very cloudy, milky.
9:15	0.9			0.67	1925	6.83	-323	19.5	1722	"
9:18	1.8			0.56	1910	6.82	-346.7	19.5	1709	"
9:21	2.1			0.53	1899	6.81	-351.2	19.5	1697	"
9:24	2.8			0.55	1944	6.83	-344.7	19.4	1735	"
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/7/17 Date	Checker Name and Signature	26/7/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-D8
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	26/7/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/7/17	Bore Radius (mm):	Chem Kit Serial No.: 15C103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.515	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.23	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☑ Other (specify) CO_2	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	℄	Odour, Colour, Turbidity
8:11	0			2.51	362.0	5.01	-166.7	19.2	321.8	cloudy, sulphur odour
8:15				1.0091	377.8	5.09	-225	19.6	339	
8:18	1			0.82	379	5.06	-251	19.6	339	
8:21				0.71	384	5.06	-271	19.5	345	
8:24	1.9			0.68	388	5.05	-277.8	19.6	349	
8:27				0.75	395	5.12	-264	19.2	352	
8:30										
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA01-260717 2x extra Amber	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
✓			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
D O'Rourke	26/7/17		

Project Manager Signature	Date	Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

Wetlands bridge

						Bore ID:	TBC
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: BG103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0	Screen Interval (m):	Chem Kit Model: YSI PRO DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.13	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:21	0		0.3l/min	4.52	396	5.87	-181	15.9	327	Clear
11:24	1			1.00	377	5.54	-251	16.5	316	
11:27	2			0.94	424	5.35	-256	16.6	356	
11:30	3			0.91	444	5.31	-258	16.6	371	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	10/8/17	Tim W	10/8/17

Project Manager Signature — Date

Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

Hope & Bibra

						Bore ID:	T413
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: TSG10-3303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.685	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.14	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:39	0			2.70	726	6.03	-214	14.3	590	Strong sulphur odour
8:42	0.8L			0.66	719	5.63	-296	16.3	605	[illegible] cloudy - yellow
8:45	2 L			0.55	670	5.49	-313	17.2	570	
8:48	3.1L			0.52	634	5.43	-322	17.2	539	
8:51	4.0L			0.51	619	5.41	-327	17.0	523	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
[signature]	10/8/17		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	T4C
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103305	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.63	Screen Interval (m):	Chem Kit Model: YSI Pro	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.835	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:57	0		0.3/min	3.30	477	6.19	-225	16.5	404	Clear, Slightly turbid
9:00	1		"	1.35	479	6.01	-319	19.1	425	
9:03	2.1		"	0.98	479	5.98	-337	19.3	427	
9:06	3.2		"	0.97	479	5.98	-343	19.4	428	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 10/8/17	Checker Name and Signature: Tim W	Date: 10/8/17
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-D4
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☐ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.10 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90 m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.P.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:48	0	-	0.4/min	6.14	192	7.38	-88.7	5.6	C 150 Clear, light sheen on top
9:51	1.5	-	-	5.10	168	7.17	-178	16.5	141
9:54	3			4.95	168	7.04	-186	16.5	141
9:57	4			4.75	168	6.91	-187	16.8	142
10:00	5.2			4.67	168	6.85	-187	17-	142
10:03	6.3			4.63	169	6.81	-185.	17.2	143
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	10/8/17 Date	Tim D Checker Name and Signature	10/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Baker

						Bore ID:	10/8/17
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	GW-D3
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 10/8/17.	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.965	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.154	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spc. Cond. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:18	0		0.3/min	1.56	413	6.41	-201	18.1	360 Clear
8:21	1			1.21	364	5.86	-242	19.1	322
8:24	2			1.92	335	5.82	-221	19.2	298
8:27	3			1.88	338	5.76	-219.	19.3	301
8:30				1.96	333	5.74	-217.	19.4	298
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	10/8/17 Date	TW Checker Name and Signature	10/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW - D7
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: YSG103503	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.51	Screen Interval (m):	Chem Kit Model: YSI ProDSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.52	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:49	0			4.76	650	7.29	-156.7	15.1	512 Very cloudy, yellow to brown
7:52	0.7L			2.17	1449	7.13	-233.1	17.1	1252 nil odour
7:55	1.2L			1.97	1579	7.14	-235	17.1	1341
7:58	2.1L			6.4	528	7.53	-165.	17.8	457
8:01	3.2L			6.27	660	7.51	-162	17.8	570
8:04	4.3L			5.57	712	7.49	-166	17.8	614
8:08	5.8L			5.07	771	7.47	-168	18.0	668
8:11	6.4L			4.97	798	7.44	-168	17.8	688
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	10/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Bore ID:	T3B
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.51	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.86	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC ~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:32	0			2.50	142	7.70	-175	17.3	121	Clear, nil odour
10:35	1.8L			0.66	143	6.80	-272	19.1	127	
10:38	3.0L			0.61	157	6.45	-287	19.4	140	
10:41	4.1L			0.58	158	6.27	-297	19.4	141	
10:44	5.0L			0.61	159	6.20	-300	19.3	141	Slightly milky
10:47	6.0L			0.61	159	6.13	-306	19.3	142	
10:50	7.0L			0.60	159	6.11	-311	19.0	141	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

[signature]	10/8/17		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	BH10
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: ISG105303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.29	Screen Interval (m):	Chem Kit Model: YSI ProDSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.64	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:56	0			6.21	489	5.65	-176	16.1	406 Tea-like colour
10:59	1.0L			4.09	474	5.33	-148	16.2	394
11:02	2.2L			3.82	459	5.34	-196	16.3	382
11:05	4.0L			3.80	444	5.46	-160	16.4	372
11:08	4.8L			3.87	457	5.38	-158	16.4	383
11:11	5.6L			3.84	464	5.30	-158	16.5	388
11:14				3.84	463	5.28	-157	16.5	388
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 10/8/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-T3E-A
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.89	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.98	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:54	0		0.3l/m	5.19	334	5.68	-201	17.5	613	Clear.
11:57	1			1.04	729	5.32	-264	18.7	642	
12:00	2			0.79	730	5.30	-285	18.9	646	
12:03	3			0.57	733	5.31	-293	19.0	649	
12:06	4			0.52	737	5.29	-296	19.0	652	
12:09	5			0.50	737	5.28	-295	19.0	654	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	10/8/17 Date	Tim W Checker Name and Signature	10/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	GW-05
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	10/8/17

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.52	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.95	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SpC Conc. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12:17	0		0.3L/min	2.20	635	5.37	-221.9	16.6	533	Tea stained slight sulphur odour.
12:20	0.9L			1.30	614	5.17	-231.6	17.5	527	
12:23	2.0L			1.20	616	5.14	-235.4	17.7	530	
12:26	2.9L			1.18	625	5.14	-236.9	17.6	536	
12:29	3.8L			1.11	639	5.13	-237.6	17.5	548	
12:32				1.04	634	5.13	-239.7	17.5	541	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 10/8/17	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	T2F
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.53	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12:39	0		0.3	4.28	856	5.84	-154	15.9	718	Clear, Strong Sulfur.
12:42	1.1		〃	0.77	944	5.85	-280	18.3	821	
12:45	2		〃	0.70	954	5.82	-297	18.4	844	
12:48	3		〃	0.66	966	5.87	-304	18.5	847	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature: Tim W	Date: 10/8/17
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

Murdoch Paddock

						Bore ID:	D2.
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.: 15G 103303	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.61	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:15	0			5.80	664	6.71	-156.2	18.2	S 30 N:1 odour, cloudy brown
14:18	1L			5.98	658	6.66	-154.7	18.2	572
14:21	3L			6.46	657	6.66	-150.5	17.8	567
14:24	3.9L			6.03	658	6.64	-153.4	17.6	565
14:27	5.0L			5.60	658	6.63	-152.9	17.6	~~S 30~~ 565
14:30	6.0L			5.28	658	6.61	-152.4	17.7	567
14:33	7.0L			5.11	658	6.61	-149.5	17.7	566
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	10/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	D1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	10/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 10/8/17	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.54 m	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.57 m	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:54	0		0.3l/min	2.60	577	6.80	-178	19.0	510 Clear, Slightly turbid.
2:57	1			1.04	558	5.82	-230	19—	493
3:00	2			0.96	565	5.86	-239	19—	499
3:03	3			0.90	568	5.93	-247	19	502
3:06	3.8			0.87	574	6.02	-251	19-	509
3:09	4.5			0.86	578	6.01	-255.7	19.1	506
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
		T.M.W	10/8/17
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	BH2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	9/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15610330	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.30m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.52m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/~~stick up~~):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☑ Other (specify) CO_2	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S/C E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
~~15:50~~									C
15:53	0			5.76	238.4	4.45	-142.3	16.1	199.1 Sandy - cloudy & yellow
15:56	0.5L			2.76	246.5	4.37	-148.7	17.1	209.7
15:59	1.1L			2.88	246.2	4.38	-150.8	17.2	209.1
16:02	1.7L			2.99	247.0	4.40	-147.0	17.0	209.5
16:05	2.0L			3.09	246.5	4.42	-139.0	15.9	203.5
16:08	2.4L			2.95	244.9	4.40	-128.6	16.7	207.7
16:12	3.0L			2.68	249.8	4.39	-127.6	17.3	213.2
16:15	3.5L			2.82	250.6	4.34	-125.1	17.4	214.2
16:17	4.0L			2.94	249.9	4.34	-120.9	16.9	212.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	9/8/17		

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW-D8
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	9/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103503	☑ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.24	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/~~NO~~):	Parameter method: ☐ Downhole		☑ Other (specify) CO_2	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SpC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
14:26	0			2.54	1448	5.32	-200	18.6	400	Cloudy, sulphur odour
14:29	1.5L			1.12	438	5.38	-267	19.3	390	
14:32	2.6L			0.77	420	5.47	-290	19.5	375	
14:36	3.7L			0.67	416	5.55	-301	19.6	374	
14:39	4.3L			0.64	415	5.59	-311	19.8	375	
14:43	5.2L			0.65	414	5.64	-320	19.9	375	
14:46	6.2L			0.67	412	5.68	-328	19.9	372	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
9/8/17			

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	FS2
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	11/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15410330	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC-E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
	15cm	depth		4.13	653	6.32	-187	12.8	500 / 2.8
	40cm	depth		2.84	645	6.30	-205	12.4	489 / 8.8
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 11/8/17	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

* Surface Water *

						Bore ID:	BL Jetty
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/2017
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: SG103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:15	15cm			8.36	1200	7.90	-149	13.9	C 946 NTU 2.2
11:18	30cm			7.89	1200	7.84	-142	13.9	946 3.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	11/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	A2
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISW103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:21				8.20	1204	7.88	-138	14.5	C NTU 964 17.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 11/8/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

★ Surface Water ★

						Bore ID:	A2[illegible]S
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: SG103803	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI ProDSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SP E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	Surface			8.03	1201	7.93	-123	13.9	C 946 NTU 0.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	BJ NS-B1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	7/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: YSI PRO DSS	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			7.80	1202	7.86	-137	13.8	945	0.5	
	50cm			7.~~66~~55	1202	7.83	-138	13.7	943	1.0	
	100cm			6.40	1202	7.76	-146	13.7	943	2.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	South S1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15410 3303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI PHO DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			[illegible]	312	[illegible]	-196	10.9	C 228 NTU 5.3 Not deep enough to profile.
				1.10		6.45			
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 11/8/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	A3
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 1541033503	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI PRODSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SpC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			1.17	347	6.08	-169	11.0	C 255 NTU 11 Not deep enough to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	RD1A
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15410330	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	Surface			0.90	731	6.57	-.208	13.1	566	31	Not deep enough to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 11/8/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

* Surface Water *

						Bore ID:	RD1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/3/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			1.40	741	6.73	-127	13.0	571 0.5 Not deep enough to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/3/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

★ Surface Water ★

						Bore ID:	A / N
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: ISQ103303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	10cm			0.68	982	6.62	-271	13.8	C 769 NTU 42.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
TW	11/8/17		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	AIE
Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Sample Date:**	11/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15410330	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.73	1305	6.59	-278	12.4	990	96.8	* Not deep enough to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
11/8/17			
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

* Surface Water

Project Name:	Buidling Roe 8	**Project Number:**	60478410	**PM Name:**	M. O'Rourke	**Bore ID:**	NLWS-N2
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW, LF	**Sample Date:**	11/8/17
						Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G103303	☐ Decontaminated	☑ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			5.38	3130	6.02	-148	15.7	C 2574 NTU 62. Not deep enough to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A.	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/2/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	A1
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15410330	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SpEC~~ EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTu	Odour, Colour, Turbidity
	15cm			2.95	2826	6.26	-176	15.2	2287	23.5	
				0.83	4742	6.13	-215	15.1	3875	27	
	40cm										
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	11/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water

						Bore ID:	FS4A
Project Name:	Buidling Roe 8	Project Number:	60478410	PM Name:	M. O'Rourke	Sample Date:	11/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW, LF	Well Development or Well Sampling Event? (circle	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 15G105303	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm depth			4.08	657	6.32	-131	12.7	C 503 NTU 11.5
Acceptable Parameter Range:			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A.	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	11/8/2017		

Project Manager Signature _____ Date _____

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D7
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW KC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.325	Screen Interval (m):	Chem Kit Model: YSI ProDSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.35	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:28	0		~0.3/min	5.01	2660	7.30	70.4	16.6	287 Slightly turbid, no odour
07:31	1			4.77	839	7.32	26.3	16.7	696
07:34	2			4.84	912	7.31	14.9	16.7	762
07:37	3			4.26	1039	7.26	-16.1	17.2	880
07:40	4			4.03	1082	7.24	-23.1	17.2	919
07:43	5			3.86	1160	7.23	-26.0	17.3	984
07:46	6			3.71	1197	7.22	-27.5	17.3	1024
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	2	x 40 mL Vial (HCl)	2	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	2x extra Amber	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		2	x 40 mL Vial (H_2SO_4)	4	x 100 mL Amber	2	x 250 mL Plastic	Duplicate WQA01	

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	24/8/17	TIM W	24/8/17

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.623	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.135	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:01	0		0.3/min	3.94	337	5.84	136.4	18.2	293	Clear, nil odour
8:04	1.2		"	3.82	324.2	5.75	154.6	18.7	325	
8:07	2.4		"	3.84	322.7	5.76	161.4	18.6	283	
8:10	3.6		"	3.81	321.4	5.75	164.8	18.6	281	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	24/8/17	TW	24/8/17

Project Manager Signature _____ Date _____

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H104156	☑ Decontaminated	☑ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.295	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.65	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spec. Cond. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:39	1		0.3	1.77	507	4.59	158	17.8	Turbid, brown, lots of organic content
11:42	2.2			1.37	502	4.68	188	17.9	
11:45	3.4			1.27	495	4.69	199	18.0	
11:48	4.6			1.20	490	4.69	200.6	18.1	
11:51	6-			1.10	489	4.69	201.3	18.2	
11:54.	6.8			1.01	491	4.69	201-	18.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Tim W Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T35
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.295	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SpC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12.09	~~0.05~~ 1.0		0.3	1.91	165	5.85	145.2	19.4	C 105 Clear, no odour.
12.12	2.0			1.14	175	5.83	94-	19.7	157.
12.15	3.0			1.00	176	5.82	87-	19.9	159
12.18	4.1			0.84	179	5.82	80.7	19.9	161
12.21	5.2			0.75	180.5	5.81	77.	20.0	163
12.24	6.3			0.68	181	5.81	74.3	20.0	165
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Tim W Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T48.
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 1741011556	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.59.	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.135.	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spec. Cond. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12:47.	2		0.3l/m	2.07	514	5.24	13.	18.5.	512	Turbid, sulfur smell
12:50	3			1.78	510	5.27	-11.1	18.6	448	
12:53	4.2			1.40	512	5.26	-22.7	18.6	450	
12:56.	6.			1.17	514	5.26	-31.7	18.6	451.4	
12:59	7			1.02	516	5.26	-40.6	18.6	453	
1:02	8.2.			0.91.	517.	5.26	-46.5	18.7	454	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.285	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.165	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up)	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:13	0		0.3/m	3.30	752	5.08	12.7	17.1	774
10:16	2		PHONE CALL - MISSED SAMPLING						
10:19	3			0.53	971	5.21	9.2	18.2	844
10:22	4			0.47	974	5.91	9.3	18.3	850
10:25	5			0.44	975	5.90	9.4	18.4	853
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	TW Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-TSE-A.
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.66	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.6	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
10:32	0		0.3	1.43	805	5.24	65	18.5	767 Clear, sulfur smell
10:35	1.2			0.75	816	5.12	66	18.8	719
10:38	2.4			0.63	818	5.09	61	18.9	724
10:41	3.6			0.52	821	5.08	56.7	19.1	728
10:44	4.8			0.51	820	5.08	47	19.1	728
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D5
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17M101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.3m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (flatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:52	0		0.3	6.47	351	5.38	113.5	18.1	624	Slightly turbid
10:55	1.2			1.84	748	5.35	101.3	18.3	649	No odour.
10:58	2.4			1.71	759	5.36	100.7	18.4	662	
11:01	3.6			1.59	774	5.37	100.4	18.5	678.	
11:04	4.8			1.56	778	5.37	100.3	18.6	683	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Tim W Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 174101.56	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.00	Screen Interval (m):	Chem Kit Model: WSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.12	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:12	0.5		0.3l/m	1.76	380	5.55	45.6	17.2	322 Clear
11:15	1.8			1.39	372	5.46	47.1	17.2	317
11:18	3 -			1.27	372	5.42	52.3	17.2	316
11:21	4			0.91	370.1	5.38	56.4	17.2	315.5
11:24	5			0.75	368	5.36	61.1	17.3	314.7
11:27	6.1			0.67	367	5.36	62.3	17.4	314.5
11:30	7			0.64	367	5.36	63.3	17.4	314.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	24/8/17	Tim W	24/8/17

Project Manager Signature — Date — Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RF	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17410156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.34	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): [illegible]	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☑ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): 12.32	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spec. Cond. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
15:47	0.5			4.62	261	5.30	68	18.7	235.2. Milky, Sulfur smell
15:50	1.5.			2.56	603	5.25	57.8	19.3	538
15:53	2.5.			2.12	599	5.27	47.1	19.6	535.
15:56	3.4			1.89.	586	5.28	40.2	19.6	526
15:59	4.2.			1.81	577	5.29	35.5	19.7	517.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	Tim W Checker Name and Signature	24/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 24/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.06	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.47	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:38	1		0.3/min	8.23	242	4.59	276	20.9	C 224 Milky
14:41	2			7.59	243	4.45	302	20.9	224.2
14:44	3.2			7.16	242	4.38	317	20.9	223.5
14:47	4.2			6.97	242	4.35	323	20.9	223.3
14:50	5.2			6.79	241.6	4.33	329	21	223.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	24/8/17 Date	TIM W Checker Name and Signature	24/8/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 25/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H1D1156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.10m	Screen Interval (m):	Chem Kit Model: YSI Pro Dss	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.92m	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:04	0			2.70	108	6.35	126	16.2	90 Clear, no odour
8:07	1.8			2.07	216.5	6.05	157	17.4	185.2
8:10	3			1.90	215.8	6.03	166.8	17.5	184.9
8:13	4.5			2.05	216	6.04	172	17.6	185
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	25/8/17 Date	TIM W Checker Name and Signature	25/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 25/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.43	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.83	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:25	0.5		0.3/min	3.51	463	6.07	50.4	17.0	410. Slightly turbid, no odour
8:28	1.5			2.01	499	6.02	28.5	18.6	438
8:31	3			1.82	502	6.01	28.0	18.7	441
8:34	4			1.61	503	6.00	27.9	18.7	443
8:37	5			1.35	504	5.98	28.0	18.7	443
8:40	6			1.18	504	5.97	28.4	18.8	444
8:43	7			1.11	504.	5.97	28.5	18.9	445
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	✓	x 40 mL Vial (HCl)	✓	x 60 mL Ferrous	✓	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		✓	x 40 mL Vial (H_2SO_4)	✓	x 100 mL Amber	✓	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	25/8/17 Date	Tim W Checker Name and Signature	25/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 23/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17A10156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.60m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	Gauging
Bore Depth (m-pvc): 5.57m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Hydrasleeve in
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve out
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Parameters
	Key Type (if applicable):	☑ Retrieved				
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
13:35	1		0.3l/m	3.16	663	6.19	102.5	18.2	577. Slightly turbid, no odour.
13:38	2.1			2.58	660	6.16	116.4	18.1	573
13:41	3.2			2.32	656	6.13	123.5	18.1	570
13:44	4.4			2.05	654	6.12	128.2	18.1	568
13:47	5.6			1.83	652	6.12	130.2	18.1	567
13:50	7			1.73	649	6.11	131.6	18.2	564
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — 23/8/17 Date — Tim W — Checker Name and Signature — 23/8/17 Date

Project Manager Signature — Date — Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/08/17.
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 23/8/17	Bore Radius (mm):	Chem Kit Serial No.: 17H011156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.435	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.56	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
2:10	0		~0.4	4.35	285	5.89	142	18.2	483 No odour
2:13	1.2			1.52	589	5.68	174	18.7	518
2:16	2.6			1.27	588	5.66	180	18.9	520
2:19	3.9			1.10	587	5.64	183	19.2	522
2:22	5.			0.88	585	5.64	184	19.6	524
2:25	6.			0.85	584	5.64	184	19.7	525
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Tim W Checker Name and Signature	23/8/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	~~BH~~ A1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S/C E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.2	2556	6.92	-153	15.8	2108	20.4	
	50cm			0.15	2718	6.72	-155	15.8	2240	31	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPEC.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			1·14	739	6·23	108	11.0°	584	17·8	
	50cm			0·83	734	6·23	107	13·6°	575	123.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	23/8/17		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water:	☑	Groundwater:	☐		
Bore / Location ID:	FS4A				
Sample Date:	23/8/17				
Well Development or Well Sampling Event? (circle)					

Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 174101 56	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm~~ or mg/L)	SPC ~~E.C.~~ ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			1.13	736	6.25	98	13.9°	580	14	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	
		1	Chlorophyll					

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

[signature]	23/8/17		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water:	☑ Groundwater: ☐
						Bore / Location ID:	41N
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 174101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC ~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.18	1085	6.6	-135	13.3	840	160	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

[signature] 23/8/17

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SP E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
	15cm			0.34	2339	7.05	-127	16.2	1947 36	
	60cm			0.16	2807	7.06	-147	15.6	2303 52.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	CMorphy 11						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South S1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
	15cm			0.56	329	6.26	119	11.8	247 119 Too shallow to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.29	351	5.95	60	11.8	263	157	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	A 23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~S/C E.C.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			0.47	857	6.55	58	14.3	681 200
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
23/8/17			

Project Manager Signature	Date	Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H1011556	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			5.3	1176	7.61	137	15.8	969	8.2	
	100cm			5.17	1176	7.59	86.7	15.7	969	20	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	2	x 40 mL Vial (HCl)	2	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	2x extra amber	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		2	x 40 mL Vial (H_2SO_4)	3	x 100 mL Amber	2	x 250 mL Plastic	WQA02 duplicate.	
		2	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
23/8/17			

Project Manager Signature | Date

Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/8/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or~~ mg/L)	~~SP~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
	15cm			5.39	1176	7.61	145	15.8	970 38	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	23/8/17		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H 101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SAL~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.37	857	6.56	58	14.3	C 679 NTU 143 Too much rubbish to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	x Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~SPC E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			5.9	1174	7.63	144	16.1	C 974 NTU 13.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	x Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H10115G	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.19	1127	6.69	-222	15.3°	C 918 NTU 85.2
	40cm			0.13	1114	6.70	-231	14.4°	889 7.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	x Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	23/8/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	B2 Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/8/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S/C E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU C Odour, Colour, Turbidity
	15cm			5.39	1174	7.56	92.5	16.0°	3.5 973
	50cm			5.53	1174	7.59	102	16.0°	10.2 972
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		Profile only.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
23/8/17			
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.05m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.13m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
15:24	0			1.91	746	5.19	78.5	17.1	652 Tenin stained, slight sulphur odour
15:27	1.0			0.30	459.8	5.28	38.1	17.1	386.9
15:30	2.0			0.18	405.3	5.29	29.5	17.1	343.3
15:33	3.0			0.13	386.0	5.29	23.5	17.1	326.2
15:36	4.0			0.11	374.7	5.30	20.3	17.1	318.0
15:39	5.0			0.10	373.5	5.30	19.1	17.1	317.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T33
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 6/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.43m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.85m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SpC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
14:49	0			1.64	191.1	5.83	~~120.3~~	22.0	178.7	Slightly cloudy.
14:52	1.1L			0.53	193.7	5.81	50.9	20.2	176.4	
14:55	2.0L			0.45	195.7	5.80	41.3	20.3	178.1	
14:58	3.0L			0.32	196.4	5.79	33.1	20.3	178.8	
15:01	4.0L			0.25	196.3	5.79	30.8	20.3	178.6	
15:04	5.0L			0.17	195.8	5.79	25.8	20.3	178.0	
15:07	6.0L			0.15	195.6	5.79	24.6	20.3	177.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	6/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-DS
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6-9-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.26m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
14:00	0			4.26	874	5.75	43.0	22.2	798	Weak tea colour, slight sulphur odour
14:03	1.0L			0.50	958	5.40	34.7	18.9	846	
14:06	2.0L			0.25	970	5.40	30.6	18.9	856	
14:09	3.0L			0.17	971	5.40	25.0	18.7	855	
14:12	4.0L			0.15	972	5.41	21.0	18.7	854	
14:15	4.9L			0.12	972	5.42	15.3	18.8	857	
14:18	5.8L			0.11	971	5.43	11.8	18.7	854	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 6/9/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.25m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
13:34	0			1.48	948	5.84	-13.8	18.5	830	Slightly turbid, slight sulphur odour.
13:37	1.2L			0.40	930	5.86	-44.3	19.0	824	
13:40	2.3L			0.25	924	5.87	-50.3	19.2	822	
13:43	3.1L			0.20	922	5.87	-52.1	19.3	820	
13:46	4.0L			0.16	924	5.87	-53.9	19.4	825	
13:49	4.9L			0.14	923	5.87	-54.3	19.4	824	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
6/9/17			

Project Manager Signature	Date	Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.68m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.72m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (flat/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SpC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
13:01	0			0.70	1114	4.60	43.8	19.4	978	Slightly turbid, slight sulphur odour
13:04	1.2L			0.27	1105	4.61	27.0	19.6	992	
13:07	2.1L			0.35	1131	4.63	16.0	19.5	1021	
13:10	3.0L			0.19	1110	4.68	3.1	19.4	990	
13:13	4.0L			0.16	1109	4.70	-4.8	19.4	990	
13:16	5.1L			0.14	1100	4.73	-13.7	19.4	983	
13:19	6.0L			0.11	1100	4.71	-20.6	19.4	981	
13:22	7.0L			0.10	1093	4.73	-21.2	19.4	978	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x ~~60~~ mL Ferrous		x 60 mL metals (~~HNO_3~~)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x ~~250~~ mL Plastic		blocked by roots?

Approval and Distribution

Fieldwork Staff Signature	6/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	[redacted] BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.08	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.43	Casing Radius (mm):	**Corrected Redox:** Y / (N)		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:**	☑ Downhole		☐ Other (specify) CO_2	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~SPCE.C.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
15:05	0			8.55	245	4.78	202	22	229	Very cloudy, slightly yellow
15:09	1.0L			5.16	257.6	4.35	286.7	20.9	237.4	
15:13	1.5L			5.08	257.7	4.38	303.0	20.7	236.3	
15:18	3.0L			5.40	257.0	4.41	309.4	20.6	235.5	
15:22	3.8L			5.76	255.1	4.45	310.3	20.7	234.2	
15:25	4.6			6.01	254.7	4.47	311.6	20.7	233.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/9/17 Date	Checker Name and Signature	7/9/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D7
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.375	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SR E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
11:11	0			4.88	1616	6.90	71.9	19.5	1440
11:14	1.0L			4.29	1521	7.06	67.8	18.9	1341
11:17	2.0L			4.45	1414	7.12	68.8	18.9	1246
11:20	3.0L			4.50	1380	7.13	72.2	18.8	1217
11:23	4.0L			4.38	1386	7.13	74.3	18.7	1221
11:26	5.0L			4.33	1381	7.13	75.7	18.7	1218
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	7/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 7/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.91	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:41	0			3.20	214.0	6.15	65.8	18.5	187.0	Turbid, nil odour.
10:44	1.0L			1.82	211.3	6.12	114.4	18.4	184.7	
10:47	2.0L			1.74	212.8	6.11	130.3	18.4	185.8	
10:50	3.0L			1.98	215.3	6.11	142.5	18.3	188.0	
10:53	4.0L			2.02	216.3	6.11	151.3	18.4	188.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 7/9/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	7/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.365	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.53	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:15	0			3.71	505	5.97	30.0	20.1	458.1	Slightly cloudy, nil odour
10:18	1.0L			0.85	505	5.94	-0.4	19.8	455.0	
10:21	2.0L			0.46	506	5.91	-7.5	19.9	456.7	
10:24	3.0L			0.40	506	5.90	-8.7	19.9	456.2	
10:27				0.37	506	5.90	-9.4	19.9	456.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 7/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T43
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 7/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.56	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.19	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
09:46		0		3.99	503	4.91	154.8	19.0	439	Strong sulphur odour, very
09:49		1.0L		0.73	447.0	5.22	8.2	17.9	386.2	cloudy
09:52		2.0L		0.28	445.6	5.23	-29.9	17.9	385.5	
09:55		3.0L		0.18	445.7	5.24	-48.9	18.0	385.6	
09:58		4.0L		0.17	445.6	5.24	-57.3	18.0	385.6	
10:01		5.0L		0.16	446.3	5.24	-60.8	18.0	386.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.335	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.59	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:13	0			1.60	279.4	5.15	158.1	18.1	252.1 Tan stained, sulphur odour.
09:16	1.0L			0.36	235.6	4.90	174.8	18.1	204.7
09:19	2.0L			0.21	235.0	4.87	175.3	18.2	204.6
09:22	3.0L			0.17	238.3	4.90	167.7	18.3	207.9
09:25	4.0L			0.16	240.1	4.91	162.5	18.4	210.1
09:28	5.0L			0.15	243.5	4.91	160.8	18.4	213.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.615	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type ((gatic)/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ EC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:37	0			3.90	327.4	5.69	165.3	18.8	288.8 Mostly clear nil odour.
08:40	0.7L			3.07	314.2	5.72	161.0	19.2	279.3
08:43	1.5L			4.06	286.7	5.92	159.9	19.3	255.5
08:46	2.1L			3.33	306.3	5.78	152.6	19.3	273.3
08:49	2.8L			3.20	314.6	5.76	147.5	19.4	281.0
8:52	3.3L			3.35	309.3	5.81	145.2	19.4	276.8
8:55	4.0L			3.33	311.9	5.80	144.5	19.4	279.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
	15cm			4.15	1204	7.63	110	20.1	1093 3.3	
	50cm			3.95	1202	7.59	113.6	20.0	1088 5.0	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
8/9/17			
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			5.21	1202	7.73	111	21.0	1113 15.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SPC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	15cm			3.21	1210	7.42	90.8	20.3	1103	3.8
	100cm			2.59	1210	7.38	72	19.5	1086	4.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
	15cm			4.13	1215	N/A	77	20.7	1115	8
						7.51				
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~EC~~ SEC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.44	729	6.62	53	16.6	612	400	Lots of organic matter in water
				0.29							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SpEC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.25	752	6.71	16.0	16.3	C 628 NTU 26.5
									Too much debris for deeper reading.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU	Odour, Colour, Turbidity
	15cm			0.92	772	6.57	-6.4	17.4	655 / 5.8	
	40cm			0.40	772	~~6.58~~	-88	15.9	638 / 246	
						6.48				
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	FS4A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU	Odour, Colour, Turbidity
	15cm			2.02	773	6.64	-65.1	18.2	670 / 1400	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South 51
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gator/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPEC. COND.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.42	346	[illegible]	-51	14.4	C 275 NTU 700
						6.37			
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
[signature]	8/9/17		

Project Manager Signature	Date	Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			0.51	~~1370~~	6.01	-74	13.0	287 180
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SRC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			0.40	1609	7.21	-187	17.1	1365 49
	40cm			0.25	1653	7.07	-210	16.7	1389 330
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — 8/9/17 Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS - N2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.18	1602	7.29	-190	17.0	1371	29.8	
	40cm			0.13	1830	7.12	-217	16.1	1516	60	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
8/9/17			

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIN
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or mg/L)~~	E.C. ~~(mS/cm or µS/cm)~~ EQC	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.24	1218	6.74	-170	19.5	C 1083 NTU 51
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C)	(NTU)
	15cm			0.15	1198	6.87	-199.5	17.4	1023	33.7
	40cm			0.12	1242	5.98	-165	16.2	1034	5.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	8/9/17		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 13/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.67	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	**Corrected Redox:** Y / (N)		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
4:04	0			1.54	688	6.05	161	18.4	604
4:07	1.0L			0.47	722	6.05	158.3	18.4	631
4:10	2.0L			0.34	718	6.06	155	18.4	626
4:13	3.0L			0.30	688	6.08	154	18.5	602
				0.27	691	6.08	152	18.4	605
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

Kim Murdoch farm manager
0414 362 473.

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	13/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 13/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.49	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.55	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):			

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
4:26	0			2.20	525	6.16	137	18.6	460	Strong sulphur odour
4:29	1.0L			0.36	516	5.68	168	19.1	456	Slightly cloudy
4:32	2.0L			0.25	509	5.67	172	19.1	451	
4:35	3.0L			0.20	509	5.66	175	19.1	451	
4:38	4.0L			0.19	493	5.62	178	19.1	440	
4:41				0.18	490	5.63	176	19.1	434	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 13/9/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SpC EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	30cm			5.17	1242	7.65	96.9	22	C 1172 NTU 9.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 19/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLWS- B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	30cm			5.08	1243	7.64	99.3	22.1	1173	4.8	
	100cm			3.87	1249	7.45	-27.3	21.2	1161	74	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	2	x 40 mL Vial (HCl)	~~2~~ 4	x 60 mL Ferrous	4	x 60 mL metals (HNO_3)	2x extra Amber	Bore volume calculation, bore condition, fate of tubing, redox correction etc
		2	x 40 mL Vial (H_2SO_4)	4	x 100 mL Amber	2	x 250 mL Plastic	WQA02	
		2	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	19/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BD1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	30cm			0.27	682	6.58	-136	16.8	577 630
									Too polluted to get a deeper reading
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 19/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.25	706	6.58	-34.5	16.6	C 593 NTU 370
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	19/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

White stake

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or~~ mg/L)	E.C. ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.59	799	6.62	-21.4	17.7	690	8.7	
	40cm			0.16	800	6.60	-43	16.5	668	23	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	19/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Edge

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS4A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	19/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm)~~ or mg/L)	Spec E.C. ~~(mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
	30cm			0.33	800	6.65	-29	18.1	691 1200	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 19/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			6.24	242	7.72	83.7	21.9	1170 7.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	19/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	19/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SP~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C	Odour, Colour, Turbidity NTU
	15cm			5.36	1243	7.51	80.5	22.1	1174	2.1
	60cm			4.98	1243	7.57	81.3	21.7	1165	3.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 19/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 22/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 12.865	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.61	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:46	0			10 –	256 6	6.00	174.3	19 –	227.1 Cloudy, yellow taint.
10:49	1			8.61	256.4	5.84	193.1	19.5	229.3.
10:52	2			8.49	254.9	5.82	201.7	19.5	228.1
10:55	2.8			8.50.	255 –	5.82	204.5	19.4	227.9 Milky.
10:58	3.			8.50.	254.7	5.81	206.9	19.4	227.8
11:01	4.			8.48	254.9.	5.81	208	20.1	231
11:04.	4.5.			8.49	254.3	5.81	209	20.2	231 – Cloudy, milky.
11:07.	5.1.			8.51.	254 6.	5.80	209.7	20.3	231.2.
11:10.	6.			8.55.	254.2	5.80	211.4	19.9.	229.2.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	22/9/17 Date	Tim W Checker Name and Signature	22/9/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 22/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.225	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.37	Casing Radius (mm):	Corrected Redox: Y / N		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
1:37	0			2.70	6.74.	6.29	-57.3	20.2	613	Clear, slight Sulfur smell
1:40	0.3			1.27.	690	6.24	-71.6	20.3	629	
1:43	1			1.00	672.	620	-76.6	20.4	612	
1:46	1.4.			0.80	710	6.22	-82.2	20.4	649	
1:49	1.8			0.54	713.	6.22	-85.5	20.5	652	
1:52.	2.4.			0.45	715	6.22	-89.2	20.5	653	
1:55.	3			0.39	724	6.22	-93.7	20.5	663	
1:58	3.5.			0.39.	721	6.23	-95.7	20.3	654	
2:01	4			0.39.	725.	6.23	-97.9.	20.0	655.	
2:04.	4.5.			0.38.	732.	6.23.	-99.2	19.9	659.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1 x 40 mL Vial (HCl)	1 50 mL Ferrous	1 x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1 x 40 mL Vial (H_2SO_4)	1 100 mL Amber	1 x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	22/9/17 Date	Checker Name and Signature	22/9/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

AECOM

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	26/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~SPC~~ EC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.58	358	6.33	-52.1	12.2	C 271.1 NTU 285
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South - S1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.94	350	6.81	-102	11.9	C 262.5 NTU 75
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		2	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 26/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIN
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or~~ mg/L)	~~S.C.~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	30cm			0.20	~~1106~~	7.17	-141.4	13.8	869	210	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	
		1	Chlorophyll					

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date** 26/9/17	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑ Groundwater: ☐	
						Bore / Location ID:	NLWS - N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~S/C~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.17	1299	7.42	-187	13.7	1019	29.6	
	30cm			0.13	1306	7.44	-217	13.7	1024	43.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 26/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or~~ mg/L)	~~S.C.E.C.~~ ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.29	1282	7.33	-171	13.7	1006	37	
	50cm			0.22	1287	7.32	-182	13.3	1011	30	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	
		1	Chlorophyll					

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc

Approval and Distribution

Fieldwork Staff Signature	26/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-05.
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26-9-17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.22	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.96	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:57	0			2.80	916	5.67	70.2	17.3	693. Tea colour
12:00	1.1			1.20	564	5.20	133.7	17.7	466.4.
12:03	2.3			1.91	462.7	4.96	153.6	17.5	398.6
12:06	3.7.			1.58	713	5.16	120.3	17.8	618.
12:09	4.6.			1.23	711	5.20	119.3.	18 —	615.
12:12	5.5.			1.08	727.	5.23	114.8.	17.8	628.
12:15	6.4.			1.03	734	5.24	113.2	17.7.	634.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/9/17 Date	Tim W Checker Name and Signature	26/9/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.185.	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16.	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:27	0			2.05	877	5.87	62.9	16.8	734. Clear.
11:30	1.5			0.36	827	6.01	15.8	17.9	709.
11:33	3			0.25	804	6.01	12.2	17.9	696
11:36	4.			0.20	803	6.01	9.6.	18 —	697.
11:39.	5.			0.17.	804.	6.01	8.7.	18.1	698
11:42.	6.			0.13	807	6.01	4.4.	18—	698.
11:45.	7.			0.12	808	6.01	5.3	18	700.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/9/17 Date	Tim W Checker Name and Signature	26/9/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-TSE-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	26/9/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.615	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.62	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:59	0			2.13	827	5.50	75.4	18.2	725 Sulfur smell, organics visible.
11:02	1.2			0.35	823	5.34	81.2	18.6	722
11:05	2.8.			0.26	829	5.29	81.5	18.7	728
11:08	4.0			0.23	829	5.27	80.0	18.7	728
11:11	4.6.			0.21	825.	5.27	78.6	18.7	726
11:14.	5.2.			0.19	828	5.25	75.8	18.7	728.
11:17	6			0.18	830	5.25	73.4	18.7	729
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	26/9/17 Date	TIM W Checker Name and Signature	26/9/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

AECOM

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	26/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/9/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.615	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.135	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:14	0		~0.3L/m	3.44	342.3	6.05	35.9	18.7	302.8	Slightly turbid
10:17	1			2.50	345.6	5.73	89.7	18.6	303.2	
10:20	2			2.49	346-	5.71	103.8	18.8	305.2	
10:23				Battery on Pump			Died			
10:26	2.5			2.35	343.8	5.70	117	18.9	303.2	
10:29	3			2.33	339.6	5.68	128.7	19.2	301.7	
10:32	3.5			2.77	332.6	5.73	129.2	19.1	294.1	
10:35	4.2			2.75	330.8	5.72	130.8	19.1	293.8	
10:38	5.			2.52	332.7	5.70	131.9	19.1	295.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc

Approval and Distribution

Fieldwork Staff Signature — Date: 26/9/17

Checker Name and Signature: Tim W — Date: 26/9/17.

Project Manager Signature — Date

Distribution: Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TH
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.315	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.82	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Sp.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
4.05	0			2.43	560	6.17	67.0	19.3	445.8
4.08	1 L			0.36	501	5.95	36.7	19.6	456.8
4.11	2 L			0.24	510	5.94	31.9	19.6	457.1
4.14	3 L			0.23	509	5.93	30.5	19.6	456.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 27/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B, T4B
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.49	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.12	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	Odour, Colour, Turbidity
1.03				1.56	457.6	5.62	35.5	18.1	389.0
1.06				0.48	446.1	5.33	18.0	17.8	386.1
1.09				0.26	443.7	5.31	6.8	17.7	382.7
1.12				0.19	442.3	5.31	−0.9	18.0	383.0
1.15				0.16	442.4	5.31	−9.3	17.9	383.0
1.18	6.5			0.14	441.3	5.31	−16.0	18.0	382.7
1.21				0.13	441.3	5.31	−22.4	17.9	381.6
1.24				0.12	440.7	5.31	−28.6	17.8	380.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		Strong Sulfur Slightly turbid.

Approval and Distribution

Fieldwork Staff Signature	27/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Wetlands Bridge

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	TJBC
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.12	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

	Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
3	9.15				1.48	478	5.37	119.4	17.1	400
3	9.18				0.44	372.1	5.37	107.9	17.1	317.4
3	9.24	2.5			0.30	372.0	5.38	108.0	17.2	316.2
3	9.24				0.26	373.5	5.35	108.5	17.2	318.4
3	9.27				0.25	376.7	5.35	109.1	17.2	320.7
	Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	27/9/17		

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~BH~~ D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.36	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.55	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spec. Cond. (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	Odour, Colour, Turbidity
9.29	0			1.62	527	5.90	137.6	18.4	46.4.2
9.32				0.45	519	5.68	152.9	19.0	459.5
9.35				0.28	512	5.65	159.1	18.9	452.6
9.37				0.23	499.6	5.62	161.8	18.9	446.7
9.39	6			0.22	493.0	5.62	163.7	19.0	435.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		Slightly turbid. no odor

Approval and Distribution

Fieldwork Staff Signature	27/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D7
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.27	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.39	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	Odour, Colour, Turbidity
10:18				8.69	832	6.94	109.8	18.0	C 746
10.21	1.3			8.50	994	7.25	97.3	18.2	865
10.24				8.08	1070	7.31	92.5	18.1	934
10.27	4.2			7.58	1187	7.30	91.7	18.2	1042
10.30				7.16	1294	7.29	90.5	18.3	1130
10.33				6.76	1391	7.28	90.2	18.3	1213
10.36	8			6.23	1456	7.28	90.5	18.2	1269
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	2	x 40 mL Vial (HCl)	2	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	2+ extra amber WQA01	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		2	x 40 mL Vial (H_2SO_4)	4	x 100 mL Amber	2	x 250 mL Plastic		Slightly turbid

Approval and Distribution

Fieldwork Staff Signature — Date: 27/9/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~BH~~ T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.42	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.23	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC. (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	Odour, Colour, Turbidity
10.54				1.67	210.4	6.75	-1.7	18.4	182.4
10.57				0.41	191.4	6.10	42.2	19.3	170.7
10.59	3			0.30	148.5	6.03	52.4	19.5	168.7
11.02	5.5			0.24	186.5	5.94	60.8	19.5	166.8
11.05				0.21	185.4	5.97	65.4	19.5	166.0
11.07	6.5			0.19	184.6	5.95	68.7	19.6	165.2
11.10				0.18	194.0	5.94	70.1	19.6	165.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.23	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.62	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV) orp	Temp °C	C	Odour, Colour, Turbidity
11.21				1.84	390.4	5.04	139.2	17.8		338.2
11.24	1.5			0.91	396.8	4.86	155.2	17.6		341.0
11.27				0.75	390.2	4.85	160.6	17.7		335.2
11.30	3.5			0.66	376.6	4.97	149.5	17.8		326.6
11.33				0.63	382.7	5.10	128.5	17.8		330.5
11.36				0.66	387.9	5.01	120.5	17.8		334.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		Dark, coffee coloured water

Approval and Distribution

Fieldwork Staff Signature	27/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwat ☑
						Bore / Location ID:	~~BH~~ D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.57	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV) o/p	Temp °C	C	Odour, Colour, Turbidity
9.07	0			2.60	684	6.07	147.0	17.7	1320 598	Battery on pump died
9.10				0.57	688	6.12	147.0	18.0	596	
9.13				0.33	697	6.14	146.1	18.0	604	
12.32				3.63	693	6.04	118.8	18.6	605	
12.35				1.50	687	6.05	131.1	18.2	598	
1238				1.91	690	6.07	137.2	18.4	601	
12.41	3.5			0.97	667	6.07	136.9	18.3	583	
12.43				0.83	667	6.08	135.1	18.4	582	
12.45	5			0.69	663	6.09	134.1	18.4	580	
12.48				0.61	647	6.10	131.8	18.4	564	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		Slightly turbid

Approval and Distribution

Fieldwork Staff Signature	Date: 28/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Fence

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - 04
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	29/9/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 7	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.9	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	EC (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	C	Odour, Colour, Turbidity
3.41				3.04	259.3	6.11	114.1	18	224.6	
3.44	2.5			2.41	259.4	6.16	127.9	18	225	
3.47				2.61	258.3	6.15	137.9	18.2	225.4	
3.50				2.66	260.1	6.16	141.7	18.2	226.1	
3.53				2.64	258.7	6.17	143.6	18.3	225.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 26/9/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	26/9/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~E.C. (mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	0.30~~m~~			0.23	1118	7.21	-122.4	14.6	896	34.7	
	0.60m			0.19	1118	6.86	-119.7	14.5	894	2.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	26/9/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	1-S2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm~~ or mg/L)	~~E.C.~~ ~~(mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	30cm			1.08	718	6.63	28.2	~~13~~ 13.8	564 3.6
	60cm			0.84	718	6.61	25.5	13.7	564 20.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	4/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A1 E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~S.C.~~ SPC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
	30cm			0.34	1094	7.20	-57.8	13.8	C 861	NTU 37.9
	60cm			0.23	1090	7.14	-67.5	13.9	860	107.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.19	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth: 11m	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.57	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC~~ ~~EC~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:58	0			4.01	797	6.18	-21.4	20.4	731 Sulphur odour, slightly turbid
15:02	1.0L			0.56	909	6.16	-50.9	20.1	824
15:06	2.1L			0.43	884	6.16	-58.1	20.0	800
15:10	3.1L			0.39	854	6.16	-63.9	20.0	772
15:14	4.1L			0.38	852	6.16	-65.7	20.0	770
15:18				0.37	850	6.16	-67.7	20.0	768
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH 10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 4/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate: 8%	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 12.82m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth: 17m	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.69 m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☑ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
14:12	0			10.26	236.6	5.78	168.7	21.9	224.8	Cloudy yellow
14:17	1.1L			8.54	242.7	5.51	199.3	21.0	223.7	
14:21	2.1L			8.46	239.8	5.51	204.4	21.2	222.2	
14:25	3.1L			8.43	238.6	5.52	207.5	21.1	221.1	
14:29	4.1L			8.48	237.9	5.52	210.2	20.9	219.5	
14:33				8.47	237.6	5.52	211.6	21.1	219.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	4/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW TSEA
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.62m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.6m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8.36				0.69	1013	5.09	47.3	18.5	890	Clear, slight sulphur odour
8.39	1.7L			0.29	1014	5.00	40.2	18.7	897	
8.41	3L			0.20	1025	4.97	38.4	18.7	902	
8:44	4L			0.17	1031	4.96	36.4	18.7	908	
8:47	5L			0.14	1030	4.95	33.1	18.8	907	
8:50	6L			0.12	1029	4.96	30.1	18.7	906	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3S
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	5/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 0	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.08	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~E.C.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
09:53	0			2.64	386.9	5.81	75.5	16.8	326.8	Clear
09:56				1.44	392	5.35	80.5	17.1	335	
09:59	1.8L			0.44	350.2	5.32	81.9	17.0	296.9	
10:01	3L			0.31	355.5	5.31	82.4	17.1	301.7	
10:03	4L			0.23	363.5	5.31	81.9	17.1	308.2	
10:06	5L			0.17	374.2	5.30	80.8	17.1	318.0	
10:09	6L			0.16	380	5.30	79.7	17.2	323.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A 1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

	Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
30cm	8.13				0.42	1204	7.25	84.5	14.8	970	20.7	
45cm	8.15				0.20	1178	7.30	-108.2	14.9	950	25.4	
Acceptable Parameter Range:					± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNSB1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
20am ~~7.59~~				7.6	1160	7.84	81.7	16.2	965	5.8	
50am 8.00				7.05	1160	7.85	80.9	16.2	965	4.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU Odour, Colour, Turbidity
				0.33	768	6.60	-5.4	14.3	611 / 13.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
				0.56	784	6.5	72.3	14.2	C NT 623 3.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS6A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
				1.54	723	6.7	20.3	13.2	C 560 NTU 17.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIN
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	°C NTU Odour, Colour, Turbidity
8.25				1.16	1103	7.32	-62.1	13.6	862 54.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox Orp (mV)	Temp °C	Odour, Colour, Turbidity
7.48				7.64	1155	7.8	86.8	16.4	C 965 NTU 5.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:58				7.22	1161	7.69	88.4	16.1	964 NTU & 8.8
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	NLW3 DW2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
20cm 8.18				0.31	1144	7.38	~~-105.5~~	14.9	C 968 NTU 21.7
50cm				0.17	1199	7.37	-115.5	14.9	969 24.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/10/2017
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC~~ EC: (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C	NTU
	30cm			7.05	1151	7.64	97.1	16.4	961	2.7
	50cm			7.11	1151	7.77	90.4	16.4	962	2.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South SL
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU Odour, Colour, Turbidity
			1.33 → 1.39		355	6.48	92.1	11.5	263 / 15.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWDS
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.21	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm or~~ mg/L)	~~SPC~~ E.C. ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:30				1.22	855	5.68	42.5	17.5	C 733 Sulphur odour, weak tea colour
09:33	1L			0.31	890	5.48	35.7	17.6	765
09:36	2.2L			0.17	894	5.46	30.8	17.6	767
09:39	3.4L			0.14	899	5.46	29.3	17.6	772
09:42	4.5L			0.13	898	5.47	27.8	17.6	772
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 5/10/17 — Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2P
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.19	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.15	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
9.03				2.50	783	6.11	27.4	16.6	660
9.06				0.40	770	5.96	-10.4	17.7	662
9.09				0.22	758	5.96	-17.2	17.8	654
9.12	3L			0.17	768	5.96	-19.7	18.0	665
9.15				0.14	775	5.96	-22.9	18.0	673
9.18				0.12	786	5.97	-24.9	17.9	680
9.21				0.11	791	5.97	-26.8	18.0	685
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	5/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.255	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.30	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
08:00	0			7.61	890	6.85	113.3	17.2	764	Turbid, nil odour.
8.03	1.5L			6.96	902	7.22	96.4	18.0	782	
8.06	2.6L			6.54	939	7.26	91.8	18.0	815	
8.09	3.7L			6.31	947	7.28	89.0	18.0	822	
8.12				6.19	949	7.29	87.3	18.2	825	
8.15				6.10	937	7.29	86.0	18.1	813	
8:18	7.0L			6.02	939	7.29	86.0	18.1	816	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	13B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	5/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.54	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.84	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:25	0			2.54	205	6.39	60.5	18.7	180 Slightly cloudy
10:28	1.5L			0.47	202.8	6.07	46.3	19.4	180.9
10:31	2.5L			0.28	186.5	5.94	39.5	19.7	167.7
10:34	3.5L			0.22	183.3	5.89	42.5	19.8	164.9
10:37	~~3~~ 4.5L			0.19	181.9	5.87	44.0	19.9	164.0
10:40	6L			0.15	182.1	5.85	44.9	19.7	163.7
10:43	7L			0.17	180.8	5.85	44.6	19.8	163.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.33	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.63	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10.50			1.70→	~~18.6~~	399.2	4.72	137.1	18.6	350.0
10.53			01	0.42	403.3	4.55	151.6	18.5	352.9
10.56	2.5			0.24	401.6	4.56	154.6	18.5	351.7
10.59	4			0.18	399.2	4.65	153.9	18.5	342.1
11.02				0.17	382.9	4.74	145.0	18.4	334.3
11.05				0.19	383.7	4.74	141.6	18.4	335.4
11.08				0.21	386.2	4.69	139.2	18.4	337.2
11.11				0.22	387.0	4.68	138.5	18.4	338.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		Very turbid

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.15m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.91 m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:20	0			5.02	289	5.70	117	18.2	C 235.7
11:23	1.1L			2.98	266.9	5.97	118.5	18.4	233.3
11:26	2.5L			2.97	266.8	6.01	126.8	18.4	233.4
11:29	4.0L			2.70	266.9	6.04	129.4	18.4	232.8
11:32	5.0L			3.09	262.7	6.04	132.4	18.4	229.3
11:35	6.0L		3.06	[illegible]	262.8	6.04	135.4	18.4	230.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 5/10/17 — Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.62	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.24	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:07				1.35	355.7	5.59	123.4	20.6	326
13:10				0.93	351.4	5.41	133.1	19.8	316.5
13.13	2L			1.45	346.5	5.48	126.2	19.8	311.8
13.16	3L			2.62	328.3	5.65	110.4	19.7	295.0
13.19	4L			2.61	330.2	5.66	107.2	19.7	297.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		clear
						Odorless

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.37	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.35	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:55	0			2.14	503	5.93	114	19.3	448.6
14:58	1L			0.33	497	5.62	137.7	19.4	444.1
15:01	2L			0.21	487.2	5.59	144	19.4	434.8
15:04	3L			0.17	488.5	5.60	147.4	19.4	435.8
15:07	4L			0.15	475.4	5.57	150.6	19.4	424.5
15:10	5L			0.13	474.3	5.56	148.8	19.4	423.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.58	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☑ Bailer ☑ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☑ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2.26				4.22	687	6.03	59.4	19.1	606
2.29	1.5L			1.70	671	6.1	90.8	18.5	587
2.32				1.58	668	6.11	102.7	18.5	585
2.35	4L			1.40	656	6.12	108.7	18.5	574
2.38				1.22	655	6.17	110.6	18.4	573
2.41				1.19	662	6.12	111.9	18.5	580
2.43				1.17	657	6.12	112.1	18.4	575
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TUC
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.31	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.82	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:52				5.4	502	5.74	8.9	20.9	461.2 Mostly clear
13:55	1.5L			0.35	512	5.89	-5.1	20.0	463 0
13:58	2.4L			0.22	514	5.89	-3.1	20.0	464.5
14:01	3.5L			0.18	513	5.89	-0.7	20.0	463.8
14:04	4.5L			0.15	512	5.90	0.8	20.0	463.0
14:07	5.5L			0.14	512	5.90	1.4	20.0	462.7
14:10	6.5L			0.13	511	5.90	1.7	20.0	462.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4 B
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 5/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.56	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.12 m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:30	0			2.7	451	5.41	14	17.5	386 Slightly cloudy
13:33	1.5L			0.35	443	5.26	-21	17.6	380.2
13:36	2.7L			0.25	442.6	5.26	-32.5	17.6	380.5
13:39	4.0L			0.20	442	5.27	-39.9	17.7	380.4
13:42	5.2L			0.16	441.7	5.27	-47.3	17.7	380.4
13:45	6.5L			0.16	441.1	5.27	-50.6	17.7	380.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	18/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
15:08	15cm			8.95	1175	7.99	85.2	20.9	1083 6.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	18/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BKNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):			

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
	15cm			7.31	1178	7.79	94.1	20.3	1074 / 2.9
	50cm			6.93	1179	7.72	96.2	20.2	1071 / 3.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	13/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	18/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			7.18	1179	7.81	93.7	20.2	C NTU 1071 3.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 18/10/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
14:58	15cm			7.55	1176	7.61	92.3	20.4	1072	3.3	
15:07	40cm			7.49	1176	7.73	89.4	20.2	1069	4.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	18/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TMC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.295	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.825	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:44	0			2.37	546	6.95	-57.4	21.2	503 Mostly clear
14:47	1L			0.41	522	6.30	-67.3	20.0	471.3 0
14:50	2L			0.28	519	6.12	-55.5	20.0	469.2
14:53	3L			0.22	517	6.05	-40.3	20.0	467.9
14:56	4L			0.19	516	6.02	-25.1	20.01	467.1
14:59	5L			0.17	515	6.00	-13.0	20.1	466.5
15:02	6L			0.16	514	6.00	-11.3	20.0	465.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter).

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature ____ Date ____ Checker Name and Signature ____ Date ____

Project Manager Signature ____ Date ____ **Distribution:** Project Central File

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.655m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.625m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:28	0			2.37	854	6.14	9.5	18.6	751 Slight sulphur odour slightly cloudy.
08:31	1L			0.77	839	5.34	17.3	18.9	742
08:34	2L			0.52	833	5.24	11.8	19.0	737
08:37	3L			0.39	833	5.22	8.7	18.9	736
08:40	4L			0.33	832	5.23	4.8	18.9	~~734~~ 735
08:43	5L			0.30	838	5.21	2.9	18.9	740
08:46	6 L			0.29	839	5.21	2.8	18.9	740
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	19/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 19/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.20	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:22	0			1.40	796	5.97	-13.5	17.3	680
09:25	1L			0.58	866	5.94	-27.4	17.9	748
09:28	2L			0.37	882	5.93	-30.1	18.0	763
09:31	3L			0.29	884	5.94	-31.8	18.0	765
09:34	4L			0.25	885	5.94	-33.5	18.0	767
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D5
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	19/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.235	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:55	0			1.70	962	5.82	27.3	18.4	838 Slightly turbid
09:58	1L			0.39	968	5.54	37.9	18.5	845
10:01	2L			0.24	963	5.50	46.4	18.1	837
10:04	3L			0.22	957	5.49	48.0	18.0	830
10:07	4L			021	957	5.49	48.9	18.0	829
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	19/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.59	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:33	0			0.99	193.4	5.95	30.8	19.4	171.3
10:36	1L			0.42	187.8	5.95	22.2	19.3	167.3
10:39	2L			0.28	186.9	5.97	20.4	19.5	167.0
10:42	3L			0.21	182.2	5.93	31.7	19.6	163.5
10:45	4L			0.19	180.9	5.92	37.6	19.7	162.6
10:48				0.19	180.2	5.92	39.8	19.7	161.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 19/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.38m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.61m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:12	0			0.91	356	4.70	132.6	19.5	319 Tanin-stained, slight sulphur odour
11:15	1L			0.32	353.1	4.64	134.2	19.3	314.4
11:18	2L			0.22	343.8	4.68	129.5	19.2	305.7
11:21	3L			0.20	349.8	4.71	119.1	19.2	310.7
11:24	4L			0.19	351.5	4.70	117.3	19.3	313.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.69m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:57	0			5.32	346.7	5.38	134.7	20.7	315.6	Mostly clear, slight sulphur odour
12:00	1L			1.62	343.2	5.42	138.6	20.0	310.1	
12:03	2L			0.95	334.6	5.51	131.0	19.9	301.2	
12:06	3L			1.02	328.5	5.58	122.1	19.8	295.2	
12:09	4L			1.26	316.3	5.68	108.3	19.9	285.9	
12:12	5L			1.34	318.5	5.70	104.1	19.9	287.5	
12:15	6L			1.34	317.4	5.70	102.9		286.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D7
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.22	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.19	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:44	0			8.14	1328	6.84	85.9	19.5	1185 Cloudy yellow
13:47	1L			7.22	1511	7.09	80.2	18.8	1335
13:50	2L			6.65	1688	7.09	82.2	18.8	1492
13:53	3L			6.30	1709	7.09	83.3	18.9	1507
13:56	4L			6.23	1597	7.10	84.0	18.9	1410 Run mostly clear
13:59	5L			6.20	[illegible]	7.09	84.6	18.9	[illegible] 1416
					1601				
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		Cover partially buried in limestone appears that some may have fallen in the well.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
	15cm			1.07	1201	7.30	-59.1	24.1	1180 / 11.6
	40cm			0.21	1229	6.93	-91.7	20.7	1129 / 152.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 23/10/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	NTU
	15cm			0.36	390	6.11	-58.1	16.3	325.3 382
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South 51
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			1.88	383	6.61	-1.6	18.1	C 332.5 NTU 165
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Fence Post.

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
				0.20	1127	7.18	-150.5	20.9	C 1040 NTU 27.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1 N
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.63	1191	7.28	-55	25°	C 1141 NTU 19.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	23/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	15cm			~~0.24~~	1204	7.30	-82	21.4	1121	18.9
				0.22						
	50cm			0.15	1142	7.28	-115	19.2	1017	23.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	30 cm			1.9	725	6.82	-30.7	22.7	C NTU 688 36
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS4A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			1.76	722	6.78	-19	22	684	23	
	40cm			0.32	722	6.66	-63	19.3	643	80.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**	**Field Commets**
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.32.	670	6.60	-60	18	C 577 NTU 103
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	30cm			0.52	677	6.62	-47.3	18	C 587 NTU 92.
									Too polluted to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TUR
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	Laura Fisher	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 0:57	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 1.17	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10.23	0			2.65	415.7	6.08	-10.9	19.3	Slight sulfuric smell
10.27	0.5			0.82	405.4	5.63	-32.7	18.5	
10.30	1.6			0.57	403.8	5.55	-44.6	18.5	
10.33	1.3			0.47	401.2	5.52	-49.6	18.5	
10.36	1.6			0.39	399.1	5.49	-53.4	18.4	Turbid
10.39	1.9			0.34	398.1	5.47	-56.0	18.4	
10.42	2.2			0.31	397.2	5.46	-59.4	18.4	
10.45	2.5			0.28	396.6	5.45	-62.3	18.5	
10.48	2.9			0.27	396.9	5.45	-64.7	18.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 24/10	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10 cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10.14	0			2.38	493.1	6.23	-7.9	21.6	slightly cloudy
10.17	0.3			0.80	479.0	6.09	-14.8	20.1	
10.20	0.6			0.46	473.9	6.03	+4.2	20.2	
10.23	0.9			0.35	472.0	6.00	-10.2	20.3	
10.26	1.2			0.26	471.3	5.98	-7.1	20.3	
10.29	1.5			0.25	471.3	5.97	-6.0	20.3	
10.32	1.9			0.25	471.1	5.97	-5.8	20.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	24/10/17		

Project Manager Signature	Date	Distribution: Project Central File

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-DH
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 0.2	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.24	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
03.13	0			24.8	220.7	6.11	167.0	18.9	
03.16	0.3			1.96	218.8	6.02	123.6	18.8	
03.22	0.6			1.94	222.7	5.98	139.7	19.0	
03.25	0.9			1.82	223.0	5.99	141.4	19.1	
03.27	1.2			1.81	221.7	6.00	142.1	19.0	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	24/10/17		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 2.427	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.54	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2.13	0			3.51	461.1	6.38	37.2	20.6	clear, no odour
2.16	0.5			1.89	444.6	5.80	86.6	19.8	
2.19	1.0			1.55	441.7	5.69	115	19.4	
2.21	1.5			1.51	432.9	5.67	122.0	19.7	
2.24	2.0			1.52	427.3	5.65	129.0	19.7	
2.27	2.5			1.41	427.3	5.64	130.2	19.6	
2.30	3.0			1.33	423.5	5.64	130.9	19.7	
2.33	3.5			1.27	425.2	5.64	130.2	19.7	
2.36	4.0			1.26	428.2	5.64	129.6	19.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 24/10/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Murdoch Uni Farm

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	D2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 1.65	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.563	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12.30	0		0	1.43	613	6.18	82.3	22.1	turbid +
12.33	0.3			0.54	566	6.16	96.9	19.1	
12.36	0.6			0.37	536	6.17	111.4	19.0	
12.39	0.9			0.32	515	6.16	113.9	18.8	
12.42	1.2			0.29	534	6.17	112.8	18.7	
12.45	1.5			0.26	527	6.17	110	18.8	
12.49	1.8			0.25	530	6.16	108.2	18.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	26/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 12.20	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C
15:34	0			4.65	1022	6.02	11.8	18.8	906
15:37	0.4			2.42	1077	6.12	-26.1	19.7	969
15:40	1.1 L			1.91	1094	6.14	-38.0	19.9	989
15:43	1.6 L			1.61	1114	6.14	-44.5	20.0	1007) Heavy rain in between sampling.
15:50	3.4 L			0.85	1085	6.10	-55.2	19.9	979)
15:55	4L.			0.61	1083	6.09	-57.8	19.9	977.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	26/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 26/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 12.875	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.590	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:47	0			9.99	244.2	5.80	178.9	18.1	212.4
14:50	0.3			8.97	255.9	5.50	187.9	18.5	224.7 - Flow cell got blown over in wind.
14:53	0.8			8.55	255.7	5.43	198.2	18.6	224.0
14:56	1.6			8.51	255.2	5.43	203.5	18.6	224.1
15:00	2.2			8.51	254.8	5.43	208.0	18.7	224.8 Cloudy, yellow. Nil odour.
15:03				8.58	254.9	5.45	209.3	18.8	224.8
15:06	3.2			8.59	254.9	5.45	211.1	18.9	224.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	N/A	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	26/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. ~~(mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	10cm			2.82	382.1	6.41	-46.3	19.1	C 339 NTU 14.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	South SI
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	10cm			0.61	393	6.59	-38.5	19.2	C 350 NTU 1052
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

White Stake

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS4A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	30cm			1.22	740	~~6.73~~	-27	24.2	C 731 NTU 15
						6.80			
	40cm			0.30	740	~~6.72~~	-54	20.3	673 195
						6.68			
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	ES2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	2/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			2.47	743	6.82	-50	25	C 742 NTU 13.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:**	Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:**	☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			0.31	701	6.55	-64.5	17.8	606	180	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.38	630	6.75	-87	18.2	C 547 NTU 886
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	2/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU / Odour, Colour, Turbidity
	30cm			[illegible]	1218	7.26	-106.5	23.1	1173 / 272.4
				0.25					
	60cm			0.14	1220	7.04	-122	20.1	1097 / -0.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water:	☑	Groundwater:	☐		
Bore / Location ID:	NLWS-N2				
Sample Date:	2/11/17				
Well Development or Well Sampling Event? (circle)					

Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C	NTU
	15cm			4.57	1212	7.33	-47.8	25.8	1239	12.1
	90cm			~~[illegible]~~	~~[illegible]~~	7.18	-49.4	19.4	1092	10.4
				0.33	1224					
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Approval and Distribution

[signature]	2/11/17		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIN
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	2/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):			

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU Odour, Colour, Turbidity
	20cm			3-81	1212	7.37	-4.8	28.8	1302 / 23.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 2/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	≈50cm			9.71	1222	8.28	24.8	24.7	1219	6.7	
	30cm			9.98	1223	8.31	32.9	24.9	1219	14	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	30cm			10.34	1215	8.36	63.8	24.8°	1210	7.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 2/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	30cm			9.93	1222	8.33	60.6	24.8°	1217 11.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	2/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Bathy
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	2/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
				9.61	1213	8.23	56.5	24.7	1205	2.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 2/11/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.46	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.61	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:27			0.3	2.15	296	5.17	82	21.3	274.4 , Brown , sulphu-
1:30	2		0.3	0.45	286.1	5.04	102.1	19.9	258.2 Brown, organic matte
1:33	3		0.3	0.31	284	5.00	118	20.0	257.5 Brown
1:36	4		0.3	0.25	281.4	5.04	101.	20	254
1:39	5.1		0.3	0.22	283.9	5.17	79	20.1	260
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	TS5
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW CS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.59	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2.26	0		0.3	0.85	177.2	5.81	51.5	19.7	159.4
2.29	2		"	0.28	170.3	5.86	47.2	20.2	153.7 clear
2.32	4		"	0.19	166.0	5.83	47.5	20.3	150.4
2.35	5.5			0.16	164.4	5.82	49.3	20.2	149.2
U									
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.33	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.83	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:52	0		0.3	2.46	520	5.99	1.6	22.5	C 470
12:55	2			0.57	509	5.84	2.6	20.1	461
12:58	3		0.3	0.49	508	5.83	6.3	20.3	461
1:01	4		↓	0.35	506	5.83	7.3	20.2	460.5
1:04	5.1			0.29	505	5.83	7.0	20.3	460.2
10.7	6.5			0.26	505	5.84	6.9	20.3	459.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD5
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW CS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.27	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.96	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
09:33	0	@	0.3/m	0.98	1209	5.52	23.1	18.6	1062	Slightly turbid.
09:36	1			0.31	1213	5.39	22.9	18.5	1060	Sulphur smell
09:39	2			0.21	1192	5.35	25.8	18.4	1039	
09:42	3			0.18	1166	5.34	27.3	18.2	1018	
09:45	4			0.16	1144	5.32	30.4	18.3	1000	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature: Tim W	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.72	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.61	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:42	0		0.3/min	3.18	795	5.38	25.9	19.5	700 Clear, sulfur smell
8:45	1		" "	0.41	791	5.12	19 —	19.1	702
8:48	2		" "	0.25	797	5.12	13.6	19.2	709
8:51	3		"	0.20	799	5.11	12.4	19.1	709
8:54	4		"	0.18	811	5.11	11.6	19.1	709
8:57									
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	3/11/2017
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW CS	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.77	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): 7.13	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:12	0		0.3/min	1.46	356	5.63	102.2	19.7	321.6	Clear
8:15	1.2		" "	0.55	350	5.58	110.2	19.8	313	Clear
8:18	2.5		" "	0.50	343.8	5.39	110.4	19.8	309.1	Clear
8:21			" "							
8:24	3.5		"	0.56	328.3	5.58	95.0	19.9	296.4	
8:27	4.5		"	0.56	329.2	5.61	93.2	19.9	296.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW CS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.24	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC (mS/cm or µS/cm)	pH	Redox (mV) ORP	Temp °C	Odour, Colour, Turbidity
9:10			0.3/m	1.93	843	5.82	-13.2	17.5	742
9:13	2		" "	0.35	857	5.81	-14.9	18.2	746
9:16	3		" "	0.24	856	5.82	-17.0	18.2	744
9:19	4		" "	0.19	855	5.82	-18.7	18.2	744
9:22	5		" "	0.16	856	5.82	-20.1	18.2	746
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐ x 250 mL Plastic		
		☐		☐		☐		
		☐		☐		☐		

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-04
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW CS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 29.5cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	5% E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10.28			0.3	3.80	258.0	5.93	99.	19.7	228.3
10.31	1		" "	2.44	258.2	5.94	115.95	19.2	229.9
10.34	2.5		"	1.97	259.5	5.93	122.2	19.3	231.3 Slightly Humbid
10.37	3.5		" "	1.95	258.7	5.93	124.4	19.3	230.2
10:40	5		"	2.04	258.7	5.92	127.5	19.3	229.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	TIM W Checker Name and Signature	3/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW CS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 64cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.15m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
11—	0		0.3L/m	3.12	455.6	5.29	17.1	20.2	405.4 Slightly turbid
11:03	1			0.50	450.7	5.23	-21.2	18.7	396.4 Strong sulfur smell.
11:06	2			0.31	450.2	5.23	-40.5	18.9	397.6
11:09	3			0.25	449.3	5.23	-47.3	18.8	395.8
11:12	4			0.23	449.1	5.23	-51.8	18.8	395.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TOC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/11/2017
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.135	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1.56	0		0.3	0.66	2095	4.84	112.	18.7	1484
2:01	2.5			0.20	533	5.25	65.7	18.4	454
2:04	5			0.16	463.0	5.25	70.2	18.5	401
2.07	6			0.14	439	5.25	71.8	18.3	383.7
2.10.	7.			0.13	433.	5.25	72—	18.6	380—
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/19/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/19/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.515	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SP. Ec. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:02	0			3.03	501	6.12	64.4	20.1	450.3	Clear, nil odour.
9:05	1L			0.53	492.2	5.56	85.8	19.5	440.4	
9:08	2.3L			0.30	497.0	5.52	94.4	19.4	448.0	
9:11	3.4L			0.25	490.0	5.51	94.3	19.5	437.0	
9:14	4.3L			0.22	464	5.45	85.5	19.5	415	
9:17	5.5L			0.19	464	5.46	75.0	19.6	416	
9:20	6.7L			0.18	464	5.46	75.5	19.6	416	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	6/19/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.75	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	**Corrected Redox:** Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:40	0		0.3/m	2.85	629	6.35	17.7	20.1	560 Clear
8:43	1.2			0.40	602	6.03	40.3	19.-	533
8:46	2.4			0.24	605	5.96	50.8	19.-	536
8:49	3.6			0.20	600	5.94	56.2	19.1	531
8:52	4.9			0.18	592	5.95	58.6	19.1	524
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

C

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	6/11/17 Date	Tim W Checker Name and Signature	6/10/17. Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/10/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☒ Dedicated	Intake depth: 11m	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.96	Casing Radius (mm):	Corrected Redox: Y / (N)	☒ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☒ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:52	0			5.05	1144	6.66	-53.8	23.7	1117
7:56	0.7L			1.58	1193	6.19	-71.0	21.5	1112 Strong sulphur odour, slightly turbid.
8:00	1.5L			1.09	1196	6.14	-74.0	21.3	1111
8:04	2.3L			0.86	1202	6.10	-75.5	21.2	1114
8:08	3.1L			0.71	1201	6.06	-77.6	21.3	1117
8:12	4.0L			0.58	1210	6.02	-78.9	21.3	1124
8:16	4.9L			0.49	1206	6.01	-78.1	21.4	1124
8:20	5.6L			0.48	1204	6.02	-78.2	21.3	1120 mostly clear
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	6/10/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D7
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 6/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.265	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:32	0			6.38	1264	7.36	104.1	19.4	1147
7:35	1L			5.75	1240	7.13	99.1	19.3	1105
7:38	2L			5.69	1254	7.10	99.5	19.3	1118
7:41	3L			5.51	1236	7.07	100.6	19.3	1102
7:44	4L			5.38	1240	7.06	101.0	19.3	1107
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 6/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH 12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/10/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination		Sampling Method		Hydrasleeve info.	
Date of GW Level: 6/10/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☑ Low Flow: Pump rate:		Hydrasleeve Size:	Monitoring sequence followed (number in order):	
Depth to GW (m-pvc): 12.94	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:		Hydrasleeve Type:		
Bore Depth (m-pvc): 17.54	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☐ Bailer	☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging	
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump	☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in	
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)		Sampling Start Time:	Hydrasleeve out	
	Key Type (if applicable):		☑ Retrieved					Parameters	
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:43	0L			8.59	287.5	5.74	128.7	25.1	287 cloudy & milky yellow
9:46	-			8.65	282.9	5.62	148.1	25-	283 plug came out - no power.
9:51	0.7L			8.87	275.5	5.51	164.9	25.1	275.0
9:55	1.5L			8.80	271.4	5.47	173.8	24.6	269.6
9:59	2.0L			8.98	271.0	5.47	177.5	25.1	270.7
10:03	2.5L			11.88	270.0	5.51	181.2	24.8	270.4
10:07	3.0L			11.52	271.8	5.67	176.0	25.6	270.5
10:11	3.5L			10.95	270.2	5.74	172.5	25.3	270.7
10:15	4.0L			10.81	269.8	5.72	175.8	25.3	270.7
10:19									
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 6/11/17

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	21/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 12.965	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.26	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	S.E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:07	0			9.32	310.7	6.56	102.3	25.6	321.9	Cloudy, turbid, yellow sand colour
9:10	0.1			9.58	297.7	6.21	133.6	24.6	294.8	
9:13	0.4			8.05	273.9	6.16	145.3	24 —	273.5	
9:16	0.6			7.99	260	6.14	148.2	25.6	263.7	
9:26	1			7.91	259.6	6.06	154.7	26.7	266.9	
9:29	1.3			8.15	268.3	6.04	159.5	25.0	254.9	
9:35	2			8.41	238.8	6.05	165.1	23.8	234.9	
9:41	2.7			8.52	233.3	6.00	173.6	23.7	227.5	
9:47	3.1			8.46	234	5.97	177.8	24 —	228.9	
9:52	4.			8.71	235.9	5.93	181 —	22.6	225.8	
9:57	4.5			8.68	237.4	5.89	181.4	23.4	230.5	
10 —	4.8			8.68	239.3	5.89	180.5	23.5	231.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	21/11/17 Date	Checker Name and Signature	24/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TLC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	21/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 21/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.43	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.83	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): /	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
8:07	0		0.4l/min	3.86	532	6.89	-51.5	20.2	475.2 Clear, slight sulfur odour.
8:10	1.2			0.75	519	6.26	-18.4	19.9	468.6.
8:13	2.2.			0.46	518	6.16	-10.7	19.9	468.2
8:16	3.2			0.35	517	6.10	-5.1.	20-	468.2
8:19	4.3.			0.32	516	6.07	-3.8	20-	466.3.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	21/11/17 Date	Tim W Checker Name and Signature	21/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TSH10
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	20/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.59	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.625	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
1:03	0		0.3/mL	1.05	290.1	6.61	6.55	22.1	267 Tea Colour
1:06	1.2			0.46	266.8	5.85	-14.7	22.6	253.7
1:09	2.4.			0.43	270.2	5.80	-16.7	22.9	257.3
1:12	3.2			0.45.	275.2	5.77	-18.7	22.9	264.4
1:15.	4.5.			0.46.	270.4	5.73	-19.1	22.9	254.9
1:18	—								
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature — Date: 20/11/17

Checker Name and Signature: Tim W — Date: 20/11/17

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	TSC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.13m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.13m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
1:28	0			1.04	449.7	5.59	15.8	18.8	392.1 Turbid.
1:31	1.2			0.30	361	5.47	55.0	18.1	313
1:34	2.6			0.22	355	5.41	77.7	18.1	307.7
1:37	3.8			0.20	353.3	5.40	81.2	18-	306.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	20/11/17 Date	Checker Name and Signature	20/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D7
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	20/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.32m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.10m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Indudes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
01:59	0		0.3l/min	6.12	1261	6.73	52.1	20.4	1154	Turbid, cloudy
2:02	1.2			5.14	1308	7.03	52.2	20.1	1185	
2:05	2.4			4.71	1339	7.05	56.4	20 —	1208	
2:08	3.6			4.67	1319	7.02	61 —	19.9	1191	
2:11	4.8			4.67	1307	7.04	66.4	20.0	1183	
2:14	5.5			5.13	1236	7.07	68.6	20 —	1113	
2:17	6.8			4.97	1273	7.06	70.5	20.1	1150	
2:20	8			4.70	1312	7.04	67.3	20.1	1185	YSI fell over, sampled.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	WQA01	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	2x extra Amber.	Limestone covering bore hole. Small amount of limestone fell into well when cover was removed.

Approval and Distribution

Fieldwork Staff Signature	20/11/17 Date	T.M W A Checker Name and Signature	20/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	20/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.13m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.93m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
02:36	0		0.2/min	1.40	1076	6.64	-71.2	22.9	1039
02:39	0.8			0.65	1070	6.52	-83.0	21.6	997
02:42	1.5			0.53	1069	6.45	-82.7	21.3	997
2:45	2.2			0.48	1090	6.36	-82.1	21.2	1010
2:48	3.0			0.41	1081	6.32	-80.2	21.1	1002
2:51	4.5			0.40	1073	6.30	-80.3	21	991
2:54				0.38	1055	6.28	-79.1	21.1	973
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	20/11/17 Date	Tim W Checker Name and Signature	20/12/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-TSE-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 17/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.835	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.63	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:49	0			1.29	887	5.44	48.4	20.5	800	Slightly turbid, sulfur odour
2:52	1.2			0.31	859	5.24	10.6	19.6	770	
2:55	2.4			0.22	856	5.25	2.2	19.5	765	
2:58.	3.6			0.19	856	5.26	-4.1	19.5	766	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3 B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 17/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.680	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.85m	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
03:14	0		0.3	1.23	184.3	5.97	23.8	20 —	165.8	Cloudy / turbid.
03:17	1.2			0.42	174.2	6.01	2.1	20 —	156.1	
03:20	2.4			0.27	159.6	5.97	4.7	20 —	143.9	
03:23	3.6			0.24	157.4	5.95	9.3	20 —	142.3	
03:26	4.8			0.23	156.7	5.94	11.9	20.1		
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-05
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17-11-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.38	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.94	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
2:30	0		0.3l/min	0.71	1194	5.66	13.2	21.4	1102
2:33	1.2			0.30	1221	5.50	33.9	19.3	1087
2:36	2.4			0.24	1212	5.47	40.6	19.3	1081
2:39	3.5			0.19	1211	5.45	43.3	19.4	1081
2:42	4.5			0.18	1206	5.44	43.7	19.4	1076
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 17/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.34	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:08	0			4.08	855	6.00	-11.7	20.8	783	Slight sulfur odour
2:11	1.3			0.48	876	6.10	-73.2	18.3	765	Clear.
2:14	2.6.			0.32	896	6.01	-68-	18.6	786	
2:17	4			0.27.	889	5.98	-58.9	18.6	781	
2:20.	5.1			0.24	887	5.98	-50.1	18.6	778.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17.11.17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17-11-17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 3.86	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 7.20	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
12:18	0		0.3/min	1.29	372.5	5.59	42.2	20.5	332.3 Clear, no odour.
12:21	1.2			0.45	366.8	5.43	69.8	20.0	331.7
12:24	2.4			0.30	362.7	5.45	77.6	20.0	328.3
12:27	3.6			0.25	359.4	5.45	83.6	19.9	323.6
12:30				0.23	350.3	5.50	86	19.9	314.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4 TB
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.725m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.12m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:52	0		0.3l/min	4.05	460	5.64	-0.8	21.3	411.3 Turbid, Sulfur odour.
11:55	1.2			0.34	454.2	5.41	-24.2	19.2	403.8
11:58	2.5			0.28	454.0	5.41	-29.6	19.2	404.5
12:01	3.8			0.25	454.0	5.40	-38.1	19.2	403.3
12:04	5.2			0.22	453.7	5.40	-43.7	19.2	403.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 17/11/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.835	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:28	0		0.3/min	3.50	606	7.55	103 -	19.7	546 No odour, slightly turbid
10:31	1.5			1.86	577	6.44	123.9	19.3	514
10:34	2.8			1.62	570	6.33	125.7	19.3	508
10:37	4			1.48	563	6.29	123.3	19.3	502
10:40	5.3			1.37	553	6.28	119.1	19.3	488
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	DI
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.62	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.535	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:51	0		0.3l/min	1.28	533	6.27	86.1	19.8	478.3 Clear, No odour.
10:54	1			0.57	527	5.83	106.2	19.7	471.9
10:57	2.1		"	0.32	516	5.73	112.9	19.6	464.1
11:00	3.5			0.27	505	5.69	116.1	19.7	453.2
11:03	4.5			0.25	498.3	5.67	114.4	19.6	446.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.39m	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.92m	Casing Radius (mm):	Corrected Redox: Y / (N)		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:18	0			3.31	258.6	6.27	64.3	20.7	239.3	
11:21	1.2			2.10	259.6	6.07	102	19.6	232.5	
11:24	2.6			1.89	261.9	6.05	117.2	19.6	235.0	
11:27	4.2			2.04	260.3	6.03	124.3	19.5	233.3	
11:30	5.9			2.26	259.2	6.03	130	19.6	232.9	
11:33	7.4			2.59	256.4	5.99	135.5	19.5	229.3	
11:36	9.1			2.45	256.2	5.99	134.5	19.6	231.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Tim W Checker Name and Signature	17/11/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			~~2.09~~ 5.56	1355	8.1	77.5	23.5	C 13.7 NTU 14.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 17/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BH32 - Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	SpC E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	20cm			5.3	1348	8.1	74.2	23.4	1307	3.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~S.C.~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	5cm			5.19	1356	7.98	69.5	23.1	C 1308 NTU 10.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	
		1	Chlorophyll					

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date: 17/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL05 - B1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	17/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SpEC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			1.46	1357	7.67	-81.8	23.6	C 1322 NTU 5.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	WQA02	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	2+ extra Amber	
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	17/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	15/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU	Odour, Colour, Turbidity
	20cm			0.66	409.9	6.55	3.1	18.9	361.9	44.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	15/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	SJ
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	15/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	20cm			0.91	429.9	6.74	55.4	20.5	392.3 55.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	15/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	F54A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	15/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			1·60	830	6·81	-37·5	23·1	C 800 NTU 17·6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	15/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	15/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~S.C.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	30cm			0.67	825	6.72	-89.5	21.9	C 775 NTU 151
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 15/11/17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	15/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPEC. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	20cm			0.55	1385	7.30	-50.1	23.2	1334	292
	40cm			0.17	1373	7.16	-96	21.1	1269	-0.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	15/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	0405-MW2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	15/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	SpC ~~E.C.~~ (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	20cm			0.60	1386	7.28	-44.1	21.1	1283	6.8	
	60cm			0.50	1390	7.23	-47.6	20.6	1272	6.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	15/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RD1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	15/11/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPCond~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			3.89	710	6.44	-49.7	18.2°	C 617 NTU 54.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber		x 250 mL Plastic		RD1A - too shallow to sample
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature — Date: 15/11/17

Checker Name and Signature — Date

Project Manager Signature — Date

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

Surface Water:	☑	Groundwater:	☐		
Bore / Location ID:	A1N				
Sample Date:	15/11/17				
Well Development or Well Sampling Event? (circle)					

Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	SPC ~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C	NTU
	15cm			~~[illegible]~~	1332	6.63	-~~[illegible]~~	25.9	1356	157.3
				0.23			118.3			
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)	
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	
		1	Chlorophyll					

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

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[signature]	15/11/17		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/11/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SEC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	20cm			0.16	1369	7.03	-120.9	22.9°C	1313 0.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	13/11/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	A1E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SpC~~ ~~Ec~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
7:44	20cm			0.52	15A	7.38	-74.6	18.0	1368	653.3	
											Too shallow to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	1/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BH Jetty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	NTU
15cm				11.90	1352	10.5?	43	19°c	1197 123
30cm				~~11.90~~ 0.41	1349	10.37	37.8	19.1	1196 240
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)	☐		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic	☐		Very windy conditions, water chopped up.
		☐	☐	☐	☐	☐	☐		
		☐	☐	☐	☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1N
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			1.23	1583	7.58	-2.3	17.3	C 1351 NTU 226.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/2/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	20cm			~~888~~	1584	7.43	-28.7	18.9	1402	19.6	
				1.19							
	60cm			1.10	1584	7.44	-62.2	19.0	1402	16.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			0.61	1580	7.36	-46.8	19	C 1401 NTU 33
	45cm			0.32	1578	7.34	-81	19	1397 4.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

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Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			12.36	1355	10.48	-114	19°	C 1202 NTU 124
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		Green water. Algal bloom?

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS - B1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	20cm			11.68	1354	10.42	-92.5	18.9	1196	130	
	60cm			8.27	1336	9.96	-105.5	18.8	1183	96.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			14.17	1364	10.66	-81	19.4	C 1248 NTU 154
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.39	993	7.24	-53.6	17.7	C 854 NTU 78
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS4A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			0.39	997	7.06	-89.5	18	C 864 NTU 800 Too shallow to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	South SI
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	5cm			0.6	452.4	7.13	-69.6	15.4	369.3	852	Very shallow.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.44m	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90m	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:33	0L			3.90	256	7.61	33.1	19.9	230	N:1 odour, slightly turbid.
9:36	1.2L			3.01	246.2	6.42	80.5	19.9	222.3	
9:39	3L			5.23	245.5	6.14	99.1	19.9	221.9	
9:42	4.2L			3.34	247.1	6.04	105.3	20.0	224.0	
9:45	5.6L			3.19	250.2	6.01	106.1	20.0	226.3	
9:48	6.8L			3.09	249.5	6.00	105.8	20.0	225.5	
9:51	8.0L			3.11	249.7	5.99	106.7	20.0	225.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 1/12/17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	TBC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.27	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.135	Casing Radius (mm):	**Corrected Redox:** Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
10:11	0		0.3l/min.	2.04	405.2	5.90	-29.3	19.2	349.8 Clear, slight Sulfur odour.
10:14	0.9			0.40	366.6	5.47	-6.7	19.5	329.3
10:17	2.			0.30	365-	5.42	-6.1	19.9	329.7
10:20	3			0.27	364.4	5.41	-7.8	20.2	331.5,
10:23	4			0.26	365.2	5.42	-9.6	20.5	333.9.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Tim W Checker Name and Signature	1/12/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.79.	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.835.	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:36	0			3.12	199.9	6.05	-34.6	20.7	175.6	Cloudy, slight sulphur odour
10:39	1.3L			0.40	156.1	5.92	-45.3	19.9	140.7	
10:42	2.5L			0.30	146.2	5.89	-32.5	19.9	131.9	
10:45	3.6L			0.26	144.3	5.85	-22.3	19.9	130.3	
10:48	5L			0.23	143.7	5.85	-17.4	20.0	129.9	
10:51	6.2L			0.22	143.6	5.84	-15.0	20.0	129.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic			
		☐	☐		☐				
		☐	☐		☐				

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.65m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.605m	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	S.E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:53	0		0.3/min	1.61	250.5	6.18	-63.1	21.9	235.3 C Tea coloured, sulphur odour
11:00	2			0.19	247.7	6.17	-94.3	22.4	234.9
11:03	3			0.16	239.3	6.16	-95.3	22.4	239.2
11:06	4			0.15	237.7	6.15	-95.5	22.5	226.5
11:09	5			0.14	238.8	6.16	-98.4	22.7	228.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
		TIN W	1/12/17
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-03
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.88	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.125	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1—	0		0.3l/min	4.70	366.6	5.67	65.9	21.4	339.3. Clear, no odour
1:03	1			3.66	358-	5.51	112.5	20.9	328.7
1:06	2			3.43	355-	5.50	115.3	20.9	327.1
1:09.	3			3.13.	353.1	5.50	109.6	21—	324.9
1:12.	4			2.97	351.6	5.55	102—	21.1	325.6
1:15	5			2.77	351.2	5.58	96.3	21.0	324.7.
1:18	6			2.26	354.2	5.64	87.2	21—	327.5
1:21	7			1.82.	354.3	5.65	86.1	21.2	329—
1:24	8			1.34	354.3	5.64	85.4	21.2	328.6
1:27	9			1.35	355.3	5.65	84.0	21.2	328.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature: Tim W	Date: 1/12/17.
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	M. D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.91	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	Corrected Redox: Y / N		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14-	0			1.45	733	6.06	71.4	20.9	663 Turbid,
14:03	1.1			0.64	703	6.06	93-	19.6	631
14:06	2.2			0.61	704	6.05	101.9	19.6	628.
14:09	3.5			0.58.	695	6.05	99.5	19.6	623.
14:12	4.5			0.53	686	6.06	95.4	19.6	615.
14:15	6.5			0.52	691	6.06	89.9	19.5	607.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Tim W Checker Name and Signature	1/12/17. Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	D1 (Triangle)
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.71	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:35	0		0.3/min	0.83	557	5.95	70.2	20.5	C 509
2:38	1.2			0.41	559	5.77	106	20.4	510
2:41	2.4			0.31	549	5.73	115.9	20.3	499.4
2:44	3.5			0.26	538	5.73	121.2	20.4	488.7
2:47	4.5			0.24	530	5.72	122.1	20.4	483.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Tim W — Checker Name and Signature	1/12/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Sec. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
15:10	0			1.02	899	6.04	-59.7	18.7	788. Clear, slight sulfur smell
15:13	1.2			0.30	989	5.95	-56.1	18.7	869
15:16	2.3			0.23	1003	5.92	-46.7	18.7	882
15:19	3.5			0.21	1000	5.92	-44.2	18.7	881
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic			
		☐	☐	☐	☐	☐			
		☐	☐	☐	☐	☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature: TM W	Date: 1/12/17
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3C-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	1/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.91	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.65	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
3:31	1.0		0.3/min	2.15	888	5.61	-20.1	20.6	807	Clear, sulfur odour.
3:34	2.0			0.38	873	5.31	-18.6	19.6	783	
3:37	3.0			0.28	870	5.30	-24.9	19.6	780	
3:40	4			0.25	870	5.29	-27.1	19.6	780	
3:43	5			0.23	875	5.26	-28.2	19.5	783	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Tim W — Checker Name and Signature	1/12/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	5/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 13.03	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): ~~17.20~~	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.20 m	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:36	0			8.56	307.8	7.61	48.0	~~24.7~~ 24 306.5	Turbid & cloudy/sandy.
8:39	0.8L			8.46	293.9	7.31	53.1	23.6	286.1
8:43	1.8L			8.09	290.4	~~5:60~~ 97.6		23.2	280.8 Cloudy & milky.
8:46	2.2L			8.07	289.5	6.28	119.8	23.0	278.2
8:49	2.6L			8.10	290.1	6.12	137.9	22.6	276.9
8:52	3.2L			8.07	289.5	6.03	151.7	22.9	278.5
8:55	3.8L			7.99	290.3	5.98	160.2	23.8	282.0
8:58	4.1L			8.04	289.4	5.94	166.7	23.2	279.4
9:01	4.6L			8.08	288.4	5.91	172.6	23.0	277.6
9:04	5.2L			8.14	287.9	5.88	176.8	22.7	274.0
9:07	5.8L			8.17	287.7	5.87	180.6	22.5	273.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	5/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.21m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.30m	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:25	0		0.2 l/min	4.88	827	6.72	-87.3	27.8	872	Clear
10:28	0.5			0.70	883	6.44	-109.9	23.1	843	
10:31	1			0.59	877	6.41	-110.0	22.9	842	
10:34	1.5			0.48	875	6.36	-108.8	22.8	838	
10:37	2			0.45	877	6.34	-108-	22.8	839	
10:40	2.5			0.41	877	6.33	-108.7	22.8	840	
10:43	3			0.39	877	6.31	-109.1	22.6	837	
10:46										
10:49										
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	5/12/17 Date	Checker Name and Signature: TIM W	5/12/17 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-DS
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	4/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.45m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): ~~5.96m~~	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
15:12	0			3.10	1130	6.38	-19.2	19.9	1011 Slight sulphur odour, mostly
15:15	1.4L			0.38	1083	5.55	-16.7	18.9	956 clear
15:18	3L			0.25	1069	5.47	-16.1	18.9	944
15:21	4L			0.21	1066	5.45	-15.9	19.0	943
15:24	5L			0.21	1063	5.45	-15.7	19.0	941
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~T5B~~ T4B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.92 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.12 m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
13:38	0			4.00	455.6	5.62	-63.9	21.2	421.5	Slightly turbid.
13:41	1.1			0.33	443	5.45	-79.1	19.7	397.7	
13:44	2.2.			0.21.	442.2	5.44.	-85.7	19.6	396.8	
13:47	3.5.			0.20	442.6	5.44	-90.6	19.6.	396.6.	Strong Sulfur Smell after ~3.8L
13:50.	4.6.			0.21.	441.3	5.44.	-94.7	19.6.	395.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature: Tim W	Date: 4/12/17.
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TMC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	4/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.51m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.85m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
15:59	0			2.05	527	5.92	-57.1	21.2	485.6
16:04	0.6L			2.36	511	6.06	-45.9	21.8	482.8 Tube filled with sand.
16:08	1.0L			1.70	524	6.16	-33.6	21.1	484.2
16:11	1.8L			0.29	513	6.03	-36.7	20.7	470.7
16:14	2.5L			0.21	512	6.01	-36.0	20.7	469.5
16:17	3.3L			0.17	511	6.01	-36.3	20.6	467.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	4/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	FS2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	10 cm			3.85	1334	7.28	-65.7	29.6	C 1541 NTU 564
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIN
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			2.14	1809	7.40	-43.3	32.8	2080	44.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	13/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	15cm			4.76	1775	7.70	-47.5	28.1	1874	19.9	
	30cm			0.30	1776	7.52	-66.1	24.1	1742	20.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	[illegible]	20cm		2.99	1786	7.51	-114.7	27.1	C 1857 NTU 37.1 Too shallow to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

[signature] Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU Odour, Colour, Turbidity
	15cm			7.95	1.778	7.77	-47.3	29.1	1917 78.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C / NTU	Odour, Colour, Turbidity
	15cm			16.50	1366	9.97	-42.4	26.4	1401	342.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
	15cm			19.52	1477	9.97	-23	26.4	1516 21.1
	40cm			19.35	1476	9.96	-21.5	26.4	1516 22
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA02	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	42
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			20.24	1468	10.20	-32.8	27.6	C 1541 NTU 286.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	B2 Jetty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	13/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	15cm			21.32	1474	10.14	-25.2	26.6	1519	34
	35cm			21.05	1474	10.12	-23	26.5	1516	85.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

GW-08 15/15
BH 12 20/30

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-08
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.27m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.88m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
04:03	0			2.29	727	6.51	-121.1	20.6	666.	Slightly turbid
04:06	1.1			1.90	725	6.43	-120.4	20.5	662	Sulfur smell.
04:09	2.2			2.31	719	6.42	-119.7	20.4	657	
04:12	3.3			2.87	716	6.41	-115.5	20.5	654	
04:15	4.1			2.65	691	6.38	-113.9	20.4	630	
04:18	5.			1.97	679	6.37	-115.5	20.3	678	
04:21	6.			1.82	669	6.38	-116	20.3	610	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature** Tim W	19/12/17 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.73	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.53	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
09:33	0			0.90	489	6.18	4.7	20.0	441	Clear, slight sulphur odour
09:36	1.5 L			0.39	470.3	5.92	43.6	19.9	425.6	
09:39	3			0.31	479.2	5.90	57.7	19.7	430.8	
09:45	6.			0.24	484.7	5.85	55.2	19.8	419.6	
9:48	7.5.			0.25	469.2	5.84	47 –	19.8	422.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	19/12/17 Date	Checker Name and Signature: Tim W	19/12/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.945m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.125m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:45	0			1.15	446.3	5.60	-72.5	19.9	402.1	Sulfur odour
10:48	1.5			0.24	428.3	5.46	-79.2	19.8	385.2	Slightly cloudy.
10:51	3			0.20	427.6	5.44	-86.6	19.8	385.3	
10:54	4.5			0.18	427.4	5.44	-91	19.8	384.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
		TMW	19/12
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.93	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:04	0			2.16	689	6.56	109.0	19.7	618	Slightly turbid, nil odour.
9:07	1.3			0.73	648	6.29	52.3	19.7	582	
9:10	3.2			0.64	653	6.26	67.7	19.7	584.	
9:13	4.5.			0.59	636	6.27	68 -	19.7	572	
9:16	5.8.			0.53	648	6.25	59.3	19.7	585.	
9:19.				0.49	633	6.26	50.8	19.8	570.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	19/12/17 Date	Tim W Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.50m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.91m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:21	0			1.63	189.2	6.04	91.3	21.3	C 179- Clear to slightly turbid.
10:24	1.5			0.93	186.8	6.01	113 -	21.1	173 1
10:27	3			0.85	187.3	6.02	125.1	21.1	173.5,
10:30	4.5			0.82	1883	6.02	132.4	21.1	174 -
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Tim W — Checker Name and Signature	19/12 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.55m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.865m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
11:05	0			1.85	520	6.02	-78.7	21.1	476 - Slighty turbid
11:08	1			0.54	513	6.00	-71.1	20.4	467.9
11:11	BLOCKAGE								
11:14	2			1.00	517	6.07	-66.5	20.9	478.3
11:17	3			0.36	515	6.01	-55	20.6	468.7
11:20	4			0.21	513	6.02	-53	20.2	466 6
11:23	5			0.23	513	6.02	-52.2	20.2	466.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	19/12/17 Date	TIM W Checker Name and Signature	19/12 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.03	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.17	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
959	0			2.13	375	5.83	88.3	21.1	347	Clear nil odour.
10.02 1002	1			0.51	383.6	5.50	130.3	20.6	351.8.	
10:05 1006	2			0.40.	378.9	5.51	110.4	20.7	348 -	
10:08 1009	3			0.36	374.2	5.53	105.9	20.8	344.3.	
10:11										
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	TIM W Checker Name and Signature	19/12/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.12m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.22.	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
15:04	0			8.74	285.1	6.15	103.2	24.9	282.0	Silty, nil odour.
15:08	0.2L			8.92	275.7	5.75	143.5	23.6	268.8	
15:12	1L			9.04	273.1	5.66	161.4	23.0	261.7	
15:15	1.5L			8.77	211.6	5.58	174.2	22.3	257.8	
15:19	2.0L			8.65	271.0	5.54	182.9	22.5	258.3	
15:23	2.6L			8.61	260.5	5.53	190.3	22.5	255	
15:27	3.0L			8.45	270.8	5.53	195.9	22.3	256.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	19/12/17. Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

9.95

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	20/12/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.83m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.85m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:29am				2.30	157	7.38	-102.9	19.1	139
7:33	1.2			0.36	146.5	6.17	-85.7	19.8	131.9
7:38	3			0.25	145.8	6.04	-67.8	19.8	131
7:41	4			0.23	146.3	6.02	-62.6	19.9	132
7:44	5			0.21	146.6	6.00	-56.5	19.9	132.4
7:47	6			0.21	146.8	5.99	-52.7	19.9	132.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BH 10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.72	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.615	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:59				2.70	244.0	6.17	-33.2	19.2	219.0
8:02	1-2			0.31	245.1	6.08	-50.0	20.5	224.0
8:05	3			0.22	245.1	6.10	-60.0	20.7	225.2
8:08	4			0.20	244.1	6.12	-64.3	20.8	224.5
8:11	5			0.19	243.8	6.13	-66.7	20.8	224.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 0.235	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.135	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:25				3.90	427	5.98	-66.0	18.3	373
8:28	1.5			0.34	357.3	5.49	-19.7	17.9	308.9
8:31	2.5			0.24	355.5	5.43	-12.5	17.9	307.3
8:34	3.5			0.20	355.1	5.42	-12.2	17.9	306.7
8:37	4.5			0.19	354.4	5.42	-12.0	17.9	306.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	TZF
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 2-645	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2-645	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:56				2.55	908	5.83	-49.8	18.8	799
8:59	1			0.52	1008	5.93	-89.3	18.4	883
9:02	2			0.33	1035	5.92	-81.4	18.5	907
9:05	3			0.25	1032	5.93	-78.8	18.6	905
9:08	4			0.22	1026	5.93	-77.7	18.6	901
9.11	5			0.20	1023	5.94	-77.8	18.6	897
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-405
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.39	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9.22				2.70	1172	5.90	-6.3	20.2	1052
9.25	2			0.37	1198	5.39	0.6	19.1	1062
9.28	3			0.33	1150	5.46	-13.1	19.2	1022
9.31	4			0.21	1138	5.47	-13.6	19.2	1013
9.35	5.3			0.20	1166	5.44	-13.0	19.2	1038
9.38	6			0.18	1155	5.43	-11.4	19.3	1030
9.41	7			0.17	1167	5.42	-12.3	19.3	1041
9.44	8			0.17	1165	5.43	-13.1	19.3	1037
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-TBE-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	20/12/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.98 3.62	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9.53				1.79	823	5.50	-21.5	20.4	746
9.56	1			0.40	800	5.38	-53.3	19.9	721
9.59	2			0.29	796	5.38	-61.9	19.8	717
10.02	3			0.26	790	5.37	-63.9	19.9	713
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	01
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.80	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
6.36				1.53	4.78	6.00	-10.2	9.25	483	CLEAR, VERY SLIGHT SULFUR ODOUR
6.46	2L			0.38	4.76	5.67	-20.8	20	431	" "
6.51	3.8L			0.28	4.70	5.65	-39.6	21.1	425	" "
6.55	5.5L			0.23	4.55	5.60	-41.7	20.1	413	" "
6.59	6.3L			0.22	4.62	5.61	-50.6	20.1	418	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD83
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.09	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0711				1.25	431	5.37	28.7	20.5	395	SLIGHTLY MILKY, ODOURLESS
0714	1.2 L			0.36	416.5	5.24	37.4	20.4	380	" "
0719	3 L			0.24	395.7	5.26	55	20.5	380.0	" "
0722				0.23	386	5.30	57	20.6	353.3	" "
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.60	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0731				3.75	258.7	5.73	55.8	20.5	235.5	
0734	1.3 L			2.78	252.1	5.68	82.0	20.4	230	ODOURLESS
0737				2.81	251.6	5.67	98.7	20.5	230.4	
				2.75	252.4	5.68	107	20.6	231.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 27.12.17	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~GW20~~ T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.91	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.83	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0752				1.52	150.9	5.87	-43.5	19.7	135.6	SLIGHT SULFUR ODOUR
0756	2 L			0.42	148.8	5.70	-60.2	20.0	134.5	
0758	2.5L			0.25	149.4	5.70	-51.5	20.0	135.1	
0801				0.23	149.9	5.70	-47.2	20.0	135.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~G184~~ T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 0.41	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0813				1.50	399.9	5.47	-65.1	18.9	358.4	SULFUR ODOUR.
0817				0.25	355.7	5.19	-37	17.8	306.9	
0820	3.5			0.27	354.3	5.14	-27.	17.8	305.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (If using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)	☐		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic	☐		
		☐	☐	☐	☐	☐	☐		
		☐	☐	☐	☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27·12·17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW + ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.78	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.64	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0831				2.12	245.4	5.77	-57	20.3	223.8	HIGH TURBIDITY, DARK BROWN, SULFUR ODOUR
0834	1.5 L			0.30	244.2	6.00	-102.6	21	225.4	" "
0836	3 L			0.19	243.7	6.02	-112.6	21.2	225.9	CLEAR, BROWN, ODOURLESS
0839	4.2 L			0.17	242.2	6.02	-114.8	21.3	224.9	" "
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (If using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date: 27·12·17 — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW & ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.74	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): ~~4.16~~	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0853				1.77	991	5.76	-47.0	18.4	878	CLEAR, SULFUR ODOUR
0856	1.2 L			0.69	1011	5.69	-53.6	18.5	884	" "
0858	2.5 L			0.47	990	5.70	-57.5	18.5	867	" "
0859	3 L			0.40	985	5.69	-58	18.5	863	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date: 27.12.17	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL JETTY
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11.30		15cm	NTU 20	6.99	1644	8.74	-67.6	25.0	WATER IS BROWN/ RED COLOUR 1644
		~~30cm~~							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW + ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.03	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.62	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0907				1.32	777	5.49	-26.7	19.9	700	CLEAR, SLIGHT SULFUR ODOUR
0911				0.33	762	5.15	-43.7	19.7	686	CLEAR, SULFUR ODOUR
0914				0.24	761	5.13	-49.4	19.8	685	" "
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD5
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.57	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.97	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
0923				1.85	1228	5.22	5.0	20	1106	SLIGHT SULFUR ODOUR, CLEAR
0927				0.31	1224	5.07	-4.0	19.2	1089	" "
0931	3 L			0.23	1206	5.09	-9.6	19.2	1073	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27-12-17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.985	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.09	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
1034				2.60	478	5.75	-98	21	434	SLIGHT SULFUR ODOUR, BROWN, MOD TURBIDITY
1037				0.35	422.6	5.27	-77.1	19.9	381.8	" "
1041				0.25	421.9	5.24	-79.5	19.9	381.2	" "
1043				0.22	422.6	5.23	-82.1	20.0	382	" "
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		* TUBING MISSING. UNABLE TO TEST. - Blocked

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	~~PZ6~~ GW-07
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW & ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.48	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.51	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		※ FILLED W LIMESTONE IN WELL HEAD
									※ DRY

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.29	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.60	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate NTU	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
1106				3.30	593	6.29	-98.5	26.5	610	STRONG SULFUR ODOUR, BROWN, CLEAR
1110	1.5L			2.13	585	6.35	-118	22.4	554	" "
1113	2.2L			2.02	578	6.31	-116.3	22.2	546	
				2.17	576	6.29	-113.9	22.0	544	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27·12·17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	NTU
1134				7.05	1644	8.89	-45	25.3	1655 18.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2S
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C NTU	Odour, Colour, Turbidity
1139		1m FROM BANK		6.95	1653	8.82	-11.2	26.2	1690 18.7	BROWN / RED
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS/BI
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	27.12.17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
1143		15cm		8.04	1653	8.84	-9.8	25.9	1683	12.5	BROWN/RED
1144		45cm		5.80	1653	8.69	-83.0	25.9	1678	34.5	"
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)	☐		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic	☐		
		☐	☐	☐	☐	☐	☐		
		☐	☐	☐	☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	27		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water:	☑ Groundwater: ☐
						Bore / Location ID:	A / N
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW + ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1153				13.35	2028	7.96	-39.5	31.7	C NTU ~~EC~~ 2292 28 QUITEDRY, CLEAR, 10 CM WATER
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW & ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 27.12.17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1157		15cm		2.71	1980	7.45	-60.7	26.6	C 2042 NTU 307.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	27/12/17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	27.12.17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	TW & ET	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
12:07		20 cm		1.27	2012	7.25	−120	26.0	2040	30	ODOUR
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic			SAMPLE LOC BECOMING OVERGROWN W GRASS
		☐	☐		☐				
		☐	☐		☐				

Approval and Distribution

Fieldwork Staff Signature	27.12.17 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	TW + ET	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C ATO
12.02		15cm		2.65	1995	7.4	8.6	25.6	2018 22.5
12.04		40cm		0.45	1992	7.28	-61.3	22.8	1904 -0.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic			* 0.7 M ON GAUGE
		☐	☐	☐	☐	☐			
		☐	☐	☐	☐	☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	21.12.17		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	28/12/17.
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.19	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): ~17.17	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11-12	0			8.65	285.9	6.02	112.7	31.2	312. Yellow, turbid, cloudy.
11.15	0.3.			8.63	273.6	5.58	132.4	29—	290.2. } Flow stopped, changed
11.18	0.6.			9.37	268.5	5.43	144.5	27.4	279.6. } battery on pump.
11:21	1			9.21	266.5	5.39	150.1	26.8	276.4
11.24	1.5			9.32	266.6	5.37	157.7	27—	275.8.
11.27	1.9.			9.49	266.3	5.36	161.5	26.8	274.6.
11.30	2.2			9.10	265.2	5.33	163.7	27.3	269.4
11:33	2.5.			9.75	265.8	5.33	164.9	27.9	280.9
11.36	2.8.			9.74	264.9	5.34	168—	26.7	273.2.
11.39	3.1			10.30	264.7	5.34	168.8	27—	275.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	28/12/17 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A1E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/01/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC - E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
0921	15cm			5.62	1194	7.36	-19.9	20.8	109.7	101.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C			± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 16/01/18	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1N
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	16/01/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	Spc ~~EC~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	NTU
09:16	15cm			6.65	1425	~~6.63~~	16.8	21.4	1327 113.9
						6.63			
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	16/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	16/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
10:04	15cm			2.41	2600	6.96	-88.4	21.3	2414 72.7
10:07	35cm			1.66	2749	6.77	-101.2	21.3	2557 77.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	1	x 40 mL Vial (HCl)	1	x 60 mL Ferrous	2	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic		
		1	Chlorophyll						

Approval and Distribution

Fieldwork Staff Signature	Date: 16/01/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

AECOM

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS - N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC SH	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C / NTU)
09:45	20cm			7.45	2279	7.43	46.0	21.8	2138 / 60.4
09:48	40cm			3.73	2333	9.23	22.5	20.4	2129 / 72.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	16/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.33	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.77	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									NTU
7:39				2.50	442.9	6.77	-123.7	21.2	56.8 Slightly turbid
7:42				3.11	420.7	6.73	-120.2	20.4	43.2
7:49				3.18	415.5	6.72	-115.8	20.4	24.6
7:52				3.15	419.7	6.72	-114.7	20.4	20.6
7:55				3.17	428.1	6.76	-111.2	20.4	18.4
7:58	6.3 L			3.17	433.8	6.77	-109.2	20.6	18.3
8:01				3.14	434.2	6.78	-108.6	20.8	16.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BH 12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	15/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 13.26	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.4	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
8:26				9.20	264.3	7.37	116.4	20.8	2000	
8:27				9.00	255.8	6.15	156.7	20.4	1750	Very cloudy, milky
8:30				9.00	246	5.84	173.3	19.8	1345	
8:33				9.00	237.2	5.70	183.2	19.6	880	
8:36				9.18	225.8	5.63	188.4	19.6	417.7	
8:39				9.13	220.7	5.59	191.5	19.6	266.6	
8:43				9.14	215.6	5.54	194.7	19.4	146.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Jeth

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	AZ
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU Odour, Colour, Turbidity
2120				9.46	1965	8.56	23.1	26.1	30
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU Odour, Colour, Turbidity
2.40				8.55	1968	8.51	24.7	26.2	16.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Setty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	11/01/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	LG SH RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~EC~~ SPC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
14:08	30cm			9.28	1963	8.45	33.5	25.9°C	1998 9.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checked Name and Signature	11/01/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	BLNS - B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									NTU
3.50				8.43	1972	8.67	30.9	26	20
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.90	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): 6	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU Odour, Colour, Turbidity
10:03				0.59	518	6.12	-46.2	21.2	67
10:07				0.43	513	5.87	-31	21.3	51
10:10				0.37	514	5.83	-22.2	21.4	140
10:12				0.31	514	5.81	-13.3	21.6	50-90 → NTU JUMPING
10:15	2.5L			0.29	515	5.8	-11.6	21.5	60-170 → NTU JUMPING
10:18				0.27	513	5.79	-11.9	21.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	GWD5
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.47	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.97	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
11.03				0.72	1183	5.20	51.7	20.2	314	Sulfur smell, yellow
11:09				0.33	1201	5.12	50.2	21.4	46	
11.13				0.33	1179	5.17	43.1	22.5	27.1	
11.16	2L			0.24	1168	5.20	36.4	20.9	63.6	
11.19				0.22	1167	5.23	33.5	20.8	92.7	
11.21				0.20	1165	5.24	31.1	20.9	170.1	
11.24	3.5L			0.20	1167	5.25	27.3	20.4	299.3	
11.27				0.19	1163	5.25	26.8	20.2	376.	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Paddock

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.14	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (NTU)
11:54				1.19	774	5.98	122.8	20.4	82.4 murky water
11:57				1.12	768	6	132.9	20.4	73.6
12:00				1.08	766	6	137.2	20.1	69.8
12:03				1.08	762	5.99	137.1	20.7	67.3
12:05				0.94	757	6	135.1	20.6	68.9
12:08	5.5L			0.88	747	6	133.8	20.7	73.6
12:11				0.85	741	6	132.4	20.6	90.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	GW D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	11/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.13	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): 4.17	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): nil.	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
10.34				0.31	4066	5.20	129.5	21.7	43.1	clear some odour
10.37				0.38	4008	5.18	138.0	21.7	95.0	← Jumping a lot.
10.40	1L			0.29	3946.3	5.20	140.2	21.7	45.5	
10.43				0.28	3887	5.22	138.5	21.7	58.1	
10.46	3L			0.27	3827	5.25	138.1	21.5	94.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Roundabout Cnr Farrington / Murdoch

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	1/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.89	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.52	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
12.27				0.84	451.9	5.86	63.0	20.7	97	
12.30				0.38	465.6	5.64	90.8	20.8	338...	Sulfur odour, clear
12.33	2L			0.30	439.8	5.59	98.2	20.9	103	
12:36				0.25	427	5.54	106	20.8	116	
12.39				0.22	421.9	5.48	112.3	20.8	74	
12.43	5L			0.21	4245	5.49	110.8	20.9	148	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)	
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	GWT3EA
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	10/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.18	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.59	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2.41				0.91	1049	5.60	-28.2	20.5	128.4 Sulfur smell, Turbid
2.44				0.49	1049	5.07	-25.3	20.5	44.1
2.47				0.36	1045	~~5.08~~	-24.1	20.5	36.8 PH 4.98
2.50				0.27	1038	4.95	-26.5	20.4	46.9
2.53				0.25	1032	4.95	-28.0	20.4	47.8
2.56				0.23	1028	4.95	-29.3	20.4	39
				0.22	1026	4.94	-29.5	20.4	35.4
									NTU Jumping still
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	10/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.29	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 9.44	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:05				1.05	1194	5.93	148	21.0	80.1
2:08				0.42	1266	5.41	-28.2	20.3	135.5 Sulphuric smell
2:11				0.37	1231	5.29	-25.4	20.1	180
2:14				0.33	1212	5.26	-22.8	20.2	120
2:17				0.30	1216	5.25	-21.8	20.3	99
2:21				0.26	1217	5.25	-20.1	20.6	87
2:24	4.5L			0.23	1217	5.25	-20.3	20.5	88
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	10/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 50cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.13	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
10:45				0.66	391	5.83	-50	19.5	40	
10:49				0.33	369.4	5.42	-18.1	19.3	31	
10:52				0.25	366.9	5.28	-3.2	19.2	28	Sulpher odour and Turbidity.
10:55				0.20	366.1	5.21	-5.7	19.2	24.7	
10:57				0.18	365.2	5.18	10.3	19.1	25.9	
11				0.16	364.1	5.17	12.8	19	32.2.	
11:03	8L			0.15	363.2	5.16	14.4	19.1	41.1	
11:06				0.14	362.4	5.16	15.6	19	48.5	
11:09				0.13	361.7	5.16	16.4	19	57	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		NTU jumping around.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

grass field bore.

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW04
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	10/11/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.68	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.89	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L): | Includes/ excludes bore annulus (circle) | # purge volumes removed: | Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU Odour, Colour, Turbidity
10:00				4	265.1	6.42	56.6	21.4	73.6
10:05				3.04	259	5.84	100.9	21.3	72.3
10:08				3.19	256.9	5.72	120.6	21.2	60.5
10:11				3.18	255.4	5.70	128.1	21.3	53.
10:14				3.08	258.7	5.68	133.7	21.2	51.2
10:16	6L			2.96	259.1	5.68	137	21.2	51.3 clear, odorless
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature | Date | Checker Name and Signature | Date

Project Manager Signature | Date | Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	10/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.85	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.65	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9.28				0.61	301.6	6.11	-56.9	21.9	64.1
9.31				0.22	300.3	6.02	-74.2	22.1	72.0
~~9.33~~ 9.36				0.15	300.1	6.02	-81.6	22.3	69.4
9.36				0.13	299.1	6.02	-86.7	22.4	73.5
9.39				0.12	297.7	6.01	-88.9	22.4	87.3
9.41	4.5L			0.11	294.2	6.01	-90.3	22.4	91.7
9.44				0.11	290.7	6.00	-90.9	22.4	94.2
9.46				0.10	287.2	6.00	-91.1	22.5	95.0
9.49	6.5L			0.10	285.4	6.00	-91.4	22.5	105.0
				0.09	284.1	5.99	-91.3	22.7	113.1 — Jumping a lot
									Yellow, odourless
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)	
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

First 2 SPC Readings 155.

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	10/01/17
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.97	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.87	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ S EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
8:45				0.62	1455	6.08	-49	20.3	55.9	
8:50				0.28	1455	5.83	-62	20.2	68.5	
8:53				0.21	160.1	5.78	-55.2	20.3	60.4	
8:56				0.17	161.0	5.76	-50.6	20.3	59.4	
8:59	4.5			0.14	162.2	5.74	-43.6	20.3	62.4	
9:05				0.16	162.7	5.72	-37.5	20.4	25.5	
9:08				0.18	150	5.72	-34.7	20.1	23.0	
9:13	6L			0.13	163.2	5.72	-33.7	20.2	21.8	(Tube was on bottom, for few of previous readings) lifted higher for last reading.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	Samples taken x6.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T4 IB
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	10/01/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.04m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.10m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	Odour, Colour, Turbidity
1:53 → 7:53am				1.09	430.1	5.80	~~-20~~ -3.60	20.3	163	(slight sulphuric odour) (Redox = -60.1) clearish.
7:57				~~Pump~~ 0.19	415.8	5.31	-41	20.3	74.3	
8:00				0.13	415.1	5.27	-45.3	20.2	60.	
8:03	4L			0.12	415	5.26	-49.6	20.3	46.	
6.08				0.11	415.3	5.26	-56.1	20.5	36.8	
6.11	7L			0.11	415.3	5.26	-59.6	20.3	30	
8.14	8L			0.10	415.1	5.25	-61.9	20.3	31.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)	Samples taken x6.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH1D
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.60	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.62	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:26	0			2.50	839.1	5.82	59.9	24.1	328.4	Tea coloured, slightly turbid
2:30	1			0.65	349.8	5.83	82.7	22.8	335.4	slight sulfur ~~odour~~ odour
2:33	2			0.64	351.4	5.84	88.5	23.1	338.5	
2:37	4			0.60	351.8	5.86	93.5	23.2	340	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	24/01/2018 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.67	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
12:08	0			1.42	969	5.63	-22	20.1	868	mostly clear, definitely sulfur odor
12:12	2			0.49	882	5.83	-47.5	19.2	783	
12:16	3			0.34	873	5.83	-46.1	19.3	777	
12:20	5			0.27	873	5.83	-44.6	19.1	776	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	24/1/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, JA	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.72	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.83	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
1:59	0			3.70	181	5.58	-47.7	25.0	171	slightly cloudy/milky, no odor
2:02	1			0.44	170.7	5.79	-64.4	21.2	158.4	
2:05	2			0.36	179.6	5.78	-45.7	21.4	167.4	
2:08	3			0.30	181.7	5.77	-35.7	21.2	168.4	
2:11	4			0.27	182.7	5.76	-26.0	21.1	169.2	
2:14				0.24	183.2	5.76	-20.8	21.1	169.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	24/1/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-05
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	RC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.50	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.90	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:45	0			1.55	1137	5.60	13.3	24.5	1068	mostly clear, sulfur odor
10:48	1			0.34	1071	5.45	9.0	21.0	990	
11:51	2			0.27	1073	5.43	12.7	20.8	986	
11:54	3			0.23	1070	5.42	15.5	20.8	982	
11:57	4			0.22	1066	5.41	18.0	20.7	979	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
		RD	24/1/18
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.90	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.67	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	~~NTU~~ Odour, Colour, Turbidity
11:24	0			1.65	890	5.46	-5.1	23.8°C	823	mostly clear, slight sulfur smell
11:27	2			0.32	848	5.10	-9.8	20.4°C	773	
11:30				0.27	843	5.04	-8.6	20.4°C	771	
11:33	4.3			0.25	846	5.04	-6.6	20.4°C	772	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	24/1/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	RC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
10:26	15cm			4.13	2286	7.37	36.1	25.9	2321	29.6	
10:28	30cm			0.82	2306	7.06	-114.8	25.0	2295	67.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
		RD	24/1/18
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL N5-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, JA	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
9:54	20cm			6.36	1707	8.40	46.3	26.7°C	1761	3.5	
9:58	50cm			6.33	1707	8.41	46.9	26.4°C	1755	5.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	24/1/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1 N
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	RC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
10:09				6.50	1823	7.10	-15.3	29.2°C	1976	75.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date: 24/1/18
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	NLWS-N2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	BC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
10:18	15cm			4.81	2293	7.26	6.8	27.6°C	2406	20.9	
10:21	30cm			1.71	2289	7.17	-4.0	25.4°C	2303	19.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date: 24/1/18
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/1/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, JA	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
10:13	15cm			6.45	1800	7.53	-9.0	26.8 °C	1862	50.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	24/1/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	24/1/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	BC, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
9:51	15cm			6.59	1706	8.35	44.4	26.7°c	1758	5.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date: 24/1/18
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	24/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, KB, JA	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
9:25	20cm		-	7.16	1697	8.41	79.1	26.4°C	1741	4.1	
9:29	40cm		-	6.86	1695	8.48	72.5	26.2°C	1733	26.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	24/1/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	24/1/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC, KB, JA	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
9:34	15 cm		–	8.58	1700	8.65	63	27.2°C	1772	10.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	24/1/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 0.16m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C
11:03	0			2.70	1001	4.88	27.0	21.3	410
11:06	1.2L			0.38	403.0	5.28	18.4	19.3	359.7
11:09	2.4L			0.29	411.5	5.27	25.0	19.3	366.7
11:11	3.6L			0.25	404.0	5.27	28.1	19.1	357.6
11:14	4.8L			0.23	394.1	5.26	31.9	19.1	349.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	25/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	25/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.85m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.08m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:32	0L			2.53	426	5.73	-52.3	22.5	402
10:35	1L			0.42	415.1	5.35	-44.3	21.2	384.7
10:38	2L			0.31	414.1	5.31	-45.6	21.1	383.6
10:41	3L			0.26	413.7	5.30	-47.9	21.2	383.7
10:44	4L			0.24	413.6	5.29	-50.4	21.2	383.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 0.47m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity C
10:03	0			2.57	251	5.96	107.9	22.8	240
10:06	1L			1.93	264.7	5.89	123.1	22.4	251.5
10:09	2L			2.36	261.3	5.86	136.6	22.2	247.7
10:12	3L			2.54	259.4	5.85	140.6	22.2	246.3
10:15	4L			2.79	256.6	5.83	145.1	22.3	243.6
10:18	5L			2.80	255.8	5.84	145.6	22.3	242.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	25/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	25/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	RC KB	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.99m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.11m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC~~ ~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:20	0L			7.69	400.1	5.63	126.0	23.9	384.4 mostly clear, nil odour
09:23	1L			0.50	383.7	5.31	138.4	22.1	362.0
09:26	2L			0.36	377.1	5.34	137.0	22.0	355.5
09:29	3L			0.33	372.3	5.36	135.5	22.1	351.9
09:32	4L			0.31	366.3	5.42	129.0	22.1	346.1
09:35	5L			0.29	360.9	5.46	124.8	22.1	340.4
09:38	6L			0.29	355.8	5.49	119.6	22.1	336.4
09:40	7L			0.28	341.3	5.54	116.4	22.1	322.7
09:43	8L			0.29	351.1	5.55	116.0	22.1	331.6
09:46	9L			0.29	351.8	5.56	115.8	22.1	332.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	25/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC KB	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.86	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SC~~ EC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
08:16	0			4.32	806	6.18	115.1	21.8	752	Slightly turbid.
08:19	2L			1.26	808	6.05	123.4	20.6	740	
08:22	3L			0.94	792	6.05	124.3	20.6	726	
08:25	4L			0.89	779	6.05	120.3	20.6	713	
08:28	5L			0.85	768	6.05	118.8	20.7	705	
08:31	6L			0.83	765	6.08	118.6	20.6	701	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	25/01/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	25/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC KB	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 25/01/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.63m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.52m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
08:44	0L			3.07	507	6.41	1.8	22.5	477.6	mostly clear, sulphur odour.
08:47	1L			0.46	513	5.72	58.6	21.0	473.1	
08:50	2L			0.33	504	5.59	76.2	20.9	463.9	
08:53	3L			0.27	495.5	5.52	85.7	20.9	456.6	
08:56	4L			0.24	499.5	5.53	82.7	20.9	459.7	
08:59	5L			0.22	498.5	5.52	66.8	20.9	459.2	
08:52	6L.			0.21	496.4	5.52	61.0	20.9	457.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	25/01/18 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	29/01/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 13.11	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.52	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SpC ~~E.C~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
10:08	0			9.40	274.3	7.01	11.4	25.1	273.2 Cloudy yellow, silty
10:11	1.5L			8.90	262.6	5.86	116.9	22.6	251.1
10:14	2.5L			8.85	260.6	5.61	149.9	22.6	248.4
10:17	3.5L			8.83	259.2	5.47	167.5	22.4	246.3
10:20	4.5L			8.83	258.6	5.41	175.9	22.4	246.1
10:23	5.5L			8.85	257.2	5.38	184.8	22.4	245.3
10:26	7.0L			8.84	255.7	5.36	190.1	22.3	242.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic			

Approval and Distribution

Fieldwork Staff Signature	Date: 29/01/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	29/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	RC KB	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:52	0			2.16	534	6.74	-82.8	22.2	501	Mostly clear, slight sulphur odour.
8:55	1L			0.53	513	6.01	-50.2	20.9	472.5	
8:58	2L			0.36	511	5.94	-39.6	20.9	471.0	
9:01	3L			0.35	510	5.92	-38.4	20.8	469.3	
9:04				0.32	510	5.91	-37.0	20.7	468.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Tubing blocking well, unable to dip, but could still sample

Approval and Distribution

Fieldwork Staff Signature — Date: 29/1/18

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	29/01/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.26	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.97	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:22	0L			7.13	480.7	7.04	-98.4	23.3	457.0 Strong sulphur odour
9:25				7.57	466.9	6.91	-94.3	21.1	425.4
9:29	3L			8.38	473.2	7.03	-88.2	21.2	438.7
9:32	3.5L			8.44	473.1	7.32	-83.7	21.4	441.5
9:35	4.0L			8.70	485.6	7.34	-81.6	21.6	455.0
09:38	4.5L			8.82	472.6	7.34	-77.9	21.6	442.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		Plenty of air coming up through the tubing -

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	29/01/18		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW-D5
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/2/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.61	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.92	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
3.44				1.14	1093	5.76	-36.1	21.3	1011
3.47				0.39	1089	5.49	-23.4	21.4	1014
3.50				0.30	1091	5.46	-22.6	21.3	1015
3.53				0.25	1090	5.45	-20.9	21.3	1013
3.56	3L			0.22	1090	5.45	-21.3	21.3	1013
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TRF
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	6/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.72	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
3.22				1.38	920	5.71	-79.1	20.4	834
3.25				0.65	905	5.85	-98.4	20.0	818
3.28				0.31	948	5.81	-88.5	19.8	856
3.31	2.5L			0.25	951	5.80	-83.9	19.7	855
3.34				0.23	951	5.80	-82.2	19.6	853
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	6/2/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	LG RC	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.02m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.57m	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	Spc ~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:48	0			2.02	890	5.12	-9.7	22.3	C 834
2.51				0.70	885	5.00	-22.8	20.8	~~[illegible]~~ 809
2.54	1.5			0.43	874	4.98	-28.0	20.8	803
2.57				0.35	861	5.00	-32.6	20.7	790
3.00	3			0.31	861	5.00	-34.7	20.7	790
3.03				0.27	872	4.97	-38.8	20.7	801
3.06				0.25	924	4.91	-34.7	20.8	853
3.09	5			0.24	950	4.85	-33.3	20.7	872
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA 01 Duplicate.	Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	A18
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	3/7/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
14:33	30cm			2.89	2723.2	6.73	-63.1	23.72	2655.7 44.81
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 7/2/18	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water:	☐	Groundwater:	☐		
Bore / Location ID:	NLWS - N2				
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	
Sample Date:	7/2/18				
Well Development or Well Sampling Event? (circle)					

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO ~~(ppm~~ or mg/L)	SPC ~~E.C.~~ ~~(mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity NTU
~~[illegible]~~										
14:20	30cm			5.07	2664.9	7.16	-19.1	25.17	2672.5	61.03
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

[signature]	7/2/2018		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1N
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	7/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	NTU
14:07	20cm			9.26	2573.2	7.25	-12.7	28.61	2536.8 282.8
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A1E
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	7/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC EC~~ (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C NTU
13:47	15cm			11.91	2179.1	8.1	14.8	25	2178.8 53.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	7/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/2/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SPC etc.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
12:19	15cm			11.27	1962	8.99	-2.3	24.0	1924.7	15.31
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS - B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	~~SPC~~ E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
12:05	20cm			11.31	1962.8	8.92	43.3	25.94	1997.5	7.14
12:08	40cm			11.61	1960.6	8.96	37.3	25.67	1986	7.51
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA02 Duplicate.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	8/2/18 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RL Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
11:49	15cm			11.19	1947	8.96	37	24.5	1931	9.5
11:51	30cm			11.10	1934	8.96	35.5	24.3	1912	10.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	8/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:38	15cm			11.56	1946.6	9	31.5	24.9	C NTU 1943 15.27
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 8/2/18	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	9/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.60m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.89m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC ~~EC~~: (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:57	0L			4.84	240.0	7.53	54.9	22.2	225.1
12:00	1L			3.96	228.1	6.23	115.5	21.7	213.8
12:03	2L			3.46	224.4	5.85	142.1	21.8	210.7 Mostly clear, nil odour.
12:06	3.2L			3.29	222.2	5.81	148.4	21.8	208.7
12:09	5.5L			3.09	218.2	5.82	149.5	21.8	204.8
12:12	6.5L			2.91	219.5	5.83	149.3	21.8	206.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 9/2/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	BH2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	9/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 13.17 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.40 m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:00	0			9.55	278.7	7.05	66.7	26.3	284.1	Cloudy yellow
11:03	0.8L			9.11	247.7	6.02	126.7	23.6	241.0	
11:06	1.8L			9.10	227.0	5.74	150.1	23.4	218.2	
11:09	2.4L			9.12	~~232~~ 214.6	5.58	165.3	23.2	207.3	
11:12	3.0L			9.11	212.3	5.52	169.4	23.0	204.2	mostly clear, slightly milky
11:15	3.5L			9.10	209.8	5.46	173.9	23.1	202.4	
11:18	4.2L			9.07	207.6	5.41	179.0	23.2	200.6	
11:21	5.0L			9.07	205.5	5.38	184.0	23.0	197.8	
11:24	5.8L			9.08	204.9	5.37	187.1	23.1	197.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 9/2/18	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	9/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.07m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.10m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:14				1.24	442.0	6.40	24.9	22.3	418.1	Mostly clear, nil odour.
10:17	1.5L			0.40	407.2	5.43	81.4	22.1	383.6	
10:20	2.5L			0.33	392.7	5.39	97.9	22.1	371.1	
10:24	4.0L			0.34	378.3	5.41	108.4	22.1	357.3	
10:27	5.0L			0.35	371.9	5.44	110.2	22.2	351.4	
10:30	6.0L			0.33	363.5	5.46	109.4	22.2	343.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	9/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	12/2/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 12/2/2018	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.297	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.834	Casing Radius (mm):	**Corrected Redox:** Y / (N)		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~EC~~ SPC (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C
08:18	0			6.94	530	6.89	-101.4	21.9	526 Strong sulphur odour, slightly milky
08:21	1L			1.40	544	6.60	-102.9	21.3	506
08:24	2L			0.76	536	6.47	-104.1	21.1	495.9
08:27	3L			0.55	529	6.41	-100.7	21.1	489.1
08:30	4L			0.47	527	6.39	-97.5	21.1	487.8
08:33	5L			0.44	532	6.38	-95.9	21.1	491.4
08:36	6L			0.42	533	6.38	-95.6	21.1	493.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date** 12/2/18	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.823	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.526	Casing Radius (mm):	Corrected Redox: Y / (N)		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~SpC~~ E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
7:12	0			3.11	535	7.66	-44.6	20.9	293.5	Slight sulphur odour, mostly clear
7:15	1L			1.63	535	6.10	-12.6	21.0	494.3	
7:18	2L			1.48	517	5.79	-1.9	21.0	477.0	
7:21	3L			1.42	517	5.74	-11.8	21.0	477.6	
7:24	4L			1.37	508	5.73	-20.5	21.1	469.1	
7:27	5L			1.22	503	~~5.72~~	-26.4	21.0	465.5	
7:30	6L			1.11	514	5.72	-26.9	21.1	475.3	
7:33	7L			1.03	498.3	5.70	-26.5	21.0	460.7	
7:36	8L			0.93	505	5.69	-27.4	21.1	467.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TSB
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.884	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.845	Casing Radius (mm):	Corrected Redox: Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:09	0			2.41	183.2	6.28	-70.9	20.4	166.6 C sulphur odour, mostly clear
08:12	1L			0.43	199.4	5.81	-51.8	20.2	181.7
08:15	2L			0.33	211.4	5.748	-39.3	20.2	192.2
08:18	3L			0.27	214.6	5.77	-28.7	20.2	195.1
08:21	4L			0.25	215.1	5.77	-25.6	20.2	195.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 13/2/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.26 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14 m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~E.C.~~ SR (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C
08:38	0L			7.72	767	5.80	-40.7	19.4	682
08:41	1L			0.95	437.0	5.37	-11.3	18.7	384.3
08:44	2L			0.60	429.8	5.30	-3.9	18.8	379.0
08:47	3L			0.53	439.1	5.28	-2.9	18.9	387.9
08:50	4L			0.45	439.9	5.27	-2.8	18.9	388.5
08:53	5L			0.40	437.3	5.27	-2.7	18.9	386.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/2/18 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	13/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.782m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.653m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
09:08	0L			2.07	354.1	5.81	-22.7	22.0	332.1	strong sulphur odour, tea coloured
09:11	1L			0.34	344.3	6.19	-85.1	22.4	327.3	
09:14	2L			0.27	343.1	6.21	-91.3	22.6	327.7	
09:17	3L			0.24	340.0	6.21	-94.1	22.7	324.9	
09:20	4L			0.23	339.8	6.20	-94.4	22.7	323.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

AECOM

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4 & T3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	13/2/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.981m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.084m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:30	0			2.04	448.3	6.41	-125.6	22.3	422.9 Strong sulphur odour
10:33	1L			0.42	414.0	5.57	-73.7	21.0	382.5
10:36	2L			0.31	412.6	5.44	-61.4	21.0	380.9
10:39	3L			0.27	412.0	5.39	-59.2	20.9	380.0
10:42	4L			0.24	411.5	5.36	-58.2	20.9	379.4
10:45	5L			0.23	411.3	5.35	-58.6	20.9	379.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	13/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TAC
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	13/2/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)		☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO)	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
								C	
10:58	0L			2.00	522	5.71	-40.7	23.2	500
11:01	1L			0.45	517	5.86	-44.2	21.2	478.6
11:04	2L			0.33	516	5.88	-40.1	21.1	477.6
11:07	3L			0.27	515	5.90	-37.0	21.1	477.4
11:10	4L			0.24	515	5.89	-34.8	21.1	476.6
11:13	5L			0.22	515	5.89	-34.0	21.1	~~476~~ 476.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		Unable to get dipper down bore due to blockage. Able to still sample though.

Approval and Distribution

Fieldwork Staff Signature	13/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Surface Water:	☐	Groundwater:	☑		
Bore / Location ID:	~~D1~~ D2				
Sample Date:	13/2/18				
Well Development or Well Sampling Event? (circle)					

Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 13/2/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.094m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	SPC E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:29	0L			2.33	613	6.03	55.2	23.8	590	Slight sulphur odour, slightly turbid.
11:32	1L			0.42	625	6.06	75.1	21.5	584	
11:35	2L			0.30	631	6.08	78.0	21.5	588	
11:38	3L			0.25	628	6.07	76.3	21.4	586	
11:41	4L			0.23	613	6.07	72.4	21.6	571	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

[signature]	13/2/18		
Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-E08
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/02/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.34	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.79	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9.22	0			5.96	570	6.88	-105.0	23.6	548	
9.26				1.01	517	6.45	-110.5	21.2	478.8	
9.29				0.66	510	6.40	-106.8	21.1	489.9	
9.32				0.54	484.7	6.33	-102.3	21.1	469.5	
9.36				0.52	474.9	6.32	-98.4	21.2	490.0	
9.39	5			0.49	475.0	6.32	-97.5	21.2	441.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/02/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.92	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☑ Bailer ☑ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☑ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:43	0			1.48	527	6.02	39.8	21.7	493.2	
8:46				0.45	517	5.62	68.8	21.5	487.2	
8:49				0.34	517	5.60	78.2	21.5	481.9	
8:53	3			0.30	512	5.60	75.0	21.5	476.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/02/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.71	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:21	0			2.89	498.4	5.99	105.3	21.2	459.5	
8:24				0.59	493.1	6.04	97.3	20.9	451.2	
8:27				0.41	510	6.06	86.0	20.9	465.5	
8:30	3			0.33	508	6.06	80.0	21.0	469.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23-2-201
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.68	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
7:56	0			4.37	253.9	6.09	127.4	22.1	242.8	
7:59				4.11	252.7	5.91	149.5	22.0	237.2	
8:04				4.07	255.5	5.89	160.1	22.0	241.4	
8.09	4.2			4.07	254.5	5.89	163.7	22.0	242.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/2/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
	20cm			8.05	2225	8.78	-2.0	24.6	2208	8.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Too shallow to profile.

Approval and Distribution

Fieldwork Staff Signature — Date: 23/2/18

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

AECOM

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/2/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	Spc ~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			8.53	2225	8.87	4.6	25.3	C 2224 NTU 8.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	23/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/2/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			8.80	2227	8.93	15.5	25.2	C NTU 284 8.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	23/2/18 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS - B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	30cm			8.71	2227	8.92	-11.6	25.2	2234	10.1
	50cm			0.33	2080	8.26	-190.1	24.6	2065	17
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	23/2/18 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	AIE
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			~~5.16~~	2879	7.76	-129.5	27.5	C 3069 NTU 12.9
				4.4					
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		Too shallow to profile

Approval and Distribution

Fieldwork Staff Signature	Date: 23/2/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	RWS-N2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	20cm			0.63	3653	6.98	-47.9	22.9	3498	136
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Too shallow to profile.

Typha is dead in the water.

Approval and Distribution

Fieldwork Staff Signature	23/2/2018 **Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	MW A1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~SPC~~ E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	15cm			3.6	3916	6.74	-78.0	24.9	C 3907 NTU 1.423
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	23/2/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
3:05	0			1.23	535	5.83	-61.9	23.8	514	
3:08				0.61	520	5.95	-79.0	22.5	494.9	
3:11				0.51	518	5.92	-64.7	22.4	491.5	
3:14	3			0.45	517	5.91	-57.9	22.4	491.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TP3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/2/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.3	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 1.98	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:33	0			2.06	416.6	5.78	-71.4	21.7	378	
2:37				0.56	403.3	5.39	-47.5	21.3	375	
2:41				0.29	403.4	5.36	-49.1	21.3	374.9	
2:44				0.26	403.1	5.34	-50.8	21.3	374.6	
2:47	4			0.23	402.8	5.34	-52.7	21.3	373.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)	
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature — Date

Checker Name and Signature — Date: 22/2/18

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.95	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.14	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:08	0			0.96	943	5.75	-75.8	20.2	860	
2:12				0.41	961	5.82	-72.1	19.6	862	
2:15				0.32	953	5.81	-66.3	19.5	852	
2:18	3			0.28	948	5.81	-64.8	19.5	847	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/02/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 13.24	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.38	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
1:21	0			8.74	273.7	5.51	138.5	24.8	271.8	
1:24				8.72	269.3	5.45	160.3	24.2	265.5	
1:27				8.71	267.2	5.40	175.6	24.0	261.0	
1:31				8.65	256.5	5.37	183.2	24.1	251.0	
1:34				11.24	252.8	5.36	194.1	24.2	246.7	
1:37				9.65	246.9	5:32	200.6	23.9	247.2	
1:42	6			9.22	243.6	5:32	203.3	24.1	239.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/2/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-05
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.71	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.93	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:05	0			0.92	1352	5.37	-4.8	20.9	1245	
11:08				0.35	1329	5.37	-8.2	20.8	1214	
11:11				0.27	1308	5.39	-10.1	20.8	1201	
11:14				0.23	1301	5.34	-7.6	20.9	1196	
11:17				0.21	1296	5.31	-5.3	21.0	1196	
11:20	5			0.20	1291	5.30	-3.9	21.0	1193	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 22/2/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW.T3EA
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/2/16
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.75	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:36	0			0.93	854	5.14	-10.4	20.6	776	
10:39				0.41	828	5:47	-22.8	20.5	755	
10:41				0.34	822	5·18	-27.6	20.5	753	
10:44				0.31	829	5.16	-28.5	20.5	757	
10:47	4			0.28	827	5.16	-28.8	20.6	756	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/16 Date
Project Manager Signature	Date	Distribution: Project Central File	

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AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TSC
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/17
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.33	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	Gauging
Bore Depth (m-pvc): 5.13	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Hydrasleeve in
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve out
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Parameters
	Key Type (if applicable):	☐ Retrieved				
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:53	0			1.01	563	5.19	38.2	19.9	460	
9:56				0.34	378.9	5.32	33.2	19.9	335.7	
9:59				0.26	377.4	5.27	36.3	19	333.0	
10:02				0.23	378.6	5.25	34.3	18.9	335.1	
10:05				0.21	381.7	5.25	31.4	18.9	337.0	
10:08	5			0.20	386.9	5.22	28.9	18.9	341.0	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/2/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.845	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.64	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9:25	0			0.80	301.2	5.99	-[illegible].5	22.2	284.9	
9:29				0.27	301.5	6.03	-66.2	22.4	286.7	
9:32				0.21	302.0	6.07	-74.7	22.5	287.9	
9:36				0.19	302.1	6.09	-79.3	22.7	288.6	
9:39	4			0.17	300.2	6.09	-80.9	22.8	287.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TJB
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.935	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.83	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9.06	0			0.69	215.5	5.68	-26.7	20.6	197.5	
9.09				0.33	229.2	5.75	-32.7	20.5	210.3	
9.12				0.26	231.8	5.74	-22.4	20.5	211.7	
9.15	3			0.23	231.8	5.73	-17.0	20.5	211.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/2/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/02/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.17	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.10	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:38	0			0.83	422.9	5.41	103.6	22.1	398.8	
8:41				0.35	396.5	5.32	98.8	22.1	372.5	
8:44				0.29	383.7	5.35	104.3	22.3	363.7	
8:48	3			0.29	378.1	5.38	103.6	22.4	358.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____

Checker Name and Signature _____ Date 22/2/18

Project Manager Signature _____ Date _____

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TSC
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.48m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:54	0			1.69	524	5.38	-21.2	21.6	477.5	
2:57	1			0.34	567	5.29	4.2	19.5	513	
3:00	2.125			0.28	602	5.21	16.1	19.4	538	
3:03	3.5			0.24	613	5.18	17.7	19.3	547	
3:06	4.75			0.21	614	5.17	16.9	19.3	548	
3:09	6			0.20	612	5.17	15.5	19.3	545	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	8/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.93m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.66m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
2:27	0			1.33	288.0	6.10	-36.0	23.5	274.1	
2:30	1.25			0.37	285.4	6.13	-58.8	22.5	272.0	
2:33	2.5			0.27	285.5	6.15	-65.4	22.8	273.3	
2:36	4			0.24	285.1	6.16	-69.7	22.8	273.3	
2:39	6.5			0.22	284.8	6.16	-71.0	22.8	273.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)	
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature — Date

R. Champion — Checker Name and Signature — 8/3/18 Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

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						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TBB
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2017
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No. 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.03m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.84m	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:04	0			2.60	234.1	5.78	-40.5	22.7	217.0
2:07	1.5			0.48	242.3	5.79	-33.4	20.9	224.0
2:10	2.75			0.33	247.2	5.77	-16.2	20.8	227.0
2:13	4			0.28	246.5	5.74	-5.8	20.7	226.4
2:16	5.5			0.25	245.6	5.73	-2.2	20.7	225.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion	8/3/18
		Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.98m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.52m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
12:14	0			1.63	481.2	6.06	47.4	23.2	457.4
12:17	1.5			0.36	456.3	5.62	86.9	22.2	428.8
12:20	2.5			0.29	458.7	5.59	95.6	22.1	434.2
12:23	3.75			0.25	454.3	5.57	98.1	22.1	428.1
12:26	4.5			0.24	451.2	5.56	94.9	21.9	449.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	8/3/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	TD2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	8/2/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.23m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.58m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:36	0			2.76	541	5.94	75.6	22	501	clear
11:39	1.5			0.81	525	6.06	73.1	21.5	505	
11:42	2.5			0.68	538	6.07	74.0	21.5	502	
11:45	4			0.63	549	6.08	70.1	21.5	509	
11:48	5.25			0.56	549	6.08	60.2	21.5	509	
11:51	6.5			0.50	542	6.08	51.4	21.7	509	
11:54	7.75			0.45	544	6.08	47.4	21.6	509	
11:57	9			0.40	542	6.09	42.7	21.7	507	
12:00	9.5			0.37	537	6.08	42.5	21.9	523	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion (for) Checker Name and Signature	8/3/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D5
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.79m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.95m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									C
10:13	0			1.42	1316	5.79	-39.1	20.6	1192
10:16	1			0.44	1289	5.57	-38.0	20.1	1170
10:19	2			0.31	1279	5.49	-32.9	20.2	1161
10:22	2.5			0.25	1275	5.46	-30.9	20.3	1162
10:25	3.5			0.23	1273	5.44	-29.6	20.3	1158
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion — Checker Name and Signature	8/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T2F
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination		Sampling Method		Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Hydrasleeve Size:	Monitoring sequence followed (number in order):	
Depth to GW (m-pvc): 3.05	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:		Hydrasleeve Type:		
Bore Depth (m-pvc): 4.16	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer	☐ Hydrasleeve	Sampling Depth (m-pvc):		Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump	☐ Waterra	Hydrasleeve Install time:		Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)		Sampling Start Time:		Hydrasleeve out
	Key Type (if applicable):		☐ Retrieved						Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:47	0			1.57	936	5.69	-48.2	20.9	C 853
9:50	1			0.47	911	5.87	-75.1	19.7	814
9:53	2.5			0.32	885	5.90	-78.0	19.7	885
9:56	3.5			0.27	885	5.90	-78.2	19.9	795
9:59	4.5			0.25	879	5.91	-78.9	19.6	792
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion	8/3/18
		Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.23	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.59	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
~~9:12~~	0			1.84	859	5.53	-30.7	20.5	C 761
9:15	1			0.46	842	5.22	-28.0	20	761
9:18	2			0.32	831	5.22	-32.2	20.1	752
9:21	3.25			0.26	831	5.21	-36.0	20.1	753
9:24	4.5			0.23	844	5.17	-36.7	20.2	771
9:27	6			0.22	849	5.15	-37.4	20.2	775
9:30	7			0.22	855	5.14	-39.1	20.2	778
Acceptable Parameter Range:				±10%	±3%	±0.05	±10 mV	±0.2 °C	±10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA01	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	8/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T45
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/2018
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:39	0			1.78	520	5.79	-46.2	21.9	484.7	tubing fell in well - unable
8:42	0.5			0.63	518	5.92	-68.0	21.0	477.8	to determine depth
8:45	1.5			0.38	518	5.93	-59.3	20.8	477.6	
8:48	2			0.31	518	5.93	-53.6	20.9	476.9	
8:51	3			0.27	518	5.93	-50.8	21.0	478.0	
8:54	4			0.25	517	5.93	-49.0	21.0	477.07	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature — Date

R. Champion — Checker Name and Signature — 8/3/18 Date

Project Manager Signature — Date

Distribution: Project Central File

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T4 B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	8/3/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.12m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:18	0			1.64	399	5.43	-35.4	22	373.5	sulphur smell, opaque, muddy
8:16	1			0.26	395.6	5.36	-40.3	21	365.7	
8:19	2			0.23	395.5	5.36	-44.0	21	365.5	
8:22	3			0.20	395.8	5.35	-48.2	21	365.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	R. Champion **Checker Name and Signature**	8/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	8/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 4.255	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7:36	0			1.25	421.1	5.95	53.9	21.9	393.6 Nil odour, clear.
7:39	0.75			0.38	396.0	5.48	71.2	21.7	369.4
7:42	1.5			0.28	382.7	5.47	80.6	21.8	359
7:45	2.5			0.27	378.6	5.48	83.3	21.9	356.4
7:48	3.25			0.27	376.4	5.49	84.6	21.9	354.0
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion	8/3/18
		Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	NL WS - N2
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	9/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	20cm			4.33	4822	7.13	1.3	26.1	4918 116.3
									Too shallow to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	9/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	BL Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	9/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
	20cm			8.62	2524	8.67	5.6	24.8	C 2515 NTU 6.0
									Too shallow to profile
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	R. Champion **Checker Name and Signature**	9/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	9/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			8.79	2525	8.84	12.6	25.1	2532 7.3
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)	☐	
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic	☐	
		☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	R. Champion **Checker Name and Signature**	9/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	9/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	C NTU Odour, Colour, Turbidity
	15cm			10·64	2527	8·93	24·4	27·9	2664 11·2.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	R. Champion **Checker Name and Signature**	9/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	Sample Date:	9/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	~~E.C.~~ (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
	20cm			10.65	2533	8.93	21.2	27.8	2666	10.1
	40cm			3.55	2531	8.88	8.2	27.7	2663	49.9
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA02
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	9/3/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	GW - D4
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	9/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.77m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90m	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC (mS/cm or µS/cm)	pH	Redox ORP (mV)	Temp °C	Odour, Colour, Turbidity
									C
12:02	0			4.32	266.0	7.28	50.9	23.7	247.9
12:05	1			4.00	253.6	6.44	80.9	22.8	242.8
12:08	2			4.04	250.5	6.14	100.4	22.7	239.5
12:11	3			4.15	250.1	6.04	109.1	22.8	239.3
12:14	4			4.05	251.4	5.99	116.9	22.7	240.5
12:17	5			4.06	251.5	5.96	118.0	22.8	240.8
12:20	6								
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	9/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	12/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No. 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.38	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.68	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
10:28	0			3.19	415.1	6.40	-59.6	28.1	434.5	pump stopped working.
~~10:31~~								28.1		
1.37				0.89	3866	6.43	-118.5	24.7	378.5	
1.40				0.47	3773	6.55	-127.3	22.5	358.5	
1.43				0.39	3793	6.48	-124.7	22.0	350	
1.46				0.40	372.8	6.45	-122.4	21.8	349.7	
1.49				0.40	382.6	6.45	-121.4	21.9	358	
1.52				0.40	389.2	6.45	-120.2	21.9	~~360~~ 365.3	
1.55	QL			0.41	385.6	6.44	-118.8	21.8	363.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	R. Champion Checker Name and Signature	12/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Bore / Location ID:	BH12
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Sample Date:	12/3/18

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.78	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 14.75	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	(C) Odour, Colour, Turbidity
1.01	0			8.50	284.3	6.08	97.0	31.3	327.1
1.04				8.17	273.0	5.91	119.6	30.7	324.7
1.07				8.07	280.1	5.69	143.9	24.0	273.3
1.10				8.16	276.3	5.52	165.3	23.2	265.0
1.13	3.5			8.97	270.1	5.47	176.1	23.3	261.8
1.16				9	267.5	5.43	184.6	22.8	256.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		Bore has been shortened due to excavation
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature — Date

R. Champion 12/3/18 — Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	NTU	Odour, Colour, Turbidity
11:06	15cm			8.81	2851	8.90	-20.9	23.3	2760	6.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
					C				NTU
10:48	15cm			10.82	2854	8.83	12.9	25.1	2858 11.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity	
									C	NTU
10:52	15cm			11.31	2851	8.82	11.8	25.2	2856	10.8
10:55	30cm			8.17	2782	8.90	-77.6	24.7	2768	30.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH 12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.55m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 14.73m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Baller ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
12:46	0			8.71	295	6.48	-1.0	29.0	311
12:49				8.77	283.0	5.84	69.4	24.8	280.4
12:52				8.84	277.2	5.65	104.1	23.7	269.0
12:55				8.91	275.1	5.53	121.2	23.4	266.9
12:58				8.81	273.2	5.48	134.6	23.3	264.1
13:01	4			8.87	272.2	5.45	141.0	23.5	264.5
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.29m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.58m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
9.07	0			1.13	838	5.32	-166	20.6	759	
9:10	1			0.56	806	5.24	-35.2	20.2	731	
9:13	2			0.44	801	5.24	-41.0	20.2	729	
9:16	3			0.38	804	5.23	-43.2	20.3	732	
9:19	4			0.34	804	5.23	-45.1	20.3	732	
9:22	5			0.31	804	5.22	-46.6	20.3	732	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D 8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.42	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.76	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	SPC E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:29	0			4.12	327	6.60	-83.5	19.6	294 Pump stopped working
11:44	0			2.14	374.9	8.03	-167.8	24.1	355.1
11:47				0.62	344.4	7.24	-163.1	21.7	323.1
11:50				0.45	329.1	6.77	-145.6	21.5	307.1
11:53				0.42	326.0	6.65	-138.9	21.4	303.6
11:56				0.42	325.5	6.58	-133.0	21.4	303.2
11:59				0.40	335.8	6.56	-129.9	21.3	312.3
12:02	7 L			0.40	342.3	6.55	-128.4	21.3	318.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D5
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	23/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.87m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.94m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:42				1.58	1177	6.11	-25.8	19.9	C 1063
8:45	0.75			0.50	1186	5.75	-34.1	19.6	1063
8:48	1.5			0.39	1166	5.68	-33.1	19.8	~~1063~~ 1050
8:51	2			0.35	1156	5.59	-30.5	19.8	1040
8:54	3			0.29	1137	5.50	-25.3	19.8	1025
8:57	4			0.27	1129	5.49	-26.0	19.9	1019
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)	☐		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic	☐		
		☐	☐	☐	☐	☐	☐		
		☐	☐	☐	☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	23/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	23/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.17	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.15	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:03	0			2.55	870	6.24	-69.5	19.5	779 Strong sulphur odour
08:06	1			0.53	863	5.98	-80.3	19.1	765
08:09	2			0.43	842	5.96	-75.4	19.1	747
08:12	3			0.37	839	5.96	-72.4	19.1	744
08:15	4			0.33	839	5.96	-70.2	19.1	745
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	23/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.62m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.14m	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:32	0			3.00	525	5.93	-54.7	20.7	471	Strong sulphur odour
11:35	1			0.37	446.2	5.39	-11.8	19.3	397.2	
11:38	2			0.24	447.0	5.32	-6.6	19.2	397.3	
11:42	3			0.25	448.8	5.29	-7.0	19.2	398.9	
11:44	4			0.23	450.1	5.29	-8.7	19.1	399.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH 10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.99	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.63	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
11:10	0			1.51	267.4	6.05	-43.4	22.8		255.9
11:13	1			0.34	267.4	6.12	-77.5	22.9		256.3
11:16	2.5			0.25	267.0	6.15	-85.9	22.9		256.2
11:19	4			0.23	2657	6.17	-88.6	22.9		255.1
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/3/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.08m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.45m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:50	0			1.41	222.2	5.93	-79.6	21.5	207.3 C Strong sulphur odour
10:53	1			0.41	247.1	5.77	-54.4	20.7	226.6
10:56	2			0.32	246.2	5.76	-43.2	20.6	225.6
10:59	3			0.28	244.8	5.75	-35.7	20.6	224.1
10:02	4			0.27	243.9	5.75	-32.6	20.6	223.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T43
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	RC SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.20m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.12m	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity (C)
09:42	0			4.88	385.6	5.95	-37.7	21.9	361.5
09:45	1			0.58	389.4	5.44	-47.5	21.3	361.9
09:48	2			0.40	388.9	5.39	-49.6	21.3	361.3
09:51	3			0.30	389.2	5.37	-51.9	21.3	361.7
09:54	4			0.29	389.2	5.37	-53.9	21.3	361.6
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW.04
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 80.20	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.91	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C Odour, Colour, Turbidity
9:10	0			4.02	262.7	6.15	49.6	22.5	249.2
9:13	1			3.13	260.6	6.01	75.7	22.5	247.2
9:16	2			3.09	257.7	5.99	90.5	22.5	244.8
9:19	3.5			3.28	257.0	5.97	99.5	22.5	244.9
9:22	4.5			3.40	254.8	5.96	106.8	22.5	242.4
9:25	5.5			3.50	253.9	5.96	110.7	22.5	241.5
9:28									
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	22/3/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.84	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.92	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	C	Odour, Colour, Turbidity
8:42	0			1.89	516	6.02	-45.5	22.0	418.1	
8:45	1.5			0.54	517	5.97	-48.1	21.2	479.5	
8:48	2			0.33	516	5.95	-46.7	20.9	478.6	
8:51	3			0.28	516	5.95	-47.7	20.8	475.0	
8:54	4			0.25	517	5.94	-48.5	20.8	475.3	
8:57	4.5			0.23	516	5.94	-49.3	20.8	474.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/3/18 Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 4.29m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.10m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	~~EC~~ SpC (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:14	0			1.30	392.2	5.69	75.1	22.8	374.0
08:17	1			0.43	377.2	5.49	76.3	22.1	356.2
08:20	2			0.33	372.7	5.48	80.5	22.1	352.4
08:23	3			0.30	374.8	5.49	79.9	22.2	354.7
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.31m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.57m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	NTU	C	Odour, Colour, Turbidity
7.27	0			1.97	593	6.67	85.1	21.6	21.6	548	
7.30	1			0.40	568	6.14	92.4	21.2	130.3	527	
7.33	2			0.30	573	6.11	80.8	21.3	252.4	532	
7.35	3			0.27	585	6.11	78.8	21.4	356.4	586	
7.38	4			0.25	582	6.12	72.8	21.4	491.1	540	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	22/3/18 **Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☒
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	22/3/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.08	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.52	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
7.49	0			2.15	458.1	6.28	-5.7	22.5	432.1
7.52	1			0.45	447.4	5.75	50.0	22.0	421.0
7.55	2			0.33	440.4	5.65	63.2	22.0	415.3
7.58	3.5			0.28	441.0	5.62	69.4	21.9	415.1
8.01	4.5			0.25	441.0	5.60	71.2	21.9	415.1
8.04	5			0.23	443.2	5.58	71.2	21.9	417.2
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		
		☐	☐	☐		
		☐	☐	☐		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	22/3/18 Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Sample QAQC Tracking Sheet

Q4AN(EV)-011-FM1

Project Name:	Building Roe 8	Project Number:	60478410
Project Location:	Beeliar Wetlands	Client:	Main Roads
PM Name:	Chris McGraghan	Fieldwork Staff:	

QAQC Information

QAQC ID	Primary Sample ID	Sample Type	Batch Number
WQA01_040418	GW-T3E-A		
WQA02-040418	BLNS-B1		
WQA03-030418		Rinsate	
WQA03-040418		Rinsate	
WQA04-DB TBW246		Trip Blank	DB TBW 246
WQA05-DB TBW404		Trip Blank	DB TBW 404

QA\QC Project Requirements

QAQC	Required		Frequency		Method Used
Field Duplicates	☐ Yes	☐ No	☐ 1 in 10	☐ 1 in 20	
Field Triplicates	☐ Yes	☐ No	☐ 1 in 10	☐ 1 in 20	
Rinsate Blanks	☐ Yes	☐ No	☐ 1 per matrix/equipment/day		
Field Blanks	☐ Yes	☐ No	☐ 1 per day		
Trip Blanks	☐ Yes	☐ No	☐ 1 per ice chest		
Trip Spikes	☐ Yes	☐ No	☐ 1 per ice chest		

Approval and Distribution

Fieldwork Staff Signature — 4/04/18 Date

Project Manager Signature — Date

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	18/4/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.40	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.57	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:43	0		0.75	1.42	789	5.49	-57.4	20.4	• rain intermittent, sunny patches.
14:46			0.75	0.51	794	5.13	-46.0	20.3	• turbid
14:49			0.75	0.36	790	5.09	-45.0	20.3	• S.I. organic matter
14:52			0.75	0.31	789	5.07	-46.3	20.3	• strong Sulphur odour.
14:55	5		0.75	0.27	786	5.06	-47.6	20.3	• colourless.
Acceptable Parameter Range:			± 10%		± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	~~GWF3E~~ A T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.27	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.08	Casing Radius (mm):	Corrected Redox: Y / N	☑ Disposable	☑ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
14:07	0		0.75	1.20	862	5.80	~~100.1~~	20.8	• Raining
14:10			0.75	0.48	843	5.77	~~100.5~~	19.9	• Sulphur smell
14:13			0.75	0.37	824	5.75	-97.0	19.8	• clear / colourless water
14:16	3		0.75	0.33	816	5.74	-91.8	19.6	•
Acceptable Parameter Range:			± 10%		± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic			
		☐	☐		☐				
		☐	☐		☐				

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWDS
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.98	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.97	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	4 Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Yes (Key)	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:38	0	2.98	75%	1.38	1523	5.56	-61.3	22.2	• morning rain - clear / sunny now
13:41			0.75	0.35	1547	5.43	-73.1	20.7	• cloudy / ~~clear~~ / low turbidity for
13:44			0.75	0.26	1485	5.32	-62.2	20.9	initial squirt
13:47	4.25		0.75	0.23	1447	5.25	-53.5	20.9	• sulphur odour
									• small amount of organic matter
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 18/4	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): ~~0.6~~ 0.61	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.13	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): 5	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:10	0		0.75	0.260	544	5.78	-72.0	20.7	* colourless, clear - no turbidity
1:13			0.75	0.51	560	5.35	-55.0	19.5	* odour - slight sulphaur
1:16			0.75	0.33	540	5.15	-25.2	19.4	
1:19			0.75	0.28	528	5.10	-16.2	19.4	
1:22	5.5		0.75	0.26	519	5.06	-12	19.4	
									* rained in the morning (clear now)
Acceptable Parameter Range:			± 10%		± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

Surface Water:	☐	Groundwater:	☑		
Bore / Location ID:	BH10				
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	DS/SD
Sample Date:	18/4/18				
Well Development or Well Sampling Event? (circle)					

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.04	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.64	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): YES	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:41	0		75%	0.72	273.2	~~21.5~~ 5.72	22.6	21.6	• Rained until 9am. Overcast/sunny
12:44			75%	0.37	260.4	5.44	28.8	21.8	• viscose
12:47			75%	0.28	252.6	5.39	38.5	21.9	• brown
12:50	4		75%	0.26	247.1	5.39	40.8	21.9	• highly turbid
									• initial brown squirt
									• organic material throughout, H_2O
									became clearer after first 2 mins
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected					QA/QC Information
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

• tubing (dedicated) needs to be replaced as internal

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.11	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:08	0		75%	1.48	221.8	5.78	-86.7	21.5	• rained until 9am - overcast
12:11			75%	0.71	228.0	5.71	-88.8	20.9	• (medium) sulphur odour
12:14			75%	0.53	221.4	5.59	-60.0	20.7	• clear/no turbidity
12:17			75%	0.42	220.5	5.55	-43.7	20.7	• colourless.
12:20	6		75%	0.39	220.2	5.53	-36.7	20.7	
Acceptable Parameter Range:			± 10%	± 3%		± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.16	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.52	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): YES	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Allan Key	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:53	0		70%	1.21	487.7	5.86	52.8	21.7	• Overcast (rained til 9am).
10:56			70%	0.45	501	5.29	87.5	21.7	• no odour
10:59			75%	0.34	497.2	5.21	102.5	21.7	• no turbidity
11:02			75%	0.28	480.9	5.13	111.9	21.8	• Colourless
11:05	5L		75%	0.27	481.3	5.13	113.1	21.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**	**Field Commets**
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.31	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): Yes	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Allan	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:27	0		75%	1.49	481.3	5.94	65.9	21.3	• Overcast (rained all morning).
10:30	1.5		75%	0.51	478.7	5.75	55.0	21.4	• clear / no turbidity
10:33			75%	0.36	472.5	5.78	43.4	21.6	
10:36			75%	0.30	471.5	5.81	31.7	21.6	
10:39			75%	0.26	463.7	5.83	23.3	21.5	
10:42	7		70%	0.24	458.9	5.84	18.5	21.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic			
		☐	☐		☐				
		☐	☐		☐				

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GWD4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	18/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.84	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.89	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Bdlock	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:59	0		75%	3.75	249.2	5.99	65.0	21.4	• Rained in morning
10:02			75%	2.86	252.6	5.65	103.9	22.1	• no odour
10:05			75%	3.02	249.1	5.65	119.1	22.3	• clear/no turbidity
10:08	5		75%	2.96	250.2	5.65	124.7	22.3	
Acceptable Parameter Range:			± 10%		± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		slugs in well
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☐	Groundwater: ☑
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Bore / Location ID:**	GWD3
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Sample Date:**	18/4/18
						Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 4.41	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.11	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): gatic	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Yes (padlock)	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:32	0		75%	1.26	390.4	5.49	79.1	21.3	◦ overcast (rained all morning)
09:35			75%	0.48	375.4	5.26	89.9	21.8	◦ no turbidity
09:38			75%	0.34	374.9	5.28	93.4	21.9	◦ mild sulphur smell
09:41	3.5		75%	0.30	379.2	5.32	92.6	21.9	◦ clear
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		good condition

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☐	Groundwater: ☑
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Bore / Location ID:	T4C
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	DS/SD	Sample Date:	18/4/18

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level: 5.92	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.92	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.9	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:07			75%	1.32	518	5.63	-56.4	20.4	• clear, no odour, no turbidity
8:10			75%	0.60	579	5.71	-76.8	20.4	• intermittent rain
8:13			75%	0.42	575	5.72	-73.2	20.4	• At 8:10 sulphur odour
8:16			75%	0.34	575	5.73	-71.9	20.4	
8:19	4L		75%	0.3	575	5.74	-71.7	20.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)	
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic	
		☐		☐		☐		
		☐		☐		☐		

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

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FQM - Groundwater Sampling and Purging Record

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Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Surface Water:** ☐	**Groundwater:** ☑
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS / SD	**Bore / Location ID:**	TLAB
						Sample Date:	

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 1.23	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.114	Casing Radius (mm):	**Corrected Redox:** Y / N	☑ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): None	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:38	0.2		75%	3.02	409.2	6.27	85.3	20.0	medium rain/~~heavy rain~~
07:41			75%	0.38	393.4	5.30	-41.0	20.8	~~No odour~~ Sulphur smell.
07:44			75%	0.30	392.7	5.25	-47.1	20.8	No colour - clear
07:47			75%	0.28	393.3	5.21	-52.0	20.8	No turbidity
Acceptable Parameter Range:			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A25
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9.32				7.23	3186	8.02	-37.8	18.0	overcast - rained 19/4 and overnight
									* patch of 'sludge' on water surface 20m from sampling point
									* large amount of organic matter, very high turbidity
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	19/4/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:35				7.16	3195	8.52	-46.9	18.1	*taken 1m out from A25
									- overcast - rained 14/4
									* patch of 'sludge' on surface water ~20m from sample point
									* large amount of organic matter, very high turbidity
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**	**Field Commets**
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

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						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:42				7.42	3187	8.63	-16.7	18.6	~~*jetty access~~
									*overcast - rained 18/4
									* medium turbidity.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		Jetty access closed - structural damage. (BL-Jetty)
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

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FQM - Groundwater Sampling and Purging Record

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* 10 = Fill Time
10 = Discharge Time
20-30 = PSI

Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Surface Water:** ☐	**Groundwater:** ☑
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Bore / Location ID:**	GW D8
						Sample Date:	19/4/18
						Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate: 10/10	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.48	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.60	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): NO	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Key w/padlock	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:09	0	9	10/10*	3.44	330.1	6.66	-92.1	20.4	• Rained overnight; overcast
09:12				1.70	331.3	6.24	-100.2	20.6	• Replaced tubing
09:15				1.75	329.9	6.21	-100.0	20.7	• Turbid/cloudy
09:18	1.5L			1.91	325.5	6.23	-100.0	20.7	• Sulphur odour
									• Grey/brown colour
									• No particulates
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

• Replaced tubing 19/4/18

Approval and Distribution

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FQM - Groundwater Sampling and Purging Record

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* Discharge Time = 10
Fill Time = 10
PSI =

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH 12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate: 10/10 *	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 9.86	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.14	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): NO	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters

Calculated bore volume (L): | Includes/ excludes bore annulus (circle) | # purge volumes removed: | Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:14	0	14	10/10 *	7.86	579	8.06	-9.7	20.7	• Rained overnight/this morning
10:17			10/10	6.17	617	7.70	-4.8	20.9	• Overcast
10:20			10/10	5.84	619	7.51	12.7	20.9	• Clear
10:23			10/10	5.75	620	7.40	25.3	21.3	• No turbidity/
10:26			10/10	5.61	620	7.31	34.3	21.8	• No particles
10:29	2		10/10	5.57	621	7.27	37.8	22.0	• No Odour
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

• Newly placed bore

Approval and Distribution

Fieldwork Staff Signature | Date | Checker Name and Signature | Date

Project Manager Signature | Date | **Distribution:** Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/5/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate: 10/15	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 9.89 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.6m	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (Gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time: ~~07:48~~ 07:54	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:48	0.1		10/15	6.90	655	6.68	142.2	16.8	slightly cloudy, no odour,
07:51	0.2			5.62	702	6.49	147.2	19.1	
07:54	1L			5.41	704	6.46	145.9	19.3	no turbidity
07:57	2								
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD / DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☑ Low Flow: Pump rate: 10/20	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 10.52	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.59	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time: 09:00	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:47	0.1	10.52	10/20	3.58	814.2	7.89	-108.2	20.1	• overcast @ 21°C
08:50	0.8			1.02	317.4	6.72	-114.6	20.3	• Slightly cloudy - clear, low turbidity
08:53	1.8			0.84	309.8	6.29	-112.0	20.4	• ~~odourless~~ light sulphur odour
08:56	2.5			0.80	307.2	6.12	-104.9	20.5	• colourless
08:59	3			0.84	306.8	6.08	-102.7	20.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)	0	x 60 mL Ferrous	1	x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber	1	x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2S
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	02/05/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	DS / SD	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc): 20cm	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time: 09:31	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				✓ Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:30	20cm		NA	8.73	3053	8.44	19.5	16.4	• overcast 21°C
									• clear
									• High turbidity
									• High amount organic matter
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)	~~Duplicate~~	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☒	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve Info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time: 09:33	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:32	20cm			7.43	3054	8.56	-59.7	16.3	• Raining • High turbidity • Odourless • High amount organic matter • Ground too soft & dangerous to profile.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**	**Field Comments**
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	Duplicate WQA02_020518	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time: 09:59	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:59	[illegible]			9.27	3032	8.74	17.9	17.5	• clear • ~~slightly turbid~~ slight turbidity • odourless • organic matter settled at waterbed.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/2018
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate: 0.075 l/	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.30	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.56	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (Gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time: 12:19	Hydrasleeve out
	Key Type (if applicable): Allen	☐ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:07	0		~~0.075~~	2.55	382.5	5.74	115.3	21.4	clear, colourless, no turbidity no odour
12:16			75 l/	0.53	367.2	5.71	89.7	21.3	
12:13				0.44	380.5	5.74	67.5	21.5	
12:15				0.40	381.6	5.77	56.9	21.6	
12:18	5.75			0.37	396.3	5.77	50.4	21.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		• New tubing - Dedicated to D2 (replace in 6 months).

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate: 75%	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.19 m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.62 m	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Allen	☐ Retrieved				✓ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:34	0		75%	1.60	4613	7.97	9.4	21.3	clear, colourless, no turbidity
12:37				0.46	4625	5.53	41.8	21.6	
12:40				0.37	4270	5.20	68.2	21.6	
12:43				0.35	453.5	5.08	82.8	21.5	
12:46	5			0.34	454.9	5.04	89.4	21.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA02_020518 Rinsate	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D3
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	2/5/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		**Parameter Info.**	**Decontamination**	**Sampling Method**	**Hydrasleeve Info.**	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 4.41m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12 m	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:01pm	0		70%	1.01	344.5	7.03	45.8	22.3	clear, colourless
1:04				0.64	345.3	5.38	98.1	22.2	
1:07				0.47	330.2	5.12	117.4	22.4	
1:10				0.42	326.0	5.08	108.7	22.1	
1:13				0.41	332.4	5.10	99.7	22.0	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		**Bottles Collected**						**QA/QC Information**	**Field Comments**
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		• Tubing replaced - replace in 6 months

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	02/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.83	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.91	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/(NO)):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time: 13:42	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				☑ Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed: 6		Total purged volume (L): 6		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13:32	0			3.63	231.7	5.75	43.8	21.8	• clear/sunny
13:35	2			3.17	221.7	5.63	70.9	21.9	• clear water
13:38	3.5			3.04	241.1	5.61	79.5	21.9	• No turbidity
13:41	5			3.27	237.4	5.60	84.3	21.9	• No odour
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

- Tubing replaced - replace in 6 months

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS/SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.25m	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.14m	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time: 0906	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed: 01		Total purged volume (L): 09		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:51	0		75%	1.42	392.7	6.22	-81.2	20.3	sulphur odour, no turbidity,
8:54				0.45	391.7	5.47	-79.6	20.8	
8:57				0.34	359.5	5.24	-72.1	20.8	cloudy/opaque.
9:00				0.28	390.2	5.15	-68.8	20.8	
9:03				0.25	390.0	5.11	-66.9	20.9	
9:06	9			0.24	389.8	5.08	-66.0	20.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Tubing replaced

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T4C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 5.98	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.77	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time: 0944	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed: 01		Total purged volume (L): 6		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:29	0		75%	7.02	515	6.65	-88.3	20.8	clear, colourless
9:32				~~7.26~~	509	6.07	-72.5	20.9	
9:35				0.39	505	5.79	-83.5	20.5	
9:38				0.32	503	5.72	-71.5	20.4	
9:41				0.28	502	5.67	-64.1	20.4	
9:44	6			0.25	502	5.65	-60.6	20.4	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

- New tubing
- lots of air in tubing. (whilst initial purging)

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 2.14	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.85	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time: 10:19	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:07	0		75%	1.05	218.9	7.02	-115.3	20.9	Clear, ~~slt~~ colourless, slightly
10:10	1			0.43	216.8	5.86	-70.7	20.6	turbid, no odour
10:13	1			0.35	246.2	5.61	-43.0	20.6	
10:16				0.30	215.8	5.53	-28.7	20.6	
10:19	6.5			0.28	215.8	5.49	-23.6	20.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Replaced tubing

Approval and Distribution

Fieldwork Staff Signature	**Date**	**Checker Name and Signature**	**Date**
Project Manager Signature	**Date**	**Distribution:** Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☑ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.06	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.66	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up): SU.	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): Yes	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time: 1045	Hydrasleeve out
	Key Type (if applicable): Key	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed: 01		Total purged volume (L): 6.8		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1033	0	2.06	80%	1.41	256.3	7.99	-91.2	21.9	• mild sulphur odour
1036	1.5		"	0.44	245.1	6.01	-55.2	22.0	• clear to slightly cloudy
1039	3		"	0.35	240.6	5.37	13.6	21.9	• turbidity is low
1042	4.5		"	0.34	235.3	5.27	30.8	21.9	
1045	6.8		"	0.35	231.4	5.21	39.8	21.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

• Tubing replaced.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T3C
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 03/05/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.60	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.15	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:05	0			1.64	516	7.46	-135.7	19.8	colourless, clear, sulphur odour
11:08				0.61	454.5	6.05	-132.3	19.0	
11:11				0.39	427.1	5.33	-81.4	19.0	
11:14				0.34	368.0	5.10	-56.3	19.0	
11:17				0.31	406.5	4.98	-37.5	19.1	
11:20				0.28	400.7	4.93	-26.5	19.1	
11:23	9			0.27	396.3	4.91	-16.8	19.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic	

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-05
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate: 75-1	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.02	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.96	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (Static/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time: 12:00	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:45	0		75-1.	1.70	8593	7.56	85.4	21.5	~~clear~~, slightly opaque, some
11:48				0.57	1028	5.24	-40.4	20.0	
11:51				0.44	1070	5.12	-35.2	20.0	turbidity, NO Odour
11:54				0.37	1095	5.14	-36.5	20.0	
11:57				0.40	1105	5.13	-36.6	20.0	
12:00	7.5			0.37	1108	5.13	-36.3	20.1	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	WQA03_030518 Rinsate.	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		* Bore cover missing
									* tubing replaced.

Approval and Distribution

Fieldwork Staff Signature — Date — Checker Name and Signature — Date

Project Manager Signature — Date — **Distribution:** Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	T2F
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	03/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS.	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									12:26 pm arrived at Bore T2F.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		* Bore was found snapped at base/ground & covered in soil. PVC pipe is split down one side. Bore is blocked at 2 metres & couldn't be sampled. Large amount of soil covered the top of bore when found.

Approval and Distribution

Fieldwork Staff Signature | Date | Checker Name and Signature | Date

Project Manager Signature | Date | **Distribution:** Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3*E-A
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	03/05/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	SD/DS	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate: 75%.	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.45	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.69	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO)	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time: 12:39	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:47	0		75%	0.56	*538	5.06	-52.4	20.5	+ Initial → high turbidity, brown
12:50				0.59	735	4.85	-40.2	20.4	
12:53				0.67	727	4.80	-35.7	20.4	↓
12:56				0.55	730	4.76	-36.1	20.4	then clear, with some turbidity
12:59	7			0.55	731	4.75	-35.7	20.3	
									strong sulphur odour
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

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Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☐
						Bore / Location ID:	Karel Ave (KA)
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS / SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.		Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved					Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:			Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:02	1			7.98	194.7	7.92	-68.8	20.1	* pressure from generator not working properly
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		* Karel Ave bore/tap at pipeline.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____

Project Manager Signature _____ Date _____ **Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Surface Water: ☐	Groundwater: ☑		
Bore / Location ID:	GW-T3C		
Sample Date:	17-05-18		

Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17-05-18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	DS / SD	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 17-05-18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.64	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.15	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:58	0		90 mL	1.87	425.4	6.47	-102.4	18.2	clear, colourless, no turbidity
9:01				0.43	393.3	5.45	-79.8	18.6	sulphur odour
9:04				0.32	380.2	5.08	-42.8	18.6	
9:07				0.29	375.0	5.05	-34.2	18.6	
9:10	5.5			0.27	371.5	5.03	-30.6	18.6	
									*bore radius not wide enough to take SWL whilst gauging.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date: 17-05-18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	SBH12
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 16/05	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 9.92	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 17.31	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging ✓
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters

Calculated bore volume (L): | Includes/ excludes bore annulus (circle) | # purge volumes removed: 3.5 | Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
8:31	0			5.49	613	6.94	190.5	18.2	• clear, colourless, no turbidity
8:34	0.5			6.22	655	6.25	181.7	20.2	
8:37	1			6.01	748	6.02	170.6	20.3	
8:40	2.5			5.63	783	5.98	164.0	20.5	
8:43	3.5			5.88	802	5.95	157.9	20.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

[signature] Fieldwork Staff Signature	16/5/18 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-D8
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	16-05-18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:	SD/DS	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 16/05/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate: 10/20	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 10.54	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 11.29	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO)	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
09:14	0	10.58	10/20	2.93	346.8	6.93	-104.4	20.3	• strong sulphur smell
09:17	0.8	10.58	10/20	1.08	342.7	6.23	-116.2	20.6	• slight turbidity
09:20	1	10.58	10/20	0.73	333.7	6.00	-113.1	20.6	
09:23	2	10.58	10/20	0.64	332.6	5.94	-110.6	20.6	
09:26	3	10.58	10/20	0.57	334.1	5.95	-108.5	20.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date: 16/5/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	
Project Name:	Building Roe 8	Project Number:	60478410	PM Name:	Chris McGraghan	Sample Date:	16/05/18
Client:	Main Roads	Project Location:	Beeliar Wetlands	Fieldwork Staff:		Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 1.27	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 2.11	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	☑ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
10:28	0	1.29	75%	1.30	391.0	6.78	-81.6	21.1	cloudy, no turbidity
10:31	~~3.0~~	1.52		0.66	387.3	5.33	-77.3	21.1	sulphur odour
10:34	~~4.59~~	1.54		0.45	385.9	5.14	-65.6	21.2	
10:37		1.52		0.37	385.2	5.09	-60.9	21.2	
10:40		1.53		0.31	384.7	5.07	-57.1	21.2	
10:43	6.5	1.40		0.27	383.8	5.05	-54.3	21.2	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	16/5/18		

Project Manager Signature	Date	Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-THC
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16-05-18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 16-05-18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 5.99	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 10.98	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:00	0		75%	1.90	503	6.47	-82.6	21.7	*Well radius not wide enough
11:03				0.53	496.3	5.80	-96.0	20.5	to take SWL.
11:06				0.40	494.7	5.72	-81.7	20.4	
11:09				0.35	493.9	5.69	-73.2	20.4	
11:12	6.5			0.32	493.7	5.67	-70.4	20.4	Clear, colourless, ~~colourless~~
~~11:15~~									
									sulfur odour
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	16/5/18		

Project Manager Signature	Date	**Distribution:** Project Central File

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - D4
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 0.87 cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.90	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L): 6

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
11:40	0	0.93	45%	3.83	233.1	6.58	15.8	21.8	• Slightly cloudy
11:43	1	0.89	45%	3.90	233.4	5.85	66.7	21.8	• low turbidity
11:46	2.5	0.89	45%	3.89	233.2	5.67	93.3	21.8	
11:49	4.5	0.89	45%	3.53	232.1	5.64	101.2	21.7	
11:52	6	0.89	45%	3.78	233.6	5.61	104.5	21.7	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
SD	16/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2S
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:54	15cm			10.39	2994	8.52	20.6	19.7	* high turbidity, clear, colourless,
									organic matter.
									* Algae/sludge on surface ~2.5m from location
									NTU: 11.4
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
SD	16/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BLNS-B1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12:57	60cm			~~8.8~~ 3.10	2930	8.16	-157.6	18.83	Very high turbidity, colourless,
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
[signature]	16/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	BL - Jetty
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16-05-18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
									* Jetty has been repaired
									& too shallow to take readings
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐	☐ x 60 mL Ferrous	☐	☐ x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	☐ x 100 mL Amber	☐	☐ x 250 mL Plastic			
		☐	☐	☐	☐	☐			
		☐	☐	☐	☐	☐			

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	16/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☑	Groundwater: ☐
						Bore / Location ID:	A2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16-05-18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1:06	20cm			11.2	2952	8.76	-15.2	20.9	Clear, colourless, medium turbidity, ammonia type odour
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐ x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic			
		☐	☐		☐				
		☐	☐		☐				

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
	16/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-T3E-A
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.49	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.64	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L): | Includes/ excludes bore annulus (circle) | # purge volumes removed: | Total purged volume (L): ~4

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:21 pm	0	3.50	45-1.	1.31	735	6.33	-79.3	22.5	• sulphur odour is strong
2:24	1	3.50	45-1.	0.66	721	5.25	-54.4	20.7	• initial purge of brown water
2:27	2	3.50	45-1.	0.62	725	5.02	-45.1	20.6	• 10% organic matter
2:30	3	3.50	45-1.	0.60	727	4.94	-41.9	20.6	• become colourless ~~yellow~~
2:33	4	3.50	45-1.	0.58	728	4.93	-41.6	20.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date: 16/5/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW - 03
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	16/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level: 16-05-18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 4.45	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 7.12	Casing Radius (mm):	**Corrected Redox:** Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
2:50	0		75%	1.58	419.6	5.77	-10.8	22.5	clear, colourless / no turbidity
2:53				0.45	383.0	5.23	26.1	22.2	
2:56				0.33	371.7	5.15	~~372.2~~	22.2	no odour
2:59				0.30	373.4	5.17	59.9	22.3	
3:02	5			0.30	374.4	5.18	63.2	22.3	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous	☐	x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber	☐	x 250 mL Plastic		
		☐		☐		☐			
		☐		☐		☐			

Approval and Distribution

Fieldwork Staff Signature	Date: 16/5/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D2
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.35	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.59	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): Yes	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Allan	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L): 5		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:06	0		45%	2.05	404	6.72	34.6	19.6	• Clear
07:09	1		45%	0.67	396.3	6.04	18.3	20.7	• No turbidity
07:12	2.5		0.45	0.47	400.8	5.97	-2.7	20.8	• No odour
07:15	3.9		0.45	0.40	403.9	5.96	-20.5	20.9	
07:18	5		0.45	0.36	415.7	5.95	-27.2	20.9	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		• Within baseline values for pH
									• Below guideline values for pH

Approval and Distribution

Fieldwork Staff Signature	Date: 17/05/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	D1
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ **Low Flow:** Pump rate:	Hydrasleeve Size:	**Monitoring sequence followed (number in order):**
Depth to GW (m-pvc): 3.20	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	**Corrected Redox:** Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	**Parameter method:** ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
07:33	0	3.2	0.45	1.44	484.7	7.33	-16.9	18.7	• Clear / colourless
07:36	2	3.2	0.45	0.73	503	5.48	46.6	20.7	• No turbidity
07:39	3	3.2	0.45	0.58	498.2	5.26	73.1	20.8	• 5% Organic matter
07:42	4	3.2	0.45	0.52	501	5.17	87.5	20.8	
07:45	5	3.2	0.45	0.49	492.7	5.15	95.1	20.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected			QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous	☐ x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber	☐ x 250 mL Plastic		• pH below baseline values & guideline values • EC within baseline values

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
[signature]	17/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

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ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW-DS
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/5/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**		**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.08	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.98	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): NA	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:29	0	3.08	0.45	2.50	876	5.67	-38.0	19.1	~~medium~~ sulphur odour mild
08:32	3	3.06	0.45	0.55	911	5.02	-20.8	19.5	• no turbidity
08:35	4	3.06	0.45	0.41	945	5.06	-32.2	19.5	• clear / colourless
08:38	5	3.06	0.45	0.37	989	5.11	-41.0	19.5	
08:41	6	3.06	0.45	0.33	1018	5.16	-48.2	19.5	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		• pH is below baseline & guideline values
									• EC is within baseline values

Approval and Distribution

Fieldwork Staff Signature	Date: 17/05/18	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

AECOM

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	GW – T3B
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/05/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SP / DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.15	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 8.84	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters

Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:	Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:21				1.95	225.5	6.27	-101.7	20.6	• clear/colourless
9:24				0.56	216.2	5.78	-120.3	20.7	• some turbidity
9:27				0.37	215.2	5.72	-121.7	20.5	• slight sulphur odour.
9:30				0.29	215.0	5.58	-92.0	20.5	
9:33				0.28	214.5	5.55	-81.6	20.6	
9:36				0.27	214.0	5.53	-74.1	20.6	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	**Unfiltered:**		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date
SP	17/5/18		
Project Manager Signature	**Date**	**Distribution:** Project Central File	

AECOM

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Surface Water: ☐	Groundwater: ☑
						Bore / Location ID:	BH10
Project Name:	Building Roe 8	**Project Number:**	60478410	**PM Name:**	Chris McGraghan	**Sample Date:**	17/5/18
Client:	Main Roads	**Project Location:**	Beeliar Wetlands	**Fieldwork Staff:**	SD/DS	**Well Development or Well Sampling Event? (circle)**	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.08	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.65	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	✓ Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☑ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable): Key	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
9:45				1.63	253.6	6.44	-27.4	21.6	• clear, colourless
9:48				0.88	242.3	5.15	44.3	21.8	• initial turbidity
9:51				1.09	240.0	5.09	57.7	21.8	• no odour
9:54				0.94	238.4	5.10	57.6	21.8	
9:57				0.96	234.2	5.09	57.6	21.8	
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

Fieldwork Staff Signature	Date: 17/5/18	Checker Name and Signature	Date
Project Manager Signature	Date	Distribution: Project Central File	

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	FI Decontaminated	FI Low Flow: Pump rate:	Bore / Location ID: GW-T3E-A
Depth to GW (m-pvc): 3.41	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	✓ Dedicated	Intake depth:	
Bore Depth (m-pvc): 3.93	Casing Radius (mm):	Corrected Redox: Y / (N)	FI Disposable	✓ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): Gatic	(The correction to apply is probe dependent)	FI Other (specify)		Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ✓ Downhole		Sample Date: 01/06/18	PM Name: Linda Kirchner
	Key Type (if applicable): NA	FI Retrieved			

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
2:29	0			6.80	20.0	740	1.14	-145.8		• clear
2:32	0.5			4.91	20.1	743	0.40	-82.5		• no turbidity
2:35	1			4.68	20.1	745	0.30	-62.2		• no odour
2:38	1.5			4.64	20.1	745	0.26	-58.7		• colourless
2:41	2			4.65	20.1	743	0.25	-58.7		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):					NA		NA	NA		

Analytes Sampled for:	Bottles Collected				DAVGL Information	Field Comments (bore condition, date of tubing, redox correction etc.)
		x 40 mL Vial (HCl)		x 60 mL Ferrous	WQA01-01_06_18 Duplicate	
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		
		x 250 mL Plastic		x 60 mL metals (HNO_3)		

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info:	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 31/05/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: GW-TP8.TYP3
Depth to GW (m-pvc): 1.16	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 2.10	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: DS/SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole		Sample Date: 31/05/18	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable): NA	☐ Retrieved			PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:13	1		707.	5.04	19.8	375.8	0.87	-52.5	88.4	• strong sulphur odour
9:16	2		↓	4.91	20.0	337.6	0.52	-76.4	69.1	• cloudy
9:19	3		↓	4.86	20.1	324.5	0.41	-85.6	73.4	• no sediment
9:22	4		↓	4.87	20.2	324.4	0.32	-88.2	33.6	
9:25	5		↓	4.89	20.2	323.5	0.28	-90.9	257.2	
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA	N/A	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, pH of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	31/05/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level: 31/05/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: GW-T4C
Depth to GW (m-pvc): 5.93	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:		
Bore Depth (m-pvc): 10.88	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff: DS/SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)			
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole		Sample Date: 31/05/18		Project: Roe 8 Environmental Monitoring
	Key Type (if applicable): NA	☐ Retrieved				PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:53	0		70%	7.98	20.0	484.5	2.37	-141.6		clear, colourless, no turbidity,
9:56				6.28	20.3	485.0	0.72	-143.1		
9:59				5.67	20.2	480.1	0.48	-117.4		
10:02				5.57	20.1	479.1	0.44	-106.2		sulphur odour.
10:05				5.53	20.1	478.1	0.39	-100.6		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	N/A	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

WQA03_310518
Rinsate

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	31/5/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☑ Groundwater: ☐	
Date of GW Level: ~~31/5/18~~	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID:	BLNS_B1
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☒ Dedicated	Intake depth:			
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Peristaltic Pump		Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)				
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		Sample Date:	31/05/18	Project:	Roe 8 Environmental Monitoring
	Key Type (if applicable):		☐ Retrieved				PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:49		30cm		8.25	14.0	2235	9.01	-18.7	10.3	◦ Too shallow to profile
										◦ Brown colour
										◦ Minimal turbidity
										◦ Clear
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	Y	

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

WQA02_310518 duplicate sample

Field Comments (bore condition, fate of tubing, redox correction etc.)

◦ storms/rain - lake appears to have filled since last guaging round.

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination		Sampling Method		Surface Water: ☑ Groundwater: ☐	
Date of GW Level: 31/5/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated		☐ Low Flow: Pump rate:		Bore / Location ID:	A2S
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☐ Dedicated		Intake depth:			
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable		☐ Peristaltic Pump		Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)					
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole				Sample Date: 31/05/18		Project:	Roe 8 Environmental Monitoring
	Key Type (if applicable):	☐ Retrieved						PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:44		20cm		7.79	14.0	2237	9.20	80.8	5.3	20cm depth
										• clear
										• minimal turbidity
										• brown colour
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N): (Y or N)				N	NA	N	NA	NA	Y	

Analytes Sampled for:	Bottles Collected				QA/QC Information	Field Comments (bore condition, lids or tubing, redox correction etc)
		x 40 mL Vial (HCl)		x 60 mL Ferrous		
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		
		x 250 mL Plastic		x 60 mL metals (HNO_3)		

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☑ Groundwater: ☐	
Date of GW Level: 31/5/18	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID:	A2
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:			
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)			Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		Sample Date:	31/05/18	PM Name:	Linda Kirchner
	Key Type (if applicable):		☐ Retrieved					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:06		15cm		8.47	14°C	2214	9.30	31.1	13.1	• Clear - Minimal turbidity - No turbidity
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	Y	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	2	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level: 1/6/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☑ Low Flow: Pump rate: 10		Bore / Location ID: BH12
Depth to GW (m-pvc): 9.86	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth: 20		
Bore Depth (m-pvc): 17.63	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Peristaltic Pump		Fieldwork Staff: DS/SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)			Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole			Sample Date: 01/06/18		PM Name: Linda Kirchner
	Key Type (if applicable):	☐ Retrieved					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
7:43	0			8.41	15.5	684	5.20	13.5		clear, colourless,
7:46	↓			7.59	18.2	756	5.08	39.5		no turbidity
7:49				6.88	18.3	900	6.26	62.4		no odour
7:52				6.43	18.4	815	6.65	79.8		
7:55				6.04	18.3	817	6.80	96.8		
7:58				5.88	18.4	810	6.85	105.4		
8:01				5.80	18.3	810	6.88	110.8		
8:04	4.5			5.76	18.5	793	6.86	114.2		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N): baseline				N	NA	N	NA	NA	N/A	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

Rinsate
WQA03_01_06-18

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: GWD3
Depth to GW (m-pvc): 4.34	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 7.12	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD / DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): gatic	(The correction to apply is probe dependent)	☐ Other (specify)		Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole		Sample Date: 01/06/18	PM Name: Linda Kirchner
	Key Type (if applicable): NA	☐ Retrieved			

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	EC (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:51	0		70.1	6.29	21.1	389.4	0.82	-2.8		clear, colourless
8:54	1		1	5.29	21.4	366.4	0.48	33.2		no turbidity
8:57	1		1	5.12	21.5	364.6	0.34	52.2		no odour
9:00	1.6		1	5.11	21.5	364.2	0.36	54.8		
			↓							
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	N/A	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	2	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)		x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

QA/QC Information

Field Comments (bore condition, type of tubing, redox correction etc.):

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination		Sampling Method		Surface Water: ☐ Groundwater: ☑	
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated		☐ Low Flow: Pump rate:		Bore / Location ID:	GW-D4
Depth to GW (m-pvc): 2.66	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated		Intake depth:			
Bore Depth (m-pvc): 3.90	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable		☑ Peristaltic Pump		Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gal)/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)				Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO)	Parameter method: ☐ Downhole				Sample Date: 01/06/18		PM Name:	Linda Kirchner
	Key Type (if applicable):	☐ Retrieved							

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:35	0			8.23	18.8	173.1	3.62	20.2		- initial turbidity
9:38	1			6.99	19.3	172.3	3.12	53.4		- clears, colourless
9:41				6.23	19.4	171.3	2.90	73.2		- no odour
9:44				5.91	19.6	172.3	2.72	86.9		
9:47				5.79	19.8	174.8	2.57	96.0		
9:50	7			5.76	19.8	177.6	2.49	99.7		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	Y	NA	NA	N/A.	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)		x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination	Sampling Method		
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☑ Low Flow: Pump rate: 530	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 10.55	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth: 20	Bore / Location ID:	GW-D8
Bore Depth (m-pvc): 11.76	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (flat/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole	☐ Retrieved		Sample Date: 01/06/18	PM Name:	Linda Kirchner
	Key Type (if applicable):						

Water Quality Parameters										
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or uS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:36	0			7.30	19.9	330.5	2.37	-115.5		Initial strong sulphur odour, slightly cloudy
10:39				6.38	20.4	325.9	1.35	-119.7		
10:42				6.10	20.5	325.1	1.49	-117.1		
10:45				6.05	20.5	320.4	1.39	-113		↓ Then clear, ~~colourless~~, yellow no turbidity, no odour
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA	N/A	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fits of tubing, redox corrections etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination	Sampling Method		
Date of GW Level: 1/6/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 2.12	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Bore / Location ID:	D2
Bore Depth (m-pvc): 5.54	Casing Radius (mm):	Corrected Redox: Y / N		☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	DS / SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)		Project:	Ree 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved			Sample Date: 1/6/18	PM Name:	Linda Kirchner
	Key Type (if applicable):						

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:11	0		70.1	7.94	20.6	441.6	1.65	-12.5		milky cloudy, no turbidity
11:14	1			6.08	21.1	428.3	0.43	6.3		"
11:17	3			5.76	21.1	427.9	0.31	4.2		"
11:20	4			5.74	21.1	419.6	0.29	4.1		then clear, no odour
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	NA	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)	1	x 60 mL Ferrous
	2	x 40 mL Vial (H_2SO_4)	1	x 100 mL Amber
	1	x 250 mL Plastic	1	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination	Sampling Method			
Date of GW Level: 1/6/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156		☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑	
Depth to GW (m-pvc): 3.02	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	Bore / Location ID:	D1	
Bore Depth (m-pvc): 6.54	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	DS / SD	
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)		Project:	Roe 8 Environmental Monitoring	
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole			Sample Date: 1/6/18	PM Name:	Linda Kirchner	
	Key Type (if applicable):	☐ Retrieved						

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:33	0ML	3.02	90%	8.22	20.1	454.5	1.46	-8.2	139.4	• clear
11:36	1		↓	5.63	20.8	449.5	0.41	35.9	954.9	• no turbidity
11:39	1.5		↓	5.19	20.9	453.4	0.35	57.8	1024.9	• no odour
11:42	2		↓	5.03	20.9	452.0	0.30	83.5		• 2% organic matter
11:45	2.5		↓	4.96	20.7	454.9	0.28	98.1		
11:48	3		↓	4.95	20.8	449.5	0.26	104.6		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA	NA	

Analytes Sampled for:	Bottles Collected				QA/QC Information	Field Comments (bore condition, fate of tubing, redox correction etc.)
		x 40 mL Vial (HCl)		x 60 mL Ferrous		
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		
		x 250 mL Plastic		x 60 mL metals (HNO_3)		

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method		
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 2.22	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	T3B
Bore Depth (m-pvc): 6.58	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO): NO	Parameter method: ☑ Downhole ☐ Retrieved		Sample Date: 01/06/18	PM Name:	Linda Kirchner
	Key Type (if applicable): NA					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
12:37	0			7.80	20.4	217.2	1.55	-105.2		• clear
12:40	0.5			6.20	20.5	205.3	0.57	-110.3		• no turbidity
12:43	1			5.57	20.5	199.6	0.49	-74.2		• odour - slight sulphur
12:46	1.5			5.43	20.5	197.3	0.44	-58.4		
12:49	2			5.38	20.5	196.3	0.40	-49.4		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	Y	NA	NA	NA	

Analytes Sampled for:	Bottles Collected:			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101155		☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: BH10
Depth to GW (m-pvc): 1.89	Screen Interval (m):	Chem Kit Model: YSI Pro DSS		☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 5.63	Casing Radius (mm):	Corrected Redox: Y / (N)		☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)		☐ Other (specify)		Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO): Yes	Parameter method: ☑ Downhole ☐ Retrieved			Sample Date: 01/06/18	PM Name: Linda Kirchner
	Key Type (if applicable): Key					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
1:00	0			8.39	20.9	242.6	1.38	-88.1		• clear
1:03	0.5			5.93	21.1	232.0	0.45	-22.8		• no turbidity
1:06	1			5.25	21.2	226.4	0.39	33.0		
1:09	1.5			4.94	21.2	223.6	0.33	78.1		
1:12	2			4.87	21.2	220.7	0.31	88.4		
1:15	2.5			4.83	21.1	216.4	0.29	92.7		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2°C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	Y	NA	NA	NA	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: T3C
Depth to GW (m-pvc): 0.34	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Fieldwork Staff: SD/DS
Bore Depth (m-pvc): 5.14	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Project: Roe 8 Environmental Monitoring
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 01/06/18	PM Name: Linda Kirchner
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved			
	Key Type (if applicable):				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
01:29pm	0			8.28	18.7	390.3	1.53	-92.6		• clear
1:32	0.5			6.22	18.6	361.4	0.61	-83.6		• no turbidity
1:35	1			5.22	18.6	351.7	0.44	-28.3		• strong sulphur odour
1:38	1.5			4.93	18.6	349.8	0.38	≈ 5.5		
1:41	2			4.85	18.7	348.7	0.36	≈ 5.5		
1:44	2.5			4.81	18.6	347.7	0.34	5.2		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA	NA	

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (note condition, fate of tubing, redox correction etc)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water ☐ Groundwater ☑
Date of GW Level: 01/06/18	Bore Radius (mm):	Chem Kit Serial No: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: GW-D5
Depth to GW (m-pvc): 3.02	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 5.98	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): Stick Guard	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO): No	Parameter method: ☑ Downhole		Sample Date: 01/06/18	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable): NA	☐ Retrieved			PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
2:00	0			8.00	19.7	870	1.76	-46.9		• clear
2:03	2.5			5.28	19.6	881	0.53	-4.2		• no turbidity
2:06	4			4.80	19.6	887	0.39	16.5		• slight sulphur odour
2:09	4.5			4.83	19.6	921	0.37	3.4		• yellow
2:12	5			4.89	19.5	985	0.44	-13.2		
2:15	5.5			4.92	19.5	998	0.42	-21.5		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA	NA	

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	01/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method			
Date of GW Level: 15/6/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☑	Groundwater: ☐	
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Bore / Location ID:	AS	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	CH/DS	
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)				
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		Sample Date:	Project:	Roe 8 Environmental Monitoring	
	Key Type (if applicable):	☐ Retrieved			PM Name:	Linda Kirchner	

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:34		0.2		8.10	14.1	1758	8.00	47.4	6.3	Very clear
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):					NA		NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature | Date | Checker Name and Signature | Date | Project Manager Signature | Date

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☑ Groundwater: ☐	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID:	A2S
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:			
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox:	Y / N	☐ Disposable	☐ Peristaltic Pump		Fieldwork Staff:	CW / DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)			Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		Sample Date:		PM Name:	Linda Kirchner
	Key Type (if applicable):		☐ Retrieved					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:22		0.20		8.28	14.4	1764	7.20	30.8	1.6	very clear/still, can see bottom
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	Y	

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Turbidity is lower than baseline; very still clear water

No further action required

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____ Project Manager Signature _____ Date _____

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		Surface Water: ☑ Groundwater: ☐
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: BLNS-B1
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:		
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump		Fieldwork Staff: CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)			
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		Sample Date:	15/6/18	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):					PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:24		0.30		8.05	14.4	1773	7.30	28.6	1.5	
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA	Y	

Analytes Sampled for:	Bottles Collected			
	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous		
	☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber		
	☐ x 250 mL Plastic	☐ x 60 mL metals (HNO_3)		

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Turbidity lower than baseline; very still clear water.
No further action required.

Approval and Distribution

Fieldwork Staff Signature _____ Date _____ Checker Name and Signature _____ Date _____ Project Manager Signature _____ Date _____ **Distribution:** Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 15/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate: 35	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 10.51	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Bore / Location ID:	GW-D8
Bore Depth (m-pvc): 11.75	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):	☐ Retrieved				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:48	0		35/35	5.91	16.4	316.0	3.05	-56.0		• clear, colourless, no odour
8:51	0.2		30/30	6.03	17.6	317.3	2.22	-85.9		"
8:54	0.5		30/30	6.08	18.1	321.1	2.26	-92.8		"
8:57	1		30/30	6.12	18.5	322.7	2.55	-93.5		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL/BL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	15/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information				Parameter Info.		Decontamination		Sampling Method		Surface Water: ☐ Groundwater: ☑	
Date of GW Level:	15/6/18	Bore Radius (mm):	150	Chem Kit Serial No.:	17H101156	☑ Decontaminated		☐ Low Flow: Pump rate:	50%	Bore / Location ID:	GW-D3
Depth to GW (m-pvc):	4.21	Screen Interval (m):		Chem Kit Model:	YSI Pro DSS	☑ Dedicated		Intake depth:			
Bore Depth (m-pvc):	7.10	Casing Radius (mm):	50	Corrected Redox:	Y / N	☐ Disposable		☑ Peristaltic Pump		Fieldwork Staff:	DS/CH
Depth to Product (m-pvc):		Cover Type (gatic/stick up):		(The correction to apply is probe dependent)		☐ Other (specify)		Sample Date:	15/6/18	Project:	Roe 8 Environmental Monitoring
Product Thickness (m):		Bore Locked (YES/NO):		Parameter method:	☐ Downhole					PM Name:	Linda Kirchner
		Key Type (if applicable):			☐ Retrieved						

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
7:42	0.2		50%	5.55	18.8	421.5	1.30	31.2		Clear, colourless, no odour
7:45			"	5.30	20.1	424.0	0.58	11.7		"
7:48	1.2		"	5.26	20.4	415.3	0.45	7.7		"
7:51			"	5.22	20.6	400.0	0.40	0.8		"
7:54	2		"	5.16	20.7	383.8	0.37	30.6		"
7:57			"	5.12	20.7	373.1	0.35	20.7		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (BL/GL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	15/6/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information			
Date of GW Level:	15/06/18	Bore Radius (mm):	
Depth to GW (m-pvc):	9.77	Screen Interval (m):	
Bore Depth (m-pvc):	17.41	Casing Radius (mm):	
Depth to Product (m-pvc):		Cover Type (gatic/stick up):	
Product Thickness (m):		Bore Locked (YES/NO):	
		Key Type (if applicable):	

Parameter Info.	
Chem Kit Serial No.:	17H101156
Chem Kit Model:	YSI Pro DSS
Corrected Redox:	Y / (N)
(The correction to apply is probe dependent)	
Parameter method:	☑ Downhole ☐ Retrieved

Decontamination	
☑	Decontaminated
☐	Dedicated
☐	Disposable
☐	Other (specify)

Sampling Method	
☑ Low Flow:	Pump rate: 15
	Intake depth: 10.5
☐ Peristaltic Pump	
Sample Date:	

Surface Water: ☐	Groundwater: ☑
Bore / Location ID:	BH12
Fieldwork Staff:	CH / DS
Project:	Roe 8 Environmental Monitoring
PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
7:14			15	8.03	16.6	710	8.98	32.5		colourless, slight turbidity, no odour
7:17			15	7.07	19.5	781	7.55	54.7		"
7:20			15	6.30	19.7	766	7.81	79.3		"
7:23			15	5.99	19.8	743	8.29	93.4		"
7:26	3.5		15	5.85	19.8	721	8.57	90.2		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	15/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm): 150	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 3.29	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	GW-T3E-A
Bore Depth (m-pvc): 3.51	Casing Radius (mm): 50	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CH/DS
Depth to Product (m-pvc): -	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m): -	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):	☐ Retrieved				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
3:32	0.5		501.	4.86	20.1	737	0.96	-36.6	-	Clear, colourless, slight decaying leaves odour
3:35	1.5		"	4.81	20.1	733	1.07	-48.9	-	"
3:38	2		"	4.80	20.1	736	0.82	-53.1	-	"
3:41	3		"	4.80	20.1	735	0.70	-58.0	-	"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (DL/QL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate: 50%	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 2.91	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Bore / Location ID:	GW-D5
Bore Depth (m-pvc): 5.91	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CH / DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
2:58			50%.	4.91	19.4	946	1.65	84.0		Brown, slightly turbid, odourless
3:01	1		"	4.83	19.3	952	0.66	76.5		"
3:04	2		"	4.80	19.3	957	0.50	58.7		"
3:07	3		"	4.78	19.3	972	0.39	39.3		Light brown, clear, odourless
3:10	3.5		"	4.77	19.2	975	0.37	26.7		"
3:13	4		"	4.76	19.2	960	0.34	13.9		"
3:16	5		"	4.76	19.2	972	0.33	8.6		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (BL/GL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Sand around

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 0.21	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	T3C
Bore Depth (m-pvc): 5.14	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):	☐ Retrieved				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
14:33	0		50%	5.49	18.2	354.9	4.71	67.6		colourless, clear, odourless, no turb
14:36			50%	4.92	18.3	354.2	0.77	15.2		"
14:40			50%	4.84	18.4	352.2	0.47	10.4		"
14:43			50%	4.83	18.3	351.7	0.41	9.9		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (BL)(GL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 1.702	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	BH10
Bore Depth (m-pvc): 5.65	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CA/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date:	Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO): YES	Parameter method: ☑ Downhole ☐ Retrieved			PM Name:	Linda Kirchner
	Key Type (if applicable): Key					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
14:07	0		50%	5.48	20.1	245.0	3.70	27.4		"clear, light brown, no turbidity, Odourless
14:10	1	1.71	50%	5.52	20.3	250.3	3.47	44.0		"
14:13	2	1.71	50%	5.52	20.3	249.2	3.42	53.9		"
14:16	3	1.71	50%	5.53	20.3	245.9	3.28	61.6		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL)	NA	Y (BL)	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information				Parameter Info.		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level:	14/06/18	Bore Radius (mm):		Chem Kit Serial No.:	17H101156	☑ Decontaminated	☑ Low Flow: Pump rate:		Bore / Location ID: T3B
Depth to GW (m-pvc):	1.88	Screen Interval (m):		Chem Kit Model:	YSI Pro DSS	☑ Dedicated	Intake depth:		
Bore Depth (m-pvc):	8.83	Casing Radius (mm):	20mm	Corrected Redox:	Y / N	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff:
Depth to Product (m-pvc):		Cover Type (gatic/stick up):	S/U	(The correction to apply is probe dependent)		☐ Other (specify)			
Product Thickness (m):		Bore Locked (YES/NO):	No	Parameter method:	☐ Downhole ☐ Retrieved		Sample Date:		Project: Roe 8 Environmental Monitoring
		Key Type (if applicable):							PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
13:46	0		50%	5.66	20.8	206.0	1.16	-78.3		colourless, odourless, no turbidity
13:49	2		"	5.41	20.6	184.5	0.44	-70.0		"
13:52	3		"	5.39	20.5	169.0	0.39	-53.2		"
13:55	3.5		"	5.37	20.5	167.5	0.37	-49.6		"
13:58	4		"	5.36	20.4	166.6	0.37	-46.6		"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL)	NA	Y (BL)	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☐
Depth to GW (m-pvc): 0.511	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	GW-D4
Bore Depth (m-pvc): 3.9	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)			
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved		Sample Date:	Project:	Roe 8 Environmental Monitoring
	Key Type (if applicable):				PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
12:27		0.515	50%	5.67	19.6	275.5	2.85	42.9	–	Clear, colourless, odourless
12:30		0.519	"	5.70	19.6	273.5	2.44	58.7	–	"
12:33		0.518	"	5.71	19.6	271.6	2.26	69.4	–	"
12:36	3.5	0.518		5.69	19.7	267.0	2.28	76.9	–	"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL)	NA	Y (GL)	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

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If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☑
Date of GW Level: 14/6/17	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: T4C
Depth to GW (m-pvc): 5.83	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 10.93	Casing Radius (mm): 20mm	Corrected Redox: Y / N	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up): S/U	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		Sample Date:	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):	☐ Retrieved			PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
12:00	0.6		50%	5.51	20.5	482.4	0.92	-79.0	—	Clear, colourless, slight Sulphur odour
12:03	1.0		"	5.57	20.4	480.1	0.52	-96.8	—	"
12:06	2		"	5.56	20.3	475.3	0.41	-86.7	—	"
12:09	2.5		"	5.56	20.3	474.4	0.38	-79.9	—	"
12:12	3		"	5.55	20.3	473.7	0.35	-74.8	—	"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GW)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous		
	☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber		
	☐ x 250 mL Plastic	☐ x 60 mL metals (HNO_3)		

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 14/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): ~~0.978~~ 0.978	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	T4B
Bore Depth (m-pvc): 2.11	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	CH/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):	☐ Retrieved				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:30	~~0.98~~ 1.11	0	50%	7.36	19.8	382.4	2.30	-42.9		• clear, no turbidity, colourless, no odour
11:33	1.10	1	40%	5.22	20.0	382.3	0.55	-79.1		"
11:36	1.10	1.5	40%	4.97	19.9	381.1	0.45	-76.0		"
11:39	1.10	2	40%	4.92	19.9	380.7	0.38	-77.3		
11:42	1.10		40%	4.91	19.9	380.7	0.34	-79.2		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL/BL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
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Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information				Parameter Info.		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑	
Date of GW Level:	14/6/18	Bore Radius (mm):	150	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☑ Low Flow: Pump rate:	50%	Bore / Location ID:	D1
Depth to GW (m-pvc):	2.914	Screen Interval (m):	-	Chem Kit Model:	YSI Pro DSS	☑ Dedicated	Intake depth:	6		
Bore Depth (m-pvc):	6.53	Casing Radius (mm):	50	Corrected Redox:	Y / (N)	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff:	DS x CH
Depth to Product (m-pvc):		Cover Type (gatic/stick up):	Gatic	(The correction to apply is probe dependent)		☐ Other (specify)				
Product Thickness (m):	-	Bore Locked (YES/NO):	Yes	Parameter method:	☐ Downhole		Sample Date:		Project:	Roe 8 Environmental Monitoring
		Key Type (if applicable):	Allen		☑ Retrieved				PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:54	0	507.4 2.914	2.914	7.10	19.2	458.2	1.96	68.7	-	Colourless, slightly turbid, no odour
10:57	1	2.914	50%	5.33	20.6	462.1	0.53	107.0	-	Colourless, clear, no odour
11:00	2	2.914	"	5.03	20.5	462.2	0.43	118.5	-	"
11:03	3	2.914	"	5.00	20.6	465.2	0.35	122.4	-	"
11:06	35	2.914	"	5.01	20.8	465.6	0.34	122.4	-	"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				(Q) Y (Q)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected				QA/QC Information	Field Comments (bore condition, fate of tubing, redox correction etc.)
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous		Tree roots in well.
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber		
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)		

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
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pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information				Parameter Info.		Decontamination		Sampling Method		Surface Water: ☐ Groundwater: ☑	
Date of GW Level:	14/6/18	Bore Radius (mm):	150	Chem Kit Serial No.:	17H101156	☐ Decontaminated		☐ Low Flow: Pump rate:	50%	Bore / Location ID:	D2
Depth to GW (m-pvc):	2.025	Screen Interval (m):	–	Chem Kit Model:	YSI Pro DSS	☑ Dedicated		Intake depth:	5		
Bore Depth (m-pvc):	5.57	Casing Radius (mm):	150	Corrected Redox:	Y / N	☐ Disposable		☑ Peristaltic Pump		Fieldwork Staff:	DS & CH
Depth to Product (m-pvc):	–	Cover Type (gatic/stick up):	Gatic	(The correction to apply is probe dependent)		☐ Other (specify)					
Product Thickness (m):	–	Bore Locked (YES/NO):	Yes	Parameter method:	☐ Downhole ☑ Retrieved			Sample Date:		Project:	Roe 8 Environmental Monitoring
		Key Type (if applicable):	Allen							PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:13	0.2	2.020	75%	5.70	20.2	462.5	1.33	143.0	–	Turbid, light brown, no odour
10:16			50%	5.74	20.7	467.4	0.52	117.6	–	"
10:20	1	2.024	50%	5.82	20.2	471.1	1.56	109.8	–	"
10:23		2.024	50%	5.78	20.6	465.9	0.38	81.0	–	"
10:26	2.9	2.02	"	5.79	20.7	452.3	0.34	89.6	–	"
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y (GL)	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Sunny, warm

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	14/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐ Groundwater: ☑
Depth to GW (m-pvc): 1.91	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID: D2
Bore Depth (m-pvc): 5.63	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole		Sample Date: 27/06/18	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):	☐ Retrieved			PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:05	0			4.91	18.9	444.2	1.33	239.4		• clear, slight sulphur odour, no co
8:08	0.6			5.21	19.6	396.8	0.52	198.7		"
8:11	1.6			5.41	19.6	386.7	0.39	169.7		
8:15	2.5			5.49	19.7	383.8	0.35	152.1		
8:19	3.5			5.54	19.8	379.7	0.31	135.3		
8:22	4.5			5.55	19.8	380.5	0.30	130.7		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			QA/QC Information	Field Comments (bore condition, fate of tubing, redox correction etc.)
	x 40 mL Vial (HCl)		x 60 mL Ferrous		
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		
	x 250 mL Plastic		x 60 mL metals (HNO_3)		

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH [within baseline values
outside of/below guideline values

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	27/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐ Groundwater: ☑
Depth to GW (m-pvc): 2.81	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID: D1
Bore Depth (m-pvc): 6.53	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 27/06/18	Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved			PM Name: Linda Kirchner
	Key Type (if applicable):				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:37	0		70%	5.24	18.5	526	2.99	121.1		clear, no colour, no odour
8:40	1.5		↓	5.03	20.1	534	0.39	149.4		
8:43	2.0			5.03	20.2	524	0.38	149.8		
8:46	2.5			5.04	20.2	536	0.33	151.4		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

- tree roots detected on dipper.

pH: below baseline & guideline values

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	27/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 27/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 3.21	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	GW-T3E-A
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	SB/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 27/06/18	Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved			PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:08	0		70%	7.52	18.8	677	2.16	-120.1		• slight sulphur odour, colourless & clear
9:11	1.0		↓	5.00	19.6	693	0.44	-60.8		• sulphur odour, colourless & clear
9:14	1.5			4.81	19.6	691	0.35	-53.7		
9:17	2			4.79	19.7	694	0.30	-54.5		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous		
	☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber		
	☐ x 250 mL Plastic	☐ x 60 mL metals (HNO_3)		

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH: below baseline & guidelines

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	27/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 27/06/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 2.83	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	GW-D5
Bore Depth (m-pvc): 5.89	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	SD | DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 27/06/18	Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved			PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9.44	0	~~2.83~~	75 l	7.57	17.1	642	4.98	-33.5		initially brown, clear, some turbidity, sulphur odour
9:47	↓		↓	5.43	18.3	805	1.79	-8.2		↓
9:50				4.84	18.5	840	0.78	10.8		
9:53				4.79	18.6	841	0.66	13.2		
9:56				4.79	18.7	836	0.52	11.8		
9:59	↓			4.81	18.8	847	0.43	6.4		then clear, odourless, no turbidity
10:02	5		↓	4.83	18.8	846	0.40	1.5		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH: below baseline & g/line

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
[signature]	27/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level: 27/06/18	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: T3B
Depth to GW (m-pvc): 1.71	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☑ Dedicated	Intake depth:		
Bore Depth (m-pvc): 8.84	Casing Radius (mm):	Corrected Redox:	Y / (N)	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)			
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☑ Downhole		Sample Date: 27/06/18		Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):		☐ Retrieved				PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:23	0		70%	7.59	19.3	169.1	2.15	-63.8		• clear, colourless, odourless
11:26	1		↓	6.09	20.1	152.4	0.52	-85.7		
11:29	1.5			5.77	20.2	142.7	0.39	-68.0		
11:32	2			5.63	20.2	142.2	0.34	-53.4		
11:35	2.5		80%	5.56	20.1	142.8	0.31	-44.1		
11:38	4			5.51	20.2	143.8	0.30	-38.4		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	Y	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH: within baseline, below guideline

EC: below baseline

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
[signature]	27/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐ Groundwater: ☑
Depth to GW (m-pvc): 0.85	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID: T4B
Bore Depth (m-pvc): 2.11	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 27/06/18	Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved			PM Name: Linda Kirchner
	Key Type (if applicable):				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
12:07	0			7.44	17.0	362.8	6.03	-14.7		• clear, colourless, odourless
12:10				5.22	19.1	375.9	0.68	-47.4		• "
12:13				4.95	19.2	377.2	0.38	-47.2		• "
12:16				4.91	19.2	377.7	0.31	-49.3		• clear, colourless, strong sulphur odour
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐ x 40 mL Vial (HCl)	☐ x 60 mL Ferrous		
	☐ x 40 mL Vial (H_2SO_4)	☐ x 100 mL Amber		
	☐ x 250 mL Plastic	☐ x 60 mL metals (HNO_3)		

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Rain heavy
Bore location is submerged.

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

- location of bore = wetland

pH: below b/line & g/line

* Ref. bore

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
[signature]	27/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: TH4C
Depth to GW (m-pvc): 5.79	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☐ Dedicated	Intake depth:		
Bore Depth (m-pvc): 10.89	Casing Radius (mm):	Corrected Redox:	Y / (N)	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependant)		☐ Other (specify)	Sample Date:	27/06/18	Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☑ Downhole				PM Name: Linda Kirchner
	Key Type (if applicable):		☐ Retrieved				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	~~NTU~~	Odour, Colour, Turbidity
12:32	0		75%	5.46	20.1	451.9	0.72	-42.5		Sulphur odour, colourless, clear.
12:35	1		↓	5.54	20.1	443.9	0.40	-63.1		
12:38	2			5.56	20.1	440.9	0.33	-58.8		
12:41	3			5.56	20.1	440.4	0.30	-57.0		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

- Ref. bore

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	27/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water: ☐ Groundwater: ☐
Date of GW Level: 28/6/18	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☑ Low Flow: Pump rate:	Bore / Location ID: BH12
Depth to GW (m-pvc): 9.68	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	
Bore Depth (m-pvc): 17.50	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff: DS/SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved		Sample Date: 28/06/18	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):				PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
7:18	0			7.83	12.2	576	8.81	36.9		clear, colourless, no turbidity, no odour
7:21				7.23	14.3	589	7.51	53.0		
7:24				6.41	15.4	657	7.26	79.9		
7:27				5.84	16.3	729	7.20	106.6		
7:30				5.65	16.6	755	7.187	122.9		
7:33				5.57	16.7	763	7.21	133.5		
7:36	4			5.52	16.8	~~6667~~ 765	7.16	141.5		
						765				
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Rinsate taken WQA03.

Field Comments (bore condition, rate of purging, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

- Ref. bore.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	28/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level: 28/6	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☐	Groundwater: ☑
Depth to GW (m-pvc): 4.08	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☑ Dedicated	Intake depth:	Bore / Location ID:	GW-D3
Bore Depth (m-pvc): 7.16	Casing Radius (mm):	Corrected Redox: Y / (N)	☐ Disposable	☑ Peristaltic Pump	Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☑ Downhole ☐ Retrieved		Sample Date: 28/06/18	PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:02	0			7.65	19	381.4	2.70	17.3		clear, colourless, no turbidity, no odour
8:05				5.17	20.8	377.0	0.50	51.1		
8:08				5.11	20.9	367.1	0.42	70.1		
8:11				5.11	20.9	364.7	0.42	78.6		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
	☐	x 40 mL Vial (HCl)	☐	x 60 mL Ferrous
	☐	x 40 mL Vial (H_2SO_4)	☐	x 100 mL Amber
	☐	x 250 mL Plastic	☐	x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, fate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH: below b/line & g/lene

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	28/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method		
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☑	Groundwater: ☐
Depth to GW (m-pvc): 50cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Bore / Location ID:	BLNS-B1
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		Sample Date:	PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:00				7.77	13.9	1570	5.11	67.1	17.5	~~clear~~ high turbidity colourless
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

WQA02_28_06_18
Duplicate

Field Comments (bore condition, rate of tubing, redox correction etc.)

- water level has risen

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	28/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method	Surface Water: ☑ Groundwater: ☐
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: A2S
Depth to GW (m-pvc): 10cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)		
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		Sample Date:	Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):				PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
8:55				8.00	13.9	1508	5.23	69.4	9.8	• clear/low turbidity
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

• water level has risen
• algae bloom/scum has disappeared.

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
[signature]	28/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Surface Water: ☑ Groundwater: ☐
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Bore / Location ID: A2
Depth to GW (m-pvc): 15cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 28/06/18	Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved			PM Name: Linda Kirchner
	Key Type (if applicable):				

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:17				8.15	14.4	1484	6.22	54.9	6.7	• medium turbidity
										• colourless / clear
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	Y	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

• water level has risen
• rained all day 27/06/18.

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

EC: below baseline values.

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
[signature]	28/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method		
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:	Surface Water: ☑	Groundwater: ☐
Depth to GW (m-pvc): 20cm	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:	Bore / Location ID:	BL-Jetty
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump	Fieldwork Staff:	DS/SD
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	Sample Date: 28/06/18	Project:	Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved			PM Name:	Linda Kirchner
	Key Type (if applicable):					

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
9:23				8.01	14.5	1483	6.64	5.97	3.6	clear, colourless
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	Y	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction, etc.)

- water table has risen

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

EC: below b/line values

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
[signature]	28/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info	Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level: 28/06	Bore Radius (mm):	Chem Kit Serial No.: 17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: GW-D8
Depth to GW (m-pvc): 10.47	Screen Interval (m):	Chem Kit Model: YSI Pro DSS	☐ Dedicated	Intake depth:		
Bore Depth (m-pvc): 11.78	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Peristaltic Pump		Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)			
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		Sample Date: 28/06/18		Project: Roe 8 Environmental Monitoring
	Key Type (if applicable):					PM Name: Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:04	0			8.37	17.3	291.5	3.40	-73.4		clear, colourless, no
10:07	1			6.93	18.8	~~84.8~~	2.22	-85.0		
10:10	↓			6.41	19.4	294.1	2.30	-81.5		turbidity, no odour
10:13	↓			6.27	19.7	290.6	2.40	-76.2		
10:16	3			6.23	19.8	289.4	2.45	-73.6		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				Y	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of drying, redox formation etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

pH: above b/line & below g/line

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	28/06/18					

Groundwater/Surface Water Sampling and Purging Record

General Bore Information			
Date of GW Level:	28/6	Bore Radius (mm):	
Depth to GW (m-pvc):	0.30 cm	Screen Interval (m):	
Bore Depth (m-pvc):	3.89	Casing Radius (mm):	
Depth to Product (m-pvc):		Cover Type (gatic/stick up):	
Product Thickness (m):		Bore Locked (YES/NO):	
		Key Type (if applicable):	

Parameter Info.	
Chem Kit Serial No.:	17H101156
Chem Kit Model:	YSI Pro DSS
Corrected Redox:	Y / ☑
(The correction to apply is probe dependent)	
Parameter method:	☑ Downhole ☐ Retrieved

Decontamination
☐ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method	
☐ Low Flow:	Pump rate:
	Intake depth:
☑ Peristaltic Pump	
Sample Date:	28/06/18

Surface Water: ☐	Groundwater: ☑
Bore / Location ID:	GW-D4
Fieldwork Staff:	DS/SD
Project:	Roe 8 Environmental Monitoring
PM Name:	Linda Kirchner

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
10:44	0			8.30	16.8	274.7	5.82	11.5		initial turbidity, clear,
10:47				6.62	17.0	271.8	4.61	38.7		
10:50				6.06	17.1	272.9	4.62	51.5		light brown, no odour
10:53				5.91	17.2	274.0	4.56	59.1		
10:56				5.84	17.3	274.2	4.61	61.6		
10:59				5.83	17.5	274.4	4.59	62.1		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	N	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date
	28/06/18				

Distribution: Project Central File

Groundwater/Surface Water Sampling and Purging Record

General Bore Information		Parameter Info		Decontamination	Sampling Method		Surface Water: ☐ Groundwater: ☑
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	17H101156	☐ Decontaminated	☐ Low Flow: Pump rate:		Bore / Location ID: BH10
Depth to GW (m-pvc): 1.53	Screen Interval (m):	Chem Kit Model:	YSI Pro DSS	☑ Dedicated	Intake depth:		
Bore Depth (m-pvc): 5.65	Casing Radius (mm):	Corrected Redox:	Y / (N)	☐ Disposable	☑ Peristaltic Pump		Fieldwork Staff: SD/DS
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	Sample Date:	28/06/18	Project: Roe 8 Environmental Monitoring
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method:	☑ Downhole ☐ Retrieved				PM Name: Linda Kirchner
	Key Type (if applicable):						

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	pH	Temp °C	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	NTU	Odour, Colour, Turbidity
11:18	0		75%	6.01	19.5	185.1	0.97	66.4		• light brown, no odour, medium turbidity
11:21	1.5		↓	5.33	19.8	180.8	0.50	105.3		
11:24	2.5			5.22	19.7	178.6	0.43	117.5		
11:27	3.5			5.21	19.6	178.8	0.44	118.3		
Acceptable Stabilised Parameter Range for Sampling:				± 0.05	± 0.2 °C	± 3%	± 10%	± 10 mV	± 10% turbidity	
Exceedances (Y/N):				N	NA	Y	NA	NA		

Analytes Sampled for:	Bottles Collected			
		x 40 mL Vial (HCl)		x 60 mL Ferrous
		x 40 mL Vial (H_2SO_4)		x 100 mL Amber
		x 250 mL Plastic		x 60 mL metals (HNO_3)

QA/QC Information

Field Comments (bore condition, rate of tubing, redox correction etc.)

Contingency Actions for Exceedances

Surface Water Quality:
Resample affected location within four weeks of original sampling event.
Contact PM and refer to DMMP and WMMP for further instructions.

Groundwater Levels:
If bore is dry determine reason why (low groundwater, blocked bore).
Determine cause for rapid change in groundwater level. Contact PM.

Groundwater Quality:
Determine if reference bore water quality also exceeds trigger values, range and guidelines.
Resample affected bore within four weeks of original sampling event.
Contact PM for further instructions if both rounds exceed trigger values and concentrations are 20% higher than reference bores.

pH (Surface Water and Groundwater):
Measure pH daily for seven days to ensure recording is not an anomaly.
Determine if reference groundwater bore water quality also exceeds targets. Contact PM.

Contingency Actions Taken:

EC: below b/line values

Approval and Distribution

Fieldwork Staff Signature	Date	Checker Name and Signature	Date	Project Manager Signature	Date	Distribution: Project Central File
	28/06/18					

Appendix C: Laboratory Documentation

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1705812**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MS FRANCESCA FLYNN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: francesca.flynn@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 01-Jun-2017 17:15	Issue Date	: 08-Jun-2017
Client Requested Due Date	: 13-Jun-2017	Scheduled Reporting Date	: **13-Jun-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not intact.
No. of coolers/boxes	: 3	Temperature	: -1.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **VOC EP080 analysis will be conducted by ALS Melbourne, NATA accreditation No. 825, Site No. 13778.**
- **Chl a analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
T4C_010617	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - EP008 Chlorophyll a	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN
EP1705812-001	01-Jun-2017 00:00	GW-D3_010617	✓			✓	✓
EP1705812-002	01-Jun-2017 00:00	GW-D7_010617	✓			✓	✓
EP1705812-003	01-Jun-2017 00:00	GW-D8_010617	✓			✓	✓
EP1705812-004	01-Jun-2017 00:00	T4B_010617	✓			✓	✓
EP1705812-005	01-Jun-2017 00:00	T4C_010617	✓			✓	✓
EP1705812-006	01-Jun-2017 00:00	BH10_010617	✓			✓	✓
EP1705812-007	01-Jun-2017 00:00	BLNS-B1_010617	✓	✓	✓	✓	✓
EP1705812-008	01-Jun-2017 00:00	A2_010617	✓	✓	✓	✓	✓
EP1705812-009	01-Jun-2017 00:00	A2S_010617	✓	✓	✓	✓	✓
EP1705812-010	01-Jun-2017 00:00	RD1_010617	✓	✓	✓	✓	✓
EP1705812-011	01-Jun-2017 00:00	WQA01_010617		✓		✓	✓
EP1705812-012	01-Jun-2017 00:00	WQA02_010617	✓	✓	✓	✓	✓
EP1705812-013	01-Jun-2017 00:00	WQA03_010617					✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

FRANCESCA FLYNN

- *AU Certificate of Analysis - NATA (COA)	Email	francesca.flynn@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	francesca.flynn@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	francesca.flynn@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	francesca.flynn@aecom.com
- A4 - AU Tax Invoice (INV)	Email	francesca.flynn@aecom.com
- Chain of Custody (CoC) (COC)	Email	francesca.flynn@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	francesca.flynn@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	francesca.flynn@aecom.com
- EDI Format - XTab (XTAB)	Email	francesca.flynn@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1705754**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: michelle.orourke@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 31-May-2017 16:10	Issue Date	: 01-Jun-2017
Client Requested Due Date	: 08-Jun-2017	Scheduled Reporting Date	: **08-Jun-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.9 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 8 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested	WATER - EG020F Dissolved Metals by ICPMS	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1705754-001	31-May-2017 14:30	GW-D4_		✓	✓	✓	
EP1705754-002	31-May-2017 11:19	GW-D5_		✓	✓	✓	
EP1705754-003	31-May-2017 10:52	T2F_		✓	✓	✓	
EP1705754-004	31-May-2017 13:39	T3B_		✓	✓	✓	
EP1705754-005	31-May-2017 14:07	T3C_		✓	✓	✓	
EP1705754-006	31-May-2017 10:09	GW-T3E-A		✓	✓	✓	
EP1705754-007	31-May-2017 00:00	TBW 545					✓
EP1705754-008	31-May-2017 00:00	TBW 546	✓				

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

MICHELLE OROURKE

- *AU Certificate of Analysis - NATA (COA)	Email	michelle.orourke@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	michelle.orourke@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	michelle.orourke@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	michelle.orourke@aecom.com
- A4 - AU Tax Invoice (INV)	Email	michelle.orourke@aecom.com
- Chain of Custody (CoC) (COC)	Email	michelle.orourke@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	michelle.orourke@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	michelle.orourke@aecom.com
- EDI Format - XTab (XTAB)	Email	michelle.orourke@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1706873**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: chris.mcgraghan@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: TIM WILLIAMSON		

Dates

Date Samples Received	: 28-Jun-2017 14:40	Issue Date	: 28-Jun-2017
Client Requested Due Date	: 05-Jul-2017	Scheduled Reporting Date	: **05-Jul-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not intact.
No. of coolers/boxes	: 2	Temperature	: 2.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **Chlorophyll analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - EP008 Chlorophyll a	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1706873-001	28-Jun-2017 00:00	T3B_	✓			✓	✓	
EP1706873-002	28-Jun-2017 00:00	T3C_	✓			✓	✓	
EP1706873-003	28-Jun-2017 00:00	BH10_	✓			✓	✓	
EP1706873-004	28-Jun-2017 00:00	BLNS-B1_	✓	✓	✓	✓	✓	
EP1706873-005	28-Jun-2017 00:00	A2_	✓	✓	✓	✓	✓	
EP1706873-006	28-Jun-2017 00:00	A2S_	✓	✓	✓	✓	✓	
EP1706873-007	28-Jun-2017 00:00	WQA02_280617	✓	✓	✓	✓	✓	
EP1706873-008	28-Jun-2017 00:00	DB TBW 575						✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CHRIS MCGRAGHAN

- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1706851**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: chris.mcgraghan@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 27-Jun-2017 16:30	Issue Date	: 28-Jun-2017
Client Requested Due Date	: 04-Jul-2017	Scheduled Reporting Date	: **03-Jul-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 8.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1706851-001	27-Jun-2017 00:00	GW-D3_	✓		✓	✓	
EP1706851-002	27-Jun-2017 00:00	GW-D4_	✓		✓	✓	
EP1706851-003	27-Jun-2017 00:00	GW-D5_	✓		✓	✓	
EP1706851-004	27-Jun-2017 00:00	GW-D7_	✓		✓	✓	
EP1706851-005	27-Jun-2017 00:00	GW-D8_	✓		✓	✓	
EP1706851-006	27-Jun-2017 00:00	T2F_	✓		✓	✓	
EP1706851-007	27-Jun-2017 00:00	T4B_	✓		✓	✓	
EP1706851-008	27-Jun-2017 00:00	T4C_	✓		✓	✓	
EP1706851-009	27-Jun-2017 00:00	GW-T3E-A	✓		✓	✓	
EP1706851-010	27-Jun-2017 00:00	WQA01_270617	✓		✓	✓	
EP1706851-011	27-Jun-2017 00:00	WQA03_270617		✓		✓	
EP1706851-012	27-Jun-2017 00:00	WQA04_DB TBW 576					✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CHRIS MCGRAGHAN

- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- A4 - AU Tax Invoice (INV)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1707992**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: michelle.orourke@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 26-Jul-2017 16:50	Issue Date	: 26-Jul-2017
Client Requested Due Date	: 01-Aug-2017	Scheduled Reporting Date	: **01-Aug-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 18.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1707992-001	26-Jul-2017 00:00	GW-D3_260717	✓		✓	✓	
EP1707992-002	26-Jul-2017 00:00	GW-D4_260717	✓		✓	✓	
EP1707992-003	26-Jul-2017 00:00	GW-D7_260717	✓		✓	✓	
EP1707992-004	26-Jul-2017 00:00	GW-D8_260717	✓		✓	✓	
EP1707992-005	26-Jul-2017 00:00	T3B_260717	✓		✓	✓	
EP1707992-006	26-Jul-2017 00:00	T3C_260717	✓		✓	✓	
EP1707992-007	26-Jul-2017 00:00	T4B_260717	✓		✓	✓	
EP1707992-008	26-Jul-2017 00:00	BH10_260717	✓		✓	✓	
EP1707992-009	26-Jul-2017 00:00	WQA01_260717	✓		✓	✓	
EP1707992-010	26-Jul-2017 00:00	WQA03_260717		✓		✓	
EP1707992-011	26-Jul-2017 00:00	WQA04_LR TBW701					✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

MICHELLE OROURKE

- *AU Certificate of Analysis - NATA (COA)	Email	michelle.orourke@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	michelle.orourke@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	michelle.orourke@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	michelle.orourke@aecom.com
- A4 - AU Tax Invoice (INV)	Email	michelle.orourke@aecom.com
- Chain of Custody (CoC) (COC)	Email	michelle.orourke@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	michelle.orourke@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	michelle.orourke@aecom.com
- EDI Format - XTab (XTAB)	Email	michelle.orourke@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1708050**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: michelle.orourke@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: TIM WILLIAMSON		

Dates

Date Samples Received	: 27-Jul-2017 17:30	Issue Date	: 28-Jul-2017
Client Requested Due Date	: 07-Aug-2017	Scheduled Reporting Date	: **07-Aug-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 2.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 15 / 15

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - EP008 Chlorophyll a	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1708050-001	27-Jul-2017 00:00	GW-D5_	✓			✓	✓	
EP1708050-002	27-Jul-2017 00:00	T2F_	✓			✓	✓	
EP1708050-003	27-Jul-2017 00:00	T3C_	✓			✓	✓	
EP1708050-004	27-Jul-2017 00:00	BH12_	✓			✓	✓	
EP1708050-005	27-Jul-2017 00:00	GW-T3E-A	✓			✓	✓	
EP1708050-006	27-Jul-2017 00:00	BLNS-B1	✓	✓	✓	✓	✓	
EP1708050-007	27-Jul-2017 00:00	A2_	✓	✓	✓	✓	✓	
EP1708050-008	27-Jul-2017 00:00	A2S_	✓	✓	✓	✓	✓	
EP1708050-009	27-Jul-2017 00:00	NLWS-N2_	✓	✓	✓	✓	✓	
EP1708050-010	27-Jul-2017 00:00	A1_	✓	✓	✓	✓	✓	
EP1708050-011	27-Jul-2017 00:00	FS2_	✓	✓	✓	✓	✓	
EP1708050-012	27-Jul-2017 00:00	RD1_	✓	✓	✓	✓	✓	
EP1708050-013	27-Jul-2017 00:00	S1_	✓	✓	✓	✓	✓	
EP1708050-014	27-Jul-2017 00:00	WQA02_270717	✓	✓	✓	✓	✓	
EP1708050-015	27-Jul-2017 00:00	WQA05_LRTBW700						✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

MICHELLE OROURKE

- *AU Certificate of Analysis - NATA (COA)	Email	michelle.orourke@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	michelle.orourke@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	michelle.orourke@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	michelle.orourke@aecom.com
- A4 - AU Tax Invoice (INV)	Email	michelle.orourke@aecom.com
- Chain of Custody (CoC) (COC)	Email	michelle.orourke@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	michelle.orourke@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	michelle.orourke@aecom.com
- EDI Format - XTab (XTAB)	Email	michelle.orourke@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1709130**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: chris.mcgraghan@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 23-Aug-2017 18:00	Issue Date	: 24-Aug-2017
Client Requested Due Date	: 31-Aug-2017	Scheduled Reporting Date	: **31-Aug-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 17.3 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - EP008 Chlorophyll a	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1709130-001	23-Aug-2017 00:00	BLNS-B1_230817	✓	✓	✓	✓	✓	
EP1709130-002	23-Aug-2017 00:00	A2_230817	✓	✓	✓	✓	✓	
EP1709130-003	23-Aug-2017 00:00	A2S_230817	✓	✓	✓	✓	✓	
EP1709130-004	23-Aug-2017 00:00	NLWS-N2_230817	✓	✓	✓	✓	✓	
EP1709130-005	23-Aug-2017 00:00	A1_230817	✓	✓	✓	✓	✓	
EP1709130-006	23-Aug-2017 00:00	A1N_230817	✓	✓	✓	✓	✓	
EP1709130-007	23-Aug-2017 00:00	FS2_230817	✓	✓	✓	✓	✓	
EP1709130-008	23-Aug-2017 00:00	FS4A_230817	✓	✓	✓	✓	✓	
EP1709130-009	23-Aug-2017 00:00	RD1_230817	✓	✓	✓	✓	✓	
EP1709130-010	23-Aug-2017 00:00	RD1A_230817	✓	✓	✓	✓	✓	
EP1709130-011	23-Aug-2017 00:00	S1_230817	✓	✓	✓	✓	✓	
EP1709130-012	23-Aug-2017 00:00	A3_230817	✓	✓	✓	✓	✓	
EP1709130-013	23-Aug-2017 00:00	WQA02_230817	✓	✓	✓	✓	✓	
EP1709130-014	23-Aug-2017 00:00	DBTBW780_230817						✓
EP1709130-015	23-Aug-2017 00:00	AIE_230817	✓	✓	✓	✓	✓	
EP1709130-016	23-Aug-2017 00:00	D1_230817	✓			✓	✓	
EP1709130-017	23-Aug-2017 00:00	D2_230817	✓			✓	✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CHRIS MCGRAGHAN

- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- A4 - AU Tax Invoice (INV)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1709182**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: chris.mcgraghan@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60475410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 24-Aug-2017 18:00	Issue Date	: 24-Aug-2017
Client Requested Due Date	: 31-Aug-2017	Scheduled Reporting Date	: **31-Aug-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- **Volatile Organic Compound analysis may be compromised as sample containers contained headspace.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP1709182-013 : [24-Aug-2017] : WQA06_DBTBW779 - TBW 779

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EG020F Dissolved Metals by ICPMS	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1709182-001	24-Aug-2017 00:00	GW-D3_	✓	✓	✓	
EP1709182-002	24-Aug-2017 00:00	GW-D5_	✓	✓	✓	
EP1709182-003	24-Aug-2017 00:00	GW-D7_	✓	✓	✓	
EP1709182-004	24-Aug-2017 00:00	GW-D8_	✓	✓	✓	
EP1709182-005	24-Aug-2017 00:00	T2F_	✓	✓	✓	
EP1709182-006	24-Aug-2017 00:00	T3B_	✓	✓	✓	
EP1709182-007	24-Aug-2017 00:00	T3C_	✓	✓	✓	
EP1709182-008	24-Aug-2017 00:00	T4B_	✓	✓	✓	
EP1709182-009	24-Aug-2017 00:00	BH10_	✓	✓	✓	
EP1709182-010	24-Aug-2017 00:00	BH12_	✓	✓	✓	
EP1709182-011	24-Aug-2017 00:00	GW-T3E-A	✓	✓	✓	
EP1709182-012	24-Aug-2017 00:00	WQA01_240817	✓	✓	✓	
EP1709182-013	24-Aug-2017 00:00	WQA06_DBTBW779 TBW				✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CHRIS MCGRAGHAN

- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- A4 - AU Tax Invoice (INV)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1709224**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: chris.mcgraghan@aecom.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60478410	Page	: 1 of 2
Order number	: 60478410-2.06	Quote number	: EP2016AECOMAU0013 (EP/1136/16 V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 25-Aug-2017 12:15	Issue Date	: 25-Aug-2017
Client Requested Due Date	: 31-Aug-2017	Scheduled Reporting Date	: **31-Aug-2017**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 21.3 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG020T Total Recoverable Metals by ICPMS (including	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN
EP1709224-001	25-Aug-2017 00:00	GW-D4_	✓		✓	✓
EP1709224-002	25-Aug-2017 00:00	T4C_	✓		✓	✓
EP1709224-003	25-Aug-2017 00:00	WQA03_		✓		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CHRIS MCGRAGHAN

- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- A4 - AU Tax Invoice (INV)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1712990**

Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: timothy.williamson@mrialliance.com .au	E-mail	: Brandon.Ovens@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: MRIA - R8 Rehab	Page	: 1 of 3
Order number	: W81020-103	Quote number	: EP2017MRIAJV0001 (EP/840/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Rachel Champion		

Dates

Date Samples Received	: 17-Nov-2017 17:02	Issue Date	: 17-Nov-2017
Client Requested Due Date	: 24-Nov-2017	Scheduled Reporting Date	: **24-Nov-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 9.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **ORC METALS analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818.**
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EP008 Chlorophyll a	WATER - MRIA 3.03 Dissolved Metals Suite	WATER - MRIA 4.03 Total Metals Suite	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1712990-001	17-Nov-2017 00:00	D1		✓		✓	✓	
EP1712990-002	17-Nov-2017 00:00	D2		✓		✓	✓	
EP1712990-003	17-Nov-2017 00:00	T2F		✓		✓	✓	
EP1712990-004	17-Nov-2017 00:00	GW-T3E-A		✓		✓	✓	
EP1712990-005	17-Nov-2017 00:00	GW-D3		✓		✓	✓	
EP1712990-006	17-Nov-2017 00:00	GW-D4		✓		✓	✓	
EP1712990-007	17-Nov-2017 00:00	GW-D5		✓		✓	✓	
EP1712990-008	17-Nov-2017 00:00	T3B		✓		✓	✓	
EP1712990-009	17-Nov-2017 00:00	T4B		✓		✓	✓	
EP1712990-010	17-Nov-2017 00:00	WQA02_151117	✓	✓	✓	✓	✓	
EP1712990-011	17-Nov-2017 00:00	BLNS-B1	✓	✓	✓	✓	✓	
EP1712990-012	17-Nov-2017 00:00	A2	✓	✓	✓	✓	✓	
EP1712990-013	17-Nov-2017 00:00	A2S	✓	✓	✓	✓	✓	
EP1712990-014	17-Nov-2017 00:00	WQA05_DB TBW 1132						✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Brandon Ovens		
- A4 - AU Tax Invoice (INV)	Email	brandon.ovens@alsglobal.com
- Chain of Custody (CoC) (COC)	Email	brandon.ovens@alsglobal.com
Lauren Biagioni		
- A4 - AU Tax Invoice (INV)	Email	lauren.biagioni@alsglobal.com
Rachel Champion		
- *AU Certificate of Analysis - NATA (COA)	Email	rachel.champion@mrialliance.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	rachel.champion@mrialliance.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	rachel.champion@mrialliance.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	rachel.champion@mrialliance.com.au
- Chain of Custody (CoC) (COC)	Email	rachel.champion@mrialliance.com.au
- EDI Format - ESDAT (ESDAT)	Email	rachel.champion@mrialliance.com.au
- EDI Format - XTab (XTAB)	Email	rachel.champion@mrialliance.com.au
Tim Williamson		
- *AU Certificate of Analysis - NATA (COA)	Email	timothy.williamson@mrialliance.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	timothy.williamson@mrialliance.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	timothy.williamson@mrialliance.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	timothy.williamson@mrialliance.com.au
- Chain of Custody (CoC) (COC)	Email	timothy.williamson@mrialliance.com.au
- EDI Format - ESDAT (ESDAT)	Email	timothy.williamson@mrialliance.com.au
- EDI Format - XTab (XTAB)	Email	timothy.williamson@mrialliance.com.au

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1713111**

Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: timothy.williamson@mrialliance.com .au	E-mail	: Brandon.Ovens@alsglobal.com
Telephone	: ----	Telephone	: 08 9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: MRIA - R8 Rehab	Page	: 1 of 3
Order number	: W81020-103	Quote number	: EP2017MRIAJV0001 (EP/840/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Rachel Champion		

Dates

Date Samples Received	: 21-Nov-2017 16:45	Issue Date	: 21-Nov-2017
Client Requested Due Date	: 28-Nov-2017	Scheduled Reporting Date	: **28-Nov-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 8.1 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **ORC METALS analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818.**
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - MRIA 3.03 Dissolved Metals Suite	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1713111-001	20-Nov-2017 00:00	BH10	✓	✓	✓	
EP1713111-002	20-Nov-2017 00:00	T3C	✓	✓	✓	
EP1713111-003	20-Nov-2017 00:00	GW-D7	✓	✓	✓	
EP1713111-004	20-Nov-2017 00:00	GW-D8	✓	✓	✓	
EP1713111-005	21-Nov-2017 00:00	T4C	✓	✓	✓	
EP1713111-006	21-Nov-2017 00:00	BH12	✓	✓	✓	
EP1713111-007	20-Nov-2017 00:00	WQA01_201117	✓	✓	✓	
EP1713111-008	20-Nov-2017 00:00	WQA06_DB TBW 1133				✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Brandon Ovens

- A4 - AU Tax Invoice (INV)	Email	brandon.ovens@alsglobal.com
- Chain of Custody (CoC) (COC)	Email	brandon.ovens@alsglobal.com

Lauren Biagioni

- A4 - AU Tax Invoice (INV)	Email	lauren.biagioni@alsglobal.com

Rachel Champion

- *AU Certificate of Analysis - NATA (COA)	Email	rachel.champion@mrialliance.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	rachel.champion@mrialliance.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	rachel.champion@mrialliance.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	rachel.champion@mrialliance.com.au
- Chain of Custody (CoC) (COC)	Email	rachel.champion@mrialliance.com.au
- EDI Format - ESDAT (ESDAT)	Email	rachel.champion@mrialliance.com.au
- EDI Format - XTab (XTAB)	Email	rachel.champion@mrialliance.com.au

Tim Williamson

- *AU Certificate of Analysis - NATA (COA)	Email	timothy.williamson@mrialliance.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	timothy.williamson@mrialliance.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	timothy.williamson@mrialliance.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	timothy.williamson@mrialliance.com.au
- Chain of Custody (CoC) (COC)	Email	timothy.williamson@mrialliance.com.au
- EDI Format - ESDAT (ESDAT)	Email	timothy.williamson@mrialliance.com.au
- EDI Format - XTab (XTAB)	Email	timothy.williamson@mrialliance.com.au

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1806776**
Amendment : **1**

Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: chris.mcgraghan@aecom.com	E-mail	: Brandon.Ovens@alsglobal.com
Telephone	: ----	Telephone	: 08 9406 1328
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 60478410	Page	: 1 of 2
Order number	: W81020-103	Quote number	: EP2017MRIAJV0001 (EP/840/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 01-Jun-2018 17:10	Issue Date	: 12-Jun-2018
Client Requested Due Date	: 11-Jun-2018	Scheduled Reporting Date	: **11-Jun-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: -1.1 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
TRH Volatiles/BTEX : EP080		
WQA03_01_06_18	- Amber Glass Bottle - Unpreserved	- Amber VOC Vial - Sulfuric Acid

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN
EP1806776-001	01-Jun-2018 09:00	GW-D3_01_06_18	✓		✓	✓
EP1806776-002	01-Jun-2018 09:50	GW-D4_01_06_18	✓		✓	✓
EP1806776-003	01-Jun-2018 00:00	GW-D5_01_06_18	✓		✓	✓
EP1806776-004	01-Jun-2018 10:45	GW-D8_01_06_18	✓		✓	✓
EP1806776-005	01-Jun-2018 12:50	T3B_01_06_18	✓		✓	✓
EP1806776-006	01-Jun-2018 13:45	T3C_01_06_18	✓		✓	✓
EP1806776-007	01-Jun-2018 13:16	BH10_01_06_18	✓		✓	✓
EP1806776-008	01-Jun-2018 08:04	BH12_01_06_18	✓		✓	✓
EP1806776-009	01-Jun-2018 14:41	GW-T3E-A_01_06_18	✓		✓	✓
EP1806776-010	01-Jun-2018 00:00	WQA01_01_06_18	✓		✓	✓
EP1806776-011	01-Jun-2018 00:00	WQA03_01_06_18		✓		✓
EP1806776-012	01-Jun-2018 11:49	D1_01_06_18	✓		✓	✓
EP1806776-013	01-Jun-2018 11:20	D2_01_06_18	✓		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Brandon Ovens
- A4 - AU Tax Invoice (INV) — Email — brandon.ovens@alsglobal.com
- Chain of Custody (CoC) (COC) — Email — brandon.ovens@alsglobal.com

Chris McGraghan
- *AU Certificate of Analysis - NATA (COA) — Email — chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC) — Email — chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT) — Email — chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB) — Email — chris.mcgraghan@aecom.com

Klinton Breese
- A4 - AU Tax Invoice (INV) — Email — Klinton.Breese@mrialliance.com.au

Lauren Biagioni
- A4 - AU Tax Invoice (INV) — Email — lauren.biagioni@alsglobal.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP1806725**
Amendment : **1**

Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: chris.mcgraghan@aecom.com	E-mail	: Brandon.Ovens@alsglobal.com
Telephone	: ----	Telephone	: 08 9406 1328
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 60478410	Page	: 1 of 2
Order number	: W81020-103	Quote number	: EP2017MRIAJV0001 (EP/840/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Tim Williamson		

Dates

Date Samples Received	: 31-May-2018 17:20	Issue Date	: 13-Jun-2018
Client Requested Due Date	: 11-Jun-2018	Scheduled Reporting Date	: **11-Jun-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 10.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICP/MS	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-04 TRH/BTEXN
EP1806725-001	31-May-2018 09:28	T4B_31_05_18	✓	✓	✓
EP1806725-002	31-May-2018 10:07	T4C_31_05_18	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Brandon Ovens		
- A4 - AU Tax Invoice (INV)	Email	brandon.ovens@alsglobal.com
- Chain of Custody (CoC) (COC)	Email	brandon.ovens@alsglobal.com
Chris McGraghan		
- *AU Certificate of Analysis - NATA (COA)	Email	chris.mcgraghan@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chris.mcgraghan@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chris.mcgraghan@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chris.mcgraghan@aecom.com
- Chain of Custody (CoC) (COC)	Email	chris.mcgraghan@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	chris.mcgraghan@aecom.com
- EDI Format - XTab (XTAB)	Email	chris.mcgraghan@aecom.com
Klinton Breese		
- A4 - AU Tax Invoice (INV)	Email	Klinton.Breese@mrialliance.com.au
Lauren Biagioni		
- A4 - AU Tax Invoice (INV)	Email	lauren.biagioni@alsglobal.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1706873**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 28-Jun-2017 14:40
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jun-2017
C-O-C number	: ----	Issue Date	: 05-Jul-2017 17:23
Sampler	: TIM WILLIAMSON		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Chlorophyll analysis conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_	T3C_	BH10_	BLNS-B1_	A2_
				Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706873-001	EP1706873-002	EP1706873-003	EP1706873-004	EP1706873-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.03**	<0.01	**0.10**	**0.02**	**0.03**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.005**	**0.019**	**0.006**	**0.013**	**0.008**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.002**	**0.003**	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.57**	**1.58**	**0.64**	**0.14**	**0.16**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	**0.04**	**0.10**
Arsenic	7440-38-2	0.001	mg/L		----	----	----	**0.002**	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	**0.003**
Copper	7440-50-8	0.001	mg/L		----	----	----	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		----	----	----	<0.001	**0.001**
Manganese	7439-96-5	0.001	mg/L		----	----	----	**0.024**	**0.076**
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	**0.002**
Selenium	7782-49-2	0.01	mg/L		----	----	----	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		----	----	----	**0.28**	**0.61**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.06**	**0.04**	**0.02**	**0.01**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.01**	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	<0.01	**0.27**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.01**	**0.27**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.2**	**0.7**	**2.9**	**4.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_	T3C_	BH10_	BLNS-B1_	A2_
				Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706873-001	EP1706873-002	EP1706873-003	EP1706873-004	EP1706873-005
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	**0.2**	**1.0**	**2.9**	**4.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.01**	**0.04**	**0.07**	**0.29**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.01**	<0.01	**0.02**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**----**	**----**	**----**	**4**	**5**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**83.8**	**82.9**	**90.7**	**79.4**	**70.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_	T3C_	BH10_	BLNS-B1_	A2_
				Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706873-001	EP1706873-002	EP1706873-003	EP1706873-004	EP1706873-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**105**	**103**	**99.7**	**118**	**103**
4-Bromofluorobenzene	460-00-4	2	%		**122**	**122**	**109**	**120**	**118**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	A2S_	WQA02_280617	DB TBW 575	----	----
			Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EP1706873-006	EP1706873-007	EP1706873-008	--------	--------
				Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.002**	**0.002**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.012**	**0.013**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.14**	**0.14**	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.05**	**0.05**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.002**	**0.002**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.026**	**0.024**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.28**	**0.32**	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.02**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**2.6**	**2.5**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2S_	WQA02_280617	DB TBW 575	----	----
				Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1706873-006	EP1706873-007	EP1706873-008	--------	--------
					Result	Result	Result	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**2.6**	**2.5**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	**0.12**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**3**	**2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**84.0**	**76.0**	**90.3**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2S_	WQA02_280617	DB TBW 575	----	----
				Client sampling date / time	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1706873-006	EP1706873-007	EP1706873-008	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**104**	**105**	**88.0**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**123**	**103**	**116**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1706851**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jun-2017 16:30
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jun-2017
C-O-C number	: ----	Issue Date	: 03-Jul-2017 16:43
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_	GW-D4_	GW-D5_	GW-D7_	GW-D8_
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706851-001	EP1706851-002	EP1706851-003	EP1706851-004	EP1706851-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.06**	**0.38**	**0.01**	**0.17**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	**0.009**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.001**	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	<0.001	**0.002**	**0.109**	**0.009**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	**0.001**	**0.002**	**0.044**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	**0.021**
Iron	7439-89-6	0.05	mg/L		**0.76**	<0.05	**0.94**	**4.42**	**0.30**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	<0.01	**0.16**	**0.35**	**0.22**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.11**	**3.00**	**0.01**	**0.02**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.11**	**3.00**	**0.01**	**0.02**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.6**	**0.6**	**2.5**	**0.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	**3.6**	**0.6**	**2.5**	**0.8**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.06**	**0.03**	**0.49**	**0.14**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	**0.42**	**0.12**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_	GW-D4_	GW-D5_	GW-D7_	GW-D8_
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706851-001	EP1706851-002	EP1706851-003	EP1706851-004	EP1706851-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**94.6**	**92.0**	**88.4**	**89.3**	**91.9**
Toluene-D8	2037-26-5	2	%		**102**	**101**	**87.9**	**89.4**	**91.9**
4-Bromofluorobenzene	460-00-4	2	%		**98.8**	**98.4**	**91.4**	**91.7**	**94.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2F_	T4B_	T4C_	GW-T3E-A	WQA01_270617
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706851-006	EP1706851-007	EP1706851-008	EP1706851-009	EP1706851-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.23**	**0.02**	**0.36**	**0.17**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.058**	**0.006**	**0.007**	**0.008**	**0.009**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	**0.002**	<0.001	**0.043**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	**0.022**
Iron	7439-89-6	0.05	mg/L		**1.77**	**0.12**	**4.34**	**0.41**	**0.31**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.38**	**0.89**	**0.17**	**0.42**	**0.22**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.6**	**1.2**	**0.3**	**1.5**	**0.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**1.2**	**0.3**	**1.5**	**0.8**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.28**	**0.02**	**0.16**	**0.15**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	**0.26**	<0.01	**0.05**	**0.13**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2F_	T4B_	T4C_	GW-T3E-A	WQA01_270617
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706851-006	EP1706851-007	EP1706851-008	EP1706851-009	EP1706851-010
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**93.2**	**93.4**	**93.0**	**91.4**	**89.9**
Toluene-D8	2037-26-5	2	%		**93.5**	**95.5**	**93.1**	**91.4**	**89.2**
4-Bromofluorobenzene	460-00-4	2	%		**96.8**	**98.6**	**96.2**	**93.7**	**93.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA03_270617	WQA04_DB TBW 576	----	----	----
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1706851-011	EP1706851-012	--------	--------	--------
					Result	Result	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA03_270617	WQA04_DB TBW 576	----	----	----
				Client sampling date / time	27-Jun-2017 00:00	27-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1706851-011	EP1706851-012	--------	--------	--------
					Result	Result	----	----	----
EP080: BTEXN - Continued									
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**84.9**	**86.3**	----	----	----
Toluene-D8	2037-26-5	2	%		**87.2**	**88.2**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**87.2**	**89.3**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1708050**	Page	: 1 of 11
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jul-2017 17:30
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jul-2017
C-O-C number	: ----	Issue Date	: 07-Aug-2017 17:09
Sampler	: TIM WILLIAMSON		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 15		
No. of samples analysed	: 15		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- EK061G/EK067G (TKN/TP): LOR raised for sample 'BH12_270717' due to possible sample matrix interference.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5_270717	T2F_270717	T3C_270717	BH12_270717	GW-T3E-A_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-001	EP1708050-002	EP1708050-003	EP1708050-004	EP1708050-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.82**	**0.03**	**0.02**	<0.01	**0.29**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.003**	<0.001	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L		**0.003**	<0.001	**0.003**	**0.002**	**0.003**
Lead	7439-92-1	0.001	mg/L		**0.002**	<0.001	**0.001**	<0.001	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.065**	**0.008**	**0.005**	**0.006**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	**0.002**	**0.008**	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.031**	<0.005	**0.024**	**0.042**	**0.029**
Iron	7439-89-6	0.05	mg/L		**2.07**	**1.84**	**3.84**	<0.05	**0.36**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.11**	**0.46**	**0.20**	**0.02**	**0.32**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**4.99**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**4.99**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.9**	**0.7**	**0.3**	**0.8**	**0.7**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.9**	**0.7**	**0.3**	**5.8**	**0.7**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.01**	<0.01	<0.02	**0.08**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	**0.01**	<0.01	<0.01	**0.07**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5_270717	T2F_270717	T3C_270717	BH12_270717	GW-T3E-A_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-001	EP1708050-002	EP1708050-003	EP1708050-004	EP1708050-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**87.2**	**90.1**	**91.4**	**90.0**	**92.2**
Toluene-D8	2037-26-5	2	%		**100**	**99.6**	**99.8**	**99.8**	**96.9**
4-Bromofluorobenzene	460-00-4	2	%		**92.5**	**92.1**	**92.4**	**90.4**	**91.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_270717	A2_270717	A2S_270717	NLWS-N2_270717	A1_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-006	EP1708050-007	EP1708050-008	EP1708050-009	EP1708050-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.03**	**0.04**	**0.03**	**1.40**	**1.18**
Arsenic	7440-38-2	0.001	mg/L		**0.001**	**0.002**	**0.001**	**0.001**	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	**0.0002**	**0.0002**
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	**0.004**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.012**	**0.010**
Manganese	7439-96-5	0.001	mg/L		**0.021**	**0.012**	**0.020**	**0.818**	**0.801**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.008**	**0.007**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	**0.073**	**0.080**
Iron	7439-89-6	0.05	mg/L		**0.24**	**0.24**	**0.24**	**9.97**	**8.73**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.08**	**0.14**	**0.07**	**1.37**	**1.19**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.001**	**0.002**	**0.001**	**0.004**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	**0.0002**	**0.0002**
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.003**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	**0.004**	**0.006**
Lead	7439-92-1	0.001	mg/L		<0.001	**0.001**	<0.001	**0.012**	**0.015**
Manganese	7439-96-5	0.001	mg/L		**0.023**	**0.033**	**0.022**	**0.736**	**0.738**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.009**	**0.008**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	**0.071**	**0.074**
Iron	7439-89-6	0.05	mg/L		**0.45**	**0.68**	**0.39**	**11.0**	**15.7**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.33**	**0.37**	**0.36**	**0.08**	**0.10**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.03**	**0.03**	**0.03**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.05**	**0.06**	**0.05**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.08**	**0.09**	**0.08**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.1**	**2.5**	**2.3**	**1.6**	**3.0**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_270717	A2_270717	A2S_270717	NLWS-N2_270717	A1_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-006	EP1708050-007	EP1708050-008	EP1708050-009	EP1708050-010
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		2.2	2.6	2.4	1.6	3.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.09	0.17	0.09	0.04	0.32
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.04	0.04	0.04	<0.01	0.02
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		6	10	4	11	44
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		98.6	92.5	95.7	94.7	90.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_270717	A2_270717	A2S_270717	NLWS-N2_270717	A1_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-006	EP1708050-007	EP1708050-008	EP1708050-009	EP1708050-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**98.0**	**101**	**101**	**102**	**103**
4-Bromofluorobenzene	460-00-4	2	%		**88.4**	**88.1**	**88.0**	**88.0**	**85.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	FS2_270717	RD1_270717	S1_270717	WQA02_270717	WQA05_LRTBW700_270717
			Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EP1708050-011	EP1708050-012	EP1708050-013	EP1708050-014	EP1708050-015
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.49**	**0.24**	**0.22**	**0.04**	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	**0.002**	**0.001**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.001**	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.014**	**0.018**	**0.026**	**0.021**	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	**0.011**	**0.009**	**0.005**	**0.009**	----
Iron	7439-89-6	0.05	mg/L	**1.00**	**0.73**	**0.40**	**0.24**	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.53**	**2.96**	**0.21**	**0.08**	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.002**	**0.002**	**0.001**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.010**	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	**0.001**	**0.046**	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	**0.002**	**0.055**	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.013**	**0.045**	**0.023**	**0.023**	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.005**	**0.001**	<0.001	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	**0.012**	**0.314**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L	**1.13**	**4.07**	**0.39**	**0.45**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.12**	**0.21**	**0.07**	**0.35**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	**0.01**	<0.01	**0.03**	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.03**	<0.01	**0.05**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.04**	<0.01	**0.08**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.8**	**3.6**	**1.7**	**2.3**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FS2_270717	RD1_270717	S1_270717	WQA02_270717	WQA05_LRTBW700_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-011	EP1708050-012	EP1708050-013	EP1708050-014	EP1708050-015
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		1.8	3.6	1.7	2.4	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	0.94	0.13	0.09	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.69	0.07	0.04	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		2	6	1	5	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	140	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	240	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	380	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	300	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	160	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	460	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	5	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	5	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		93.9	93.2	93.0	92.6	97.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FS2_270717	RD1_270717	S1_270717	WQA02_270717	WQA05_LRTBW700_270717
				Client sampling date / time	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1708050-011	EP1708050-012	EP1708050-013	EP1708050-014	EP1708050-015
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**101**	**100**	**102**	**102**	**99.8**
4-Bromofluorobenzene	460-00-4	2	%		**86.7**	**87.3**	**86.3**	**87.4**	**86.9**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1709130**	Page	: 1 of 14
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 23-Aug-2017 18:00
Order number	: 60478410-2.06	Date Analysis Commenced	: 24-Aug-2017
C-O-C number	: ----	Issue Date	: 30-Aug-2017 21:24
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 17		
No. of samples analysed	: 17		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It is recognised that some total metals (EG020T) are less than dissolved metals (ED020F) for various samples. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_230817	A2_230817	A2S_230817	NLWS-N2_230817	A1_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-001	EP1709130-002	EP1709130-003	EP1709130-004	EP1709130-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.04**	**0.06**	**0.04**	**0.04**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.001**	**0.002**	**0.004**	**0.003**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.033**	**0.028**	**0.031**	**1.09**	**1.16**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.008**	**0.005**	<0.005
Iron	7439-89-6	0.05	mg/L		**0.27**	**0.26**	**0.31**	**11.1**	**15.0**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.06**	**0.06**	**0.10**	**0.08**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.004**	**0.005**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	**0.001**	<0.001	**0.002**	**0.001**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.032**	**0.030**	**0.032**	**1.12**	**1.14**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.005**	<0.005	**0.014**	**0.010**
Iron	7439-89-6	0.05	mg/L		**0.48**	**0.44**	**0.55**	**18.6**	**19.4**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.70**	**0.61**	**0.67**	**0.10**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.09**	**0.10**	**0.09**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.23**	**0.23**	**0.21**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.32**	**0.33**	**0.30**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.1**	**2.0**	**2.1**	**6.4**	**3.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_230817	A2_230817	A2S_230817	NLWS-N2_230817	A1_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-001	EP1709130-002	EP1709130-003	EP1709130-004	EP1709130-005
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**2.4**	**2.3**	**2.4**	**6.4**	**3.8**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.19**	**0.18**	**0.20**	**2.03**	**1.12**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.12**	**0.12**	**0.12**	**1.10**	**0.41**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**2**	**3**	**3**	**19**	**95**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	**100**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**170**	**470**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	**370**	**660**
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	**540**	**1230**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	**120**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**460**	**970**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	**160**	**260**
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	**620**	**1350**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	**120**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.7**	**99.1**	**102**	**100**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_230817	A2_230817	A2S_230817	NLWS-N2_230817	A1_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-001	EP1709130-002	EP1709130-003	EP1709130-004	EP1709130-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**105**	**107**	**104**	**107**	**107**
4-Bromofluorobenzene	460-00-4	2	%		**99.4**	**99.3**	**96.3**	**96.8**	**96.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1N_230817	FS2_230817	FS4A_230817	RD1_230817	RD1A_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-006	EP1709130-007	EP1709130-008	EP1709130-009	EP1709130-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.33**	**0.32**	**0.25**	**0.27**
Arsenic	7440-38-2	0.001	mg/L		**0.003**	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.777**	**0.035**	**0.038**	**0.017**	**0.016**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	**0.001**	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	**0.006**	**0.008**
Iron	7439-89-6	0.05	mg/L		**0.69**	**1.07**	**1.01**	**0.62**	**0.63**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.09**	**0.40**	**0.37**	**0.92**	**0.31**
Arsenic	7440-38-2	0.001	mg/L		**0.004**	<0.001	<0.001	**0.002**	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.004**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	**0.001**	<0.001	**0.014**	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.013**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.777**	**0.034**	**0.050**	**0.024**	**0.015**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	**0.001**	**0.002**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.007**	**0.008**	**0.098**	**0.009**
Iron	7439-89-6	0.05	mg/L		**3.37**	**1.67**	**1.56**	**1.60**	**0.86**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	<0.01	<0.01	**0.08**	**0.07**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**0.10**	**0.06**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**0.10**	**0.06**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.9**	**1.4**	**1.5**	**2.2**	**1.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1N_230817	FS2_230817	FS4A_230817	RD1_230817	RD1A_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-006	EP1709130-007	EP1709130-008	EP1709130-009	EP1709130-010
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**2.9**	**1.4**	**1.5**	**2.3**	**1.7**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**1.98**	**0.16**	**0.16**	**0.81**	**0.75**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**1.85**	**0.03**	**0.03**	**0.69**	**0.68**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**10**	<1	**3**	**5**	<1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		**140**	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		**700**	<50	<50	**120**	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		**840**	<50	<50	**120**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		**110**	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		**700**	<100	<100	**150**	<100
>C34 - C40 Fraction	----	100	µg/L		**210**	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		**1020**	<100	<100	**150**	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		**110**	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**102**	**105**	**103**	**101**	**106**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1N_230817	FS2_230817	FS4A_230817	RD1_230817	RD1A_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-006	EP1709130-007	EP1709130-008	EP1709130-009	EP1709130-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**107**	**105**	**104**	**106**	**104**
4-Bromofluorobenzene	460-00-4	2	%		**95.9**	**97.6**	**97.3**	**96.3**	**97.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	S1_230817	A3_230817	WQA02_230817	DBTBW780_230817	AIE_230817
			Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit	EP1709130-011	EP1709130-012	EP1709130-013	EP1709130-014	EP1709130-015
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.14**	**0.26**	**0.04**	----	**0.04**
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.001**	**0.002**	----	**0.002**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	<0.001	----	**0.001**
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.020**	**0.036**	**0.032**	----	**0.554**
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.001**	<0.001	----	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	**0.005**	<0.005	----	<0.005
Iron	7439-89-6	0.05	mg/L	**0.41**	**0.75**	**0.26**	----	**0.23**
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.17**	**0.33**	**0.05**	----	**0.05**
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.001**	**0.002**	----	**0.003**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	**0.001**	**0.002**	<0.001	----	**0.001**
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	**0.001**	<0.001	----	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.022**	**0.038**	**0.034**	----	**0.539**
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.001**	<0.001	----	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01
Zinc	7440-66-6	0.005	mg/L	**0.008**	**0.010**	<0.005	----	<0.005
Iron	7439-89-6	0.05	mg/L	**0.59**	**1.09**	**0.48**	----	**2.67**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	**0.02**	**0.69**	----	<0.01
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	**0.09**	----	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	**0.22**	----	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	**0.31**	----	**0.02**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.2**	**1.5**	**2.0**	----	**2.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	S1_230817	A3_230817	WQA02_230817	DBTBW780_230817	AIE_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-011	EP1709130-012	EP1709130-013	EP1709130-014	EP1709130-015
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**1.2**	**1.5**	**2.3**	**----**	**2.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.22**	**0.12**	**0.18**	**----**	**1.38**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.11**	<0.01	**0.12**	**----**	**1.23**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		<1	<1	**1**	**----**	**9**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	**----**	**140**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	**----**	**420**
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	**----**	**560**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**----**	**420**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	**----**	**140**
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	**----**	**560**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	**----**	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**104**	**102**	**98.8**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	S1_230817	A3_230817	WQA02_230817	DBTBW780_230817	AIE_230817
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00	23-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709130-011	EP1709130-012	EP1709130-013	EP1709130-014	EP1709130-015
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**106**	**106**	**105**	**106**	**106**
4-Bromofluorobenzene	460-00-4	2	%		**97.1**	**95.0**	**98.8**	**97.6**	**93.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_230817	D2_230817	----	----	----
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1709130-016	EP1709130-017	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.26**	**0.27**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.004**	**0.010**	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.001**	**0.003**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.003**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.029**	**0.047**	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.05**	**0.09**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.01**	**0.04**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.46**	**0.19**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.48**	**0.19**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**0.9**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**1.1**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.07**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_230817	D2_230817	----	----	----
				Client sampling date / time	23-Aug-2017 00:00	23-Aug-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1709130-016	EP1709130-017	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**101**	**98.6**	----	----	----
Toluene-D8	2037-26-5	2	%		**104**	**105**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**97.9**	**96.9**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1709182**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 24-Aug-2017 18:00
Order number	: 60475410-2.06	Date Analysis Commenced	: 24-Aug-2017
C-O-C number	: ----	Issue Date	: 30-Aug-2017 17:11
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Sample EP1709182-008 is positive for TRH C6-C9 fraction due to compounds other than BTEXN.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_	GW-D5_	GW-D7_	GW-D8_	T2F_
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709182-001	EP1709182-002	EP1709182-003	EP1709182-004	EP1709182-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.56**	**0.01**	**0.14**	**0.03**
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.001**	**0.005**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	<0.001	**0.002**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.004**	**0.008**	**0.004**	<0.001	**0.005**
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.003**	**0.034**	**0.009**	**0.066**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	**0.002**	**0.024**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.027**	**0.042**	**0.020**	**0.343**	**0.035**
Iron	7439-89-6	0.05	mg/L		**0.27**	**1.18**	**1.57**	**2.82**	**1.87**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.07**	**0.14**	**0.14**	**0.18**	**0.39**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	**0.05**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.36**	<0.01	**4.61**	**0.06**	**0.03**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.36**	<0.01	**4.66**	**0.06**	**0.03**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.7**	**1.7**	**0.7**	**0.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**0.7**	**6.4**	**0.8**	**0.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.08**	**0.04**	**0.28**	**0.08**	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.26**	**0.04**	**0.02**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_	GW-D5_	GW-D7_	GW-D8_	T2F_
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709182-001	EP1709182-002	EP1709182-003	EP1709182-004	EP1709182-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**114**	**107**	**110**	**108**	**112**
Toluene-D8	2037-26-5	2	%		**102**	**83.6**	**101**	**101**	**97.4**
4-Bromofluorobenzene	460-00-4	2	%		**116**	**113**	**118**	**113**	**118**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_	T3C_	T4B_	BH10_	BH12_
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709182-006	EP1709182-007	EP1709182-008	EP1709182-009	EP1709182-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	<0.01	**0.24**	**1.28**	<0.01
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.006**	**0.006**	**0.002**	**0.002**	**0.019**
Lead	7439-92-1	0.001	mg/L		**0.001**	**0.001**	<0.001	<0.001	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.012**	**0.008**	**0.007**	**0.003**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.008**	**0.001**	**0.001**	**0.025**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.029**	**0.029**	**0.024**	<0.005	**0.322**
Iron	7439-89-6	0.05	mg/L		**0.61**	**0.96**	**0.17**	**1.62**	<0.05
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.06**	**0.77**	**0.09**	**0.02**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	<0.01	**0.01**	**0.86**	**5.45**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	<0.01	**0.01**	**0.86**	**5.45**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.1**	**0.1**	**1.4**	**3.2**	**0.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.1**	**0.1**	**1.4**	**4.1**	**6.0**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	**0.02**	**0.29**	**0.14**	**0.06**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.28**	**0.10**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	**30**	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_	T3C_	T4B_	BH10_	BH12_
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EP1709182-006	EP1709182-007	EP1709182-008	EP1709182-009	EP1709182-010
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**117**	**108**	**116**	**112**
Toluene-D8	2037-26-5	2	%		**98.1**	**105**	**101**	**107**	**98.5**
4-Bromofluorobenzene	460-00-4	2	%		**114**	**117**	**115**	**117**	**115**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	WQA01_240817	WQA06_DBTBW779 TBW 779	----	----
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1709182-011	EP1709182-012	EP1709182-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.64**	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.005**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.002**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.033**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.001**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.030**	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.60**	**1.48**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.31**	**0.15**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.06**	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	**4.69**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**4.75**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.7**	**1.8**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.7**	**6.6**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**0.30**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.04**	**0.27**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	WQA01_240817	WQA06_DBTBW779 TBW 779	----	----
				Client sampling date / time	24-Aug-2017 00:00	24-Aug-2017 00:00	24-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1709182-011	EP1709182-012	EP1709182-013	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**121**	**107**	**106**	----	----
Toluene-D8	2037-26-5	2	%		**101**	**84.1**	**103**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**114**	**116**	**115**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1709224**	Page	: 1 of 5
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 25-Aug-2017 12:15
Order number	: 60478410-2.06	Date Analysis Commenced	: 25-Aug-2017
C-O-C number	: ----	Issue Date	: 31-Aug-2017 17:00
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4_	T4C_	WQA03_	----	----
				Client sampling date / time	25-Aug-2017 00:00	25-Aug-2017 00:00	25-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1709224-001	EP1709224-002	EP1709224-003	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.008**	**0.001**	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.001**	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.001**	**0.007**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.001**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.032**	**0.023**	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**3.85**	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		----	----	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	**0.19**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**2.22**	**0.02**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**2.22**	**0.02**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.9**	**0.3**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4_	T4C_	WQA03_	----	----
				Client sampling date / time	25-Aug-2017 00:00	25-Aug-2017 00:00	25-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1709224-001	EP1709224-002	EP1709224-003	--------	--------
					Result	Result	Result	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**3.1**	**0.3**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.08**	<0.01	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	**108**	**108**	----	----
Toluene-D8	2037-26-5	2	%		**100**	**99.7**	**101**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**95.2**	**94.3**	**93.1**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1710701**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 28-Sep-2017 21:30
Order number	: W81020-103	Date Analysis Commenced	: 28-Sep-2017
C-O-C number	: ----	Issue Date	: 04-Oct-2017 15:54
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Analytical Results
- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Brisbane, NATA Site No. 818.
- Ultra Trace metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	D1	D2	BH10	T3B	T3C
			Client sampling date / time	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EP1710701-001	EP1710701-002	EP1710701-003	EP1710701-004	EP1710701-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.09**	**0.29**	**0.95**	**0.02**	**0.08**
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	**0.002**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.002**	**0.001**	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.004**	**0.005**	**0.002**	<0.001	**0.008**
Lead	7439-92-1	0.001	mg/L	**0.002**	**0.004**	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.003**	**0.002**	**0.006**	**0.003**	**0.013**
Nickel	7440-02-0	0.001	mg/L	**0.001**	**0.002**	**0.002**	<0.001	**0.002**
Zinc	7440-66-6	0.005	mg/L	**0.025**	**0.032**	**0.008**	<0.005	**0.026**
Iron	7439-89-6	0.05	mg/L	**0.28**	**0.06**	**2.55**	**0.59**	**1.21**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS								
Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	**0.6**	<0.2	<0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	**0.06**	**0.24**	**0.05**	**0.07**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**0.03**	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.68**	**0.05**	**0.06**	**0.01**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.71**	**0.05**	**0.06**	**0.01**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.9**	**3.3**	**0.1**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.9**	**1.0**	**3.4**	**0.1**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.01**	**0.02**	**0.19**	**0.02**	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	**0.19**	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	BH10	T3B	T3C
				Client sampling date / time	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710701-001	EP1710701-002	EP1710701-003	EP1710701-004	EP1710701-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**102**	**104**	**104**	**107**	**109**
Toluene-D8	2037-26-5	2	%		**103**	**103**	**98.1**	**104**	**104**
4-Bromofluorobenzene	460-00-4	2	%		**108**	**97.9**	**102**	**101**	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4B	T4C	GW-D4	GW-D7	WQA01_260917
				Client sampling date / time	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710701-006	EP1710701-007	EP1710701-008	EP1710701-009	EP1710701-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.21**	**0.03**	**0.04**	**0.01**	**0.01**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.001**
Copper	7440-50-8	0.001	mg/L		**0.001**	**0.004**	**0.029**	**0.009**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	**0.001**	**0.002**	**0.002**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.008**	**0.002**	**0.004**	**0.004**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	**0.001**	**0.002**	**0.001**
Zinc	7440-66-6	0.005	mg/L		**0.009**	**0.011**	**0.032**	**0.031**	<0.005
Iron	7439-89-6	0.05	mg/L		**0.11**	**4.31**	<0.05	<0.05	<0.05
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.4**	<0.2	**1.2**	<0.2	<0.2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.91**	**0.20**	**0.01**	**0.01**	**0.03**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	**0.02**	**0.02**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	**0.02**	**3.14**	**17.8**	**17.5**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**0.02**	**3.14**	**17.8**	**17.5**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.3**	**0.3**	**0.7**	**3.5**	**3.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.3**	**0.3**	**3.8**	**21.3**	**20.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.24**	<0.01	**0.04**	**0.19**	**0.20**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.24**	<0.01	<0.01	**0.19**	**0.19**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4B	T4C	GW-D4	GW-D7	WQA01_260917
				Client sampling date / time	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00	27-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710701-006	EP1710701-007	EP1710701-008	EP1710701-009	EP1710701-010
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**109**	**111**	**113**	**111**
Toluene-D8	2037-26-5	2	%		**104**	**105**	**101**	**101**	**103**
4-Bromofluorobenzene	460-00-4	2	%		**100**	**101**	**99.2**	**98.7**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WQA06_DB TBW 869	----	----	----	----
			Client sampling date / time	27-Sep-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1710701-011	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**113**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**101**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**95.9**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1710595**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 26-Sep-2017 17:50
Order number	: W81020-103	Date Analysis Commenced	: 26-Sep-2017
C-O-C number	: ----	Issue Date	: 04-Oct-2017 12:23
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Brisbane, NATA Site No. 818.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D5	T2F	GW-T3E-A	A1E
				Client sampling date / time	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710595-001	EP1710595-002	EP1710595-003	EP1710595-004	EP1710595-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.68**	**0.04**	**0.48**	**0.06**
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	**0.004**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	**0.002**
Copper	7440-50-8	0.001	mg/L		**0.010**	<0.001	<0.001	**0.001**	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.005**	**0.003**	**0.044**	**0.006**	**0.331**
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.002**	**0.001**	**0.002**	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.009**	**0.006**	<0.005	**0.006**	<0.005
Iron	7439-89-6	0.05	mg/L		**0.34**	**1.39**	**1.47**	**0.46**	**2.37**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	----	**0.17**
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	----	----	----	**0.002**
Manganese	7439-96-5	0.001	mg/L		----	----	----	----	**0.384**
Nickel	7440-02-0	0.001	mg/L		----	----	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L		----	----	----	----	**0.008**
Iron	7439-89-6	0.05	mg/L		----	----	----	----	**3.90**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.5**	<0.2	<0.2	<0.2	<0.2
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		----	----	----	----	**0.3**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.07**	**0.34**	**0.33**	**0.21**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.72**	<0.01	**0.03**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.72**	<0.01	**0.03**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**1.0**	**0.7**	**0.7**	**5.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.9**	**1.0**	**0.7**	**0.7**	**5.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D5	T2F	GW-T3E-A	A1E
				Client sampling date / time	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710595-001	EP1710595-002	EP1710595-003	EP1710595-004	EP1710595-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.02	0.04	0.03	0.07	1.48
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	0.02	0.05	1.06
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		----	----	----	----	10
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	50
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	250
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	250
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	40
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	310
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	110
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	420
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	17
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	17
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		104	107	114	103	98.1
Toluene-D8	2037-26-5	2	%		97.6	96.7	94.6	98.6	103
4-Bromofluorobenzene	460-00-4	2	%		83.7	95.1	88.1	93.6	84.6

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1N	A1	NLWS-N2	A3	S1
				Client sampling date / time	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710595-006	EP1710595-007	EP1710595-008	EP1710595-009	EP1710595-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.06**	**0.07**	**0.07**	**0.24**	**0.11**
Arsenic	7440-38-2	0.001	mg/L		**0.003**	**0.004**	**0.004**	**0.001**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.342**	**0.452**	**0.450**	**0.032**	**0.022**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.006**	**0.009**	**0.006**	**0.006**
Iron	7439-89-6	0.05	mg/L		**2.18**	**0.58**	**1.06**	**0.98**	**0.50**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.12**	**0.10**	**0.09**	**0.46**	**0.18**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.390**	**0.514**	**0.498**	**0.042**	**0.031**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	<0.001	**0.002**	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.005**	**0.012**	**0.008**	**0.018**	**0.007**
Iron	7439-89-6	0.05	mg/L		**2.68**	**2.18**	**1.88**	**1.47**	**0.64**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	**0.2**	**0.2**	<0.2	<0.2
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.3**	**0.4**	**0.3**	**0.2**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.09**	**0.08**	<0.01	**0.05**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**4.5**	**4.6**	**4.2**	**3.7**	**1.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**4.5**	**4.6**	**4.2**	**3.7**	**1.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1N	A1	NLWS-N2	A3	S1
				Client sampling date / time	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00	26-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EP1710595-006	EP1710595-007	EP1710595-008	EP1710595-009	EP1710595-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		1.42	1.55	1.48	0.19	0.17
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		1.06	1.30	1.29	0.01	0.11
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		24	19	6	2	<1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		30	70	60	20	<20
C10 - C14 Fraction	----	50	µg/L		<50	170	140	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	110	120	<100	<100
C29 - C36 Fraction	----	50	µg/L		260	260	280	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		260	540	540	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		30	40	40	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	30	30	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	160	140	<100	<100
>C16 - C34 Fraction	----	100	µg/L		300	330	360	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		300	490	500	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	160	140	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		18	9	9	9	3
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		18	9	9	9	3
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		100	105	115	103	102
Toluene-D8	2037-26-5	2	%		102	99.6	96.4	101	101
4-Bromofluorobenzene	460-00-4	2	%		83.7	85.0	87.7	83.9	83.2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA05_BD TBW 868	----	----	----	----
				Client sampling date / time	26-Sep-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1710595-011	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**102**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**81.9**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1710522**	Page	: 1 of 5
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 22-Sep-2017 17:40
Order number	: W81020-103	Date Analysis Commenced	: 22-Sep-2017
C-O-C number	: ----	Issue Date	: 03-Oct-2017 12:55
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals analyses by ICPMS and ORC-ICPMS conducted by ALS Brisbane, NATA Site No. 818.
- EG094-T (Total Metals in Fresh Water by ORC-ICPMS): LORs for EG094 have been raised due to client request.
- EG094-F (Dissolved Metals in Fresh Water by ORC-ICPMS): LORs for EG094 have been raised due to client request.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH12	GW-D8	----	----	----
				Client sampling date / time	22-Sep-2017 00:00	22-Sep-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1710522-001	EP1710522-002	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	**0.08**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.007**	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.002**	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.001**	**0.008**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.005**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.038**	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**1.25**	----	----	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.4**	**0.3**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.18**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**6.62**	**0.28**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**6.62**	**0.28**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.1**	**0.7**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**7.7**	**1.0**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**0.05**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	**0.03**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH12	GW-D8	----	----	----
				Client sampling date / time	22-Sep-2017 00:00	22-Sep-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1710522-001	EP1710522-002	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**101**	**102**	----	----	----
Toluene-D8	2037-26-5	2	%		**108**	**90.5**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.8**	**85.5**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1710339**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Water Monitoring	Date Samples Received	: 19-Sep-2017 17:30
Order number	: W81020-103	Date Analysis Commenced	: 20-Sep-2017
C-O-C number	: ----	Issue Date	: 27-Sep-2017 16:08
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals analysis conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG020 : It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- EG093: All samples were run on EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	BLNS-B1	A2	A2S	FS2	FS4A
				Client sampling date / time	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00
					EP1710339-001	EP1710339-002	EP1710339-003	EP1710339-004	EP1710339-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.02**	**0.02**	**0.24**	**0.24**
Arsenic	7440-38-2	0.001	mg/L		**0.001**	**0.002**	**0.002**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.041**	**0.037**	**0.040**	**0.030**	**0.029**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.013**	**0.008**	**0.006**	<0.005
Iron	7439-89-6	0.05	mg/L		**0.27**	**0.30**	**0.28**	**1.29**	**1.26**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.05**	**0.08**	**0.31**	**0.48**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.043**	**0.044**	**0.046**	**0.050**	**0.041**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.002**
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.030**	**0.006**	**0.005**	**0.010**
Iron	7439-89-6	0.05	mg/L		**0.39**	**0.40**	**0.44**	**1.55**	**1.99**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.47**	**0.48**	**0.47**	<0.01	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.08**	**0.08**	**0.08**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.29**	**0.24**	**0.28**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.37**	**0.32**	**0.36**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.4**	**2.6**	**2.5**	**2.0**	**4.9**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.8**	**2.9**	**2.9**	**2.0**	**4.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BLNS-B1	A2	A2S	FS2	FS4A
			Client sampling date / time	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EP1710339-001	EP1710339-002	EP1710339-003	EP1710339-004	EP1710339-005
				Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.24**	**0.25**	**0.24**	**0.16**	**0.37**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.23**	**0.22**	**0.22**	**0.04**	**0.04**
EP008: Chlorophyll a & Pheophytin a								
Chlorophyll a	----	1	mg/m³	**2**	**2**	**4**	<1	<1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	**110**	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	**110**	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**96.7**	**93.7**	**95.4**	**93.4**	**95.9**
Toluene-D8	2037-26-5	2	%	**99.5**	**100**	**100**	**101**	**101**
4-Bromofluorobenzene	460-00-4	2	%	**88.2**	**89.8**	**84.9**	**84.9**	**84.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RD1	RD1A	WQA02_190917	----	----
				Client sampling date / time	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1710339-006	EP1710339-007	EP1710339-008	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.18**	**0.17**	**0.02**	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.008**	**0.010**	**0.040**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.005**	**0.006**	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**0.41**	**0.41**	**0.29**	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.39**	**2.37**	**0.04**	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	**0.007**	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.017**	**0.031**	**0.042**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.003**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.022**	**0.126**	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**0.66**	**5.17**	**0.39**	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.07**	**0.09**	**0.46**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	**0.03**	**0.09**	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.18**	**0.08**	**0.26**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.20**	**0.11**	**0.35**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.6**	**3.7**	**2.3**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**3.8**	**2.6**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RD1	RD1A	WQA02_190917	----	----
				Client sampling date / time	19-Sep-2017 00:00	19-Sep-2017 00:00	19-Sep-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1710339-006	EP1710339-007	EP1710339-008	--------	--------
					Result	Result	Result	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.21**	**0.61**	**0.25**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.15**	**0.12**	**0.22**	**----**	**----**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**3**	**23**	**3**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	**----**	**----**
C10 - C14 Fraction	----	50	µg/L		<50	**100**	<50	**----**	**----**
C15 - C28 Fraction	----	100	µg/L		<100	**350**	<100	**----**	**----**
C29 - C36 Fraction	----	50	µg/L		<50	**260**	<50	**----**	**----**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	**710**	<50	**----**	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	**----**	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	**----**	**----**
>C10 - C16 Fraction	----	100	µg/L		<100	**120**	<100	**----**	**----**
>C16 - C34 Fraction	----	100	µg/L		<100	**490**	<100	**----**	**----**
>C34 - C40 Fraction	----	100	µg/L		<100	**130**	<100	**----**	**----**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	**740**	<100	**----**	**----**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	**120**	<100	**----**	**----**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	**----**	**----**
Toluene	108-88-3	2	µg/L		<2	<2	<2	**----**	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	**----**	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	**----**	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	**----**	**----**
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	**----**	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	**----**	**----**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.8**	**101**	**95.6**	**----**	**----**
Toluene-D8	2037-26-5	2	%		**99.4**	**99.3**	**101**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**87.7**	**84.6**	**83.6**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1711669**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 19-Oct-2017 17:20
Order number	: W81020-103	Date Analysis Commenced	: 19-Oct-2017
C-O-C number	: ----	Issue Date	: 26-Oct-2017 17:06
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Brisbane, NATA Site No. 818.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2	A2S	BLNS-B1	WQA02_171017	T4C
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	19-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711669-001	EP1711669-002	EP1711669-003	EP1711669-004	EP1711669-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.012**	**0.024**	**0.025**	**0.025**	**0.007**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.005**
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.23**	**0.23**	**0.24**	**0.24**	**3.78**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.03**	**0.04**	**0.04**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.022**	**0.028**	**0.027**	**0.028**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.30**	**0.30**	**0.31**	**0.31**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	**0.2**	**0.3**	<0.2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.13**	**0.15**	**0.16**	**0.16**	**0.19**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.04**	**0.03**	**0.04**	**0.03**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.18**	**0.18**	**0.18**	**0.19**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.22**	**0.21**	**0.22**	**0.22**	**0.02**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.6**	**1.4**	**1.5**	**1.4**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**1.6**	**1.7**	**1.6**	**0.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2	A2S	BLNS-B1	WQA02_171017	T4C
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	19-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711669-001	EP1711669-002	EP1711669-003	EP1711669-004	EP1711669-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.23**	**0.23**	**0.24**	**0.24**	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.20**	**0.20**	**0.20**	**0.20**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**2**	**2**	**3**	**3**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**99.1**	**103**	**102**	**104**	**103**
Toluene-D8	2037-26-5	2	%		**85.6**	**86.6**	**86.2**	**83.9**	**86.4**
4-Bromofluorobenzene	460-00-4	2	%		**90.1**	**90.7**	**86.4**	**85.9**	**85.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	T2F	GW-D5	T3B	BH10
				Client sampling date / time	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711669-006	EP1711669-007	EP1711669-008	EP1711669-009	EP1711669-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.55**	**0.05**	**0.69**	**0.37**	**1.15**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	**0.003**	<0.001	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.049**	<0.001	**0.003**	**0.006**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.37**	**2.15**	**0.36**	**0.54**	**3.70**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	<0.2	**0.3**	<0.2	**1.0**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.38**	**0.38**	**0.05**	**0.09**	**0.28**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	**0.02**	**0.01**	**0.01**	**0.03**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.02**	**0.01**	**0.01**	**0.03**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.7**	**0.8**	**0.4**	**0.1**	**3.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.7**	**0.8**	**0.4**	**0.1**	**3.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.02**	<0.01	<0.01	**0.16**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.06**	**0.01**	<0.01	<0.01	**0.15**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	T2F	GW-D5	T3B	BH10
				Client sampling date / time	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711669-006	EP1711669-007	EP1711669-008	EP1711669-009	EP1711669-010
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**106**	**112**	**106**	**105**	**106**
Toluene-D8	2037-26-5	2	%		**82.1**	**82.7**	**82.9**	**84.4**	**86.7**
4-Bromofluorobenzene	460-00-4	2	%		**89.4**	**87.8**	**87.6**	**84.8**	**79.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D7	WQA01_191017	----	----
				Client sampling date / time	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1711669-011	EP1711669-012	EP1711669-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.08**	**0.03**	**0.02**	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.002**	**0.002**	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.001**	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.003**	**0.003**	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.002**	**0.002**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	**0.001**	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**0.49**	**0.06**	**0.06**	----	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**1.1**	**0.5**	**0.6**	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.02**	**0.02**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.01**	**0.01**	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.79**	**19.0**	**18.7**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.79**	**19.0**	**18.7**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**5.0**	**5.6**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	**24.0**	**24.3**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.21**	**0.21**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.21**	**0.21**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D7	WQA01_191017	----	----
				Client sampling date / time	19-Oct-2017 00:00	19-Oct-2017 00:00	19-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1711669-011	EP1711669-012	EP1711669-013	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**105**	**108**	**106**	----	----
Toluene-D8	2037-26-5	2	%		**82.6**	**85.7**	**88.1**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**82.7**	**80.4**	**75.8**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1711878**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 24-Oct-2017 17:35
Order number	: W81020-103	Date Analysis Commenced	: 24-Oct-2017
C-O-C number	: ----	Issue Date	: 31-Oct-2017 19:13
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 15		
No. of samples analysed	: 15		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.
- It is recognised that EG094-T (Total Metals in Fresh Water by ORC-ICP-MS) is less than EG094-F (Dissolved Metals in Fresh Water by ORC-ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- EK057G (Nitrite): LOR for samples 'A1E' and 'A3' raised due to possible sample matrix interference.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-001	EP1711878-002	EP1711878-003	EP1711878-004	EP1711878-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.06**	**0.07**	**0.06**	**0.06**	**0.21**
Arsenic	7440-38-2	0.001	mg/L		**0.004**	**0.004**	**0.004**	**0.004**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.260**	**0.262**	**0.268**	**0.267**	**0.020**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**3.44**	**4.57**	**6.25**	**3.91**	**1.13**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	**0.17**	**0.16**	**0.07**	**0.25**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.255**	**0.258**	**0.272**	**0.257**	**0.021**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.010**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**4.27**	**5.33**	**9.91**	**4.22**	**1.29**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.3**	**0.4**	**0.3**	**0.3**
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.2**	**0.3**	**0.2**	**0.2**	<0.2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.19**	**0.46**	**0.59**	**0.35**	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.02	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	<0.01	<0.02	**0.02**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	<0.01	<0.01	**0.02**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**3.1**	**4.1**	**5.9**	**3.2**	**1.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.1**	**4.1**	**5.9**	**3.2**	**1.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-001	EP1711878-002	EP1711878-003	EP1711878-004	EP1711878-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**1.09**	**1.19**	**1.56**	**1.17**	**0.11**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.87**	**1.06**	**1.10**	**1.04**	**0.02**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**5**	**9**	**5**	**6**	**2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	**60**	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	**60**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**110**	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	**110**	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	**2**	**11**	**2**	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	**2**	**11**	**2**	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**103**	**104**	**103**	**103**
Toluene-D8	2037-26-5	2	%		**103**	**103**	**103**	**104**	**103**
4-Bromofluorobenzene	460-00-4	2	%		**103**	**101**	**98.7**	**98.6**	**98.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FS4A	RD1	RD1A	S1	A3
				Client sampling date / time	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-006	EP1711878-007	EP1711878-008	EP1711878-009	EP1711878-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.21**	**0.26**	**0.26**	**0.10**	**0.21**
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.001**	**0.001**	**0.001**	**0.001**
Copper	7440-50-8	0.001	mg/L		**0.084**	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.021**	**0.014**	**0.013**	**0.018**	**0.020**
Nickel	7440-02-0	0.001	mg/L		**0.007**	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.010**	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**1.13**	**0.50**	**0.58**	**0.50**	**0.81**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.25**	**2.55**	**0.36**	**0.35**	**0.34**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	**0.0006**	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.005**	**0.002**	**0.001**	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.021**	**0.774**	**0.013**	**0.041**	**0.031**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.033**	**0.002**	**0.001**	**0.001**
Zinc	7440-66-6	0.005	mg/L		<0.005	**2.44**	<0.005	**0.024**	**0.008**
Iron	7439-89-6	0.05	mg/L		**1.32**	**14.2**	**0.80**	**1.19**	**1.30**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.4**	**0.5**	<0.2	<0.2
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	**0.9**	**0.5**	**0.3**	<0.2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	**0.07**	**0.06**	**0.04**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.02
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.03**	**0.02**	**0.01**	<0.02
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.03**	**0.02**	**0.01**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.6**	**4.1**	**1.7**	**6.6**	**2.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.6**	**4.1**	**1.7**	**6.6**	**2.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FS4A	RD1	RD1A	S1	A3
				Client sampling date / time	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00	23-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-006	EP1711878-007	EP1711878-008	EP1711878-009	EP1711878-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.09**	**1.30**	**0.32**	**0.60**	**0.14**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	**0.27**	**0.29**	**0.07**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**3**	**52**	**7**	**6**	**1**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**20**
C10 - C14 Fraction	----	50	µg/L		<50	**90**	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	**380**	<100	**170**	<100
C29 - C36 Fraction	----	50	µg/L		<50	**100**	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	**570**	<50	**170**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**20**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	**260**	<100	**130**	<100
>C16 - C34 Fraction	----	100	µg/L		<100	**260**	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	**520**	<100	**130**	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	**260**	<100	**130**	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	**7**	**17**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	**7**	**17**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**105**	**103**	**107**	**104**	**105**
Toluene-D8	2037-26-5	2	%		**102**	**102**	**103**	**102**	**101**
4-Bromofluorobenzene	460-00-4	2	%		**98.8**	**98.2**	**98.3**	**97.2**	**98.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4	T4B	T3C	D1	D2
				Client sampling date / time	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-011	EP1711878-012	EP1711878-013	EP1711878-014	EP1711878-015
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.33**	**0.28**	**0.03**	**0.11**	**0.36**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.001**	**0.006**	**0.007**	**0.002**	**0.001**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.12**	**0.12**	**4.18**	**0.33**	**0.06**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**1.6**	**1.2**	<0.2	**0.3**	**0.4**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.01**	**0.92**	**0.20**	**0.02**	**0.06**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	<0.01	<0.01	**0.02**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**2.81**	**0.02**	**0.02**	**0.71**	**0.18**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**2.82**	**0.02**	**0.02**	**0.73**	**0.18**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.9**	**1.2**	**0.4**	**0.2**	**0.9**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.7**	**1.2**	**0.4**	**0.9**	**1.1**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.25**	**0.01**	**0.01**	**0.03**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.23**	<0.01	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4	T4B	T3C	D1	D2
				Client sampling date / time	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00	24-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		EP1711878-011	EP1711878-012	EP1711878-013	EP1711878-014	EP1711878-015
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	**103**	**106**	**106**	**106**
Toluene-D8	2037-26-5	2	%		**101**	**102**	**102**	**97.3**	**99.3**
4-Bromofluorobenzene	460-00-4	2	%		**96.0**	**99.4**	**98.9**	**99.1**	**100**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1712054**	Page	: 1 of 5
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Oct-2017 13:00
Order number	: W81020-103	Date Analysis Commenced	: 27-Oct-2017
C-O-C number	: ----	Issue Date	: 06-Nov-2017 16:40
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.
- EK067 (Total Phosphorus): LOR raised due to possible sample matrix interference.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	GW-D8	----	----	----
				Client sampling date / time	26-Oct-2017 00:00	26-Oct-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1712054-001	EP1712054-002	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.12**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.005**	**0.018**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.003**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.026**	**0.007**	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.71**	----	----	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.5**	**0.3**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	**0.28**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**3.83**	**1.15**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**3.83**	**1.15**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.2**	**6.4**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**5.0**	**7.6**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.02	**0.05**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.01**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	GW-D8	----	----	----
				Client sampling date / time	26-Oct-2017 00:00	26-Oct-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1712054-001	EP1712054-002	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**107**	**108**	----	----	----
Toluene-D8	2037-26-5	2	%		**101**	**101**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.6**	**94.2**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1712990**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 17-Nov-2017 17:02
Order number	: W81020-103	Date Analysis Commenced	: 17-Nov-2017
C-O-C number	: ----	Issue Date	: 27-Nov-2017 07:43
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 14		
No. of samples analysed	: 14		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Surrogate Control Limits

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Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA

General Comments

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	D1	D2	T2F	GW-T3E-A	GW-D3
				Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1712990-001	EP1712990-002	EP1712990-003	EP1712990-004	EP1712990-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.10**	**0.52**	**0.05**	**0.50**	**0.04**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	**0.003**	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.002**	<0.001	**0.049**	**0.007**	**0.005**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.29**	<0.05	**2.09**	**0.48**	**0.41**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.7**	**0.5**	<0.2	<0.2	**0.5**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	**0.03**	**0.44**	**0.36**	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.06**	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.92**	**0.78**	<0.01	<0.01	**0.10**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.98**	**0.78**	<0.01	<0.01	**0.10**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**1.2**	**1.0**	**2.0**	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.4**	**2.0**	**1.0**	**2.0**	**0.1**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.03**	**0.05**	**0.22**	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.02**	**0.07**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**1110**	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	**190**	<50

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	D1	D2	T2F	GW-T3E-A	GW-D3
				Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1712990-001	EP1712990-002	EP1712990-003	EP1712990-004	EP1712990-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	**1300**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**1210**	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	**1210**	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**126**	**130**	**131**	**127**	**128**
Toluene-D8	2037-26-5	2	%		**91.5**	**87.9**	**87.7**	**88.0**	**88.2**
4-Bromofluorobenzene	460-00-4	2	%		**93.2**	**85.9**	**85.7**	**89.1**	**86.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	GW-D4	GW-D5	T3B	T4B	----
			Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit	EP1712990-006	EP1712990-007	EP1712990-008	EP1712990-009	--------
				Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.39**	**0.41**	**1.12**	**0.29**	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	**0.002**	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.002**	<0.001	**0.003**	**0.005**	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L	**0.10**	**0.73**	**0.45**	**0.10**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS								
Selenium	7782-49-2	0.2	µg/L	**1.8**	<0.2	**0.2**	**0.2**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	**0.09**	**0.09**	**0.87**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**0.02**	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**3.57**	<0.01	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**3.59**	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.6**	**0.4**	**0.2**	**1.2**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**4.2**	**0.4**	**0.2**	**1.2**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.04**	**0.02**	**0.26**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**0.26**	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	**70**	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	GW-D4	GW-D5	T3B	T4B	----
				Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1712990-006	EP1712990-007	EP1712990-008	EP1712990-009	--------
					Result	Result	Result	Result	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	**70**	<50	<50	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	**----**
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**----**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	**----**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	**----**
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	**----**
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	**----**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**127**	**133**	**128**	**131**	**----**
Toluene-D8	2037-26-5	2	%		**90.4**	**87.3**	**89.1**	**87.4**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**87.1**	**89.5**	**86.6**	**88.5**	**----**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	WQA02_151117	BLNS-B1	A2	A2S	----
				Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1712990-010	EP1712990-011	EP1712990-012	EP1712990-013	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.02**	**0.01**	**0.01**	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.005**	**0.005**	**0.005**	**0.006**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.12**	**0.13**	**0.12**	**0.12**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.05**	**0.07**	**0.06**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.002**	**0.001**	----
Manganese	7439-96-5	0.001	mg/L		**0.041**	**0.042**	**0.044**	**0.044**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.27**	**0.29**	**0.30**	**0.30**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.2**	<0.2	**0.3**	**0.2**	----
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.3**	**0.5**	**0.3**	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	<0.01	**0.03**	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.8**	**2.0**	**2.0**	**1.9**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**2.0**	**2.0**	**1.9**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	WQA02_151117	BLNS-B1	A2	A2S	----
				Client sampling date / time	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	17-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1712990-010	EP1712990-011	EP1712990-012	EP1712990-013	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.31**	**0.32**	**0.34**	**0.36**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.23**	**0.23**	**0.23**	**0.22**	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**13**	**18**	**25**	**4**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**133**	**133**	**136**	**134**	----
Toluene-D8	2037-26-5	2	%		**87.2**	**88.2**	**87.2**	**85.0**	----
4-Bromofluorobenzene	460-00-4	2	%		**88.7**	**87.7**	**90.4**	**88.2**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA05_DB TBW 1132	----	----	----	----
				Client sampling date / time	17-Nov-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1712990-014	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**130**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**90.2**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**86.0**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1712847**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 15-Nov-2017 15:00
Order number	: W81020-103	Date Analysis Commenced	: 15-Nov-2017
C-O-C number	: ----	Issue Date	: 22-Nov-2017 15:37
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.
- It is recognised that total phosphorus (EK067G) is less than reactive phosphorus (EK071G) for sample 'A1E'. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1712847-001	EP1712847-002	EP1712847-003	EP1712847-004	EP1712847-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	**0.07**	**0.08**	**0.07**	**0.16**
Arsenic	7440-38-2	0.001	mg/L		**0.004**	**0.005**	**0.004**	**0.005**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.261**	**0.243**	**0.246**	**0.257**	**0.029**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**4.07**	**4.91**	**5.07**	**4.12**	**0.94**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.08**	**0.27**	**0.10**	**0.08**	**0.22**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.003**	**0.002**	**0.002**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.273**	**0.270**	**0.261**	**0.275**	**0.033**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.006**	**0.010**	**0.007**	**0.006**	**0.008**
Iron	7439-89-6	0.05	mg/L		**4.46**	**6.28**	**5.73**	**4.52**	**1.93**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.2**	**0.2**	**0.3**	**0.3**	**0.3**
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.4**	**0.4**	**0.3**	**0.4**	**0.3**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.37**	**0.38**	**0.56**	**0.42**	**0.03**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**3.5**	**4.5**	**3.6**	**3.7**	**2.0**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.5**	**4.5**	**3.6**	**3.7**	**2.0**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1712847-001	EP1712847-002	EP1712847-003	EP1712847-004	EP1712847-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		1.29	1.41	1.18	1.36	0.13
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		1.23	1.22	1.26	1.24	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		22	18	47	23	34
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		350	<100	140	<100	130
C29 - C36 Fraction	----	50	µg/L		190	70	80	60	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		540	70	220	60	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		460	140	190	130	140
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		460	140	190	130	140
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	2	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		107	110	111	112	116
Toluene-D8	2037-26-5	2	%		103	97.6	96.0	101	97.5
4-Bromofluorobenzene	460-00-4	2	%		81.8	82.4	82.8	83.0	82.5

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	FS4A	RD1	S1	A3	----
				Client sampling date / time	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1712847-006	EP1712847-007	EP1712847-008	EP1712847-009	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.16**	**0.14**	**0.09**	**0.20**	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	<0.001	<0.001	**0.001**	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.033**	**0.053**	**0.030**	**0.032**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.011**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.94**	**0.42**	**0.57**	**1.16**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.26**	**0.86**	**0.23**	**0.27**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.005**	**0.001**	**0.001**	----
Manganese	7439-96-5	0.001	mg/L		**0.063**	**0.176**	**0.036**	**0.052**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.009**	**0.001**	**0.001**	----
Zinc	7440-66-6	0.005	mg/L		**0.008**	**0.363**	**0.020**	**0.009**	----
Iron	7439-89-6	0.05	mg/L		**1.92**	**5.71**	**1.02**	**2.77**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.5**	**0.2**	<0.2	----
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**1.0**	**0.4**	**0.3**	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	**0.12**	**0.02**	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.04**	**0.02**	**0.02**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.04**	**0.02**	**0.02**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**11.7**	**8.2**	**2.1**	**1.7**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**11.7**	**8.2**	**2.1**	**1.7**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	FS4A	RD1	S1	A3	----
				Client sampling date / time	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	15-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1712847-006	EP1712847-007	EP1712847-008	EP1712847-009	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**1.67**	**3.09**	**0.22**	**0.06**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.16**	**0.04**	<0.01	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**24**	**46**	**10**	**1**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	**20**	**30**	----
C10 - C14 Fraction	----	50	µg/L		**190**	**720**	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		**340**	**1310**	**260**	<100	----
C29 - C36 Fraction	----	50	µg/L		**120**	**1310**	**170**	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		**650**	**3340**	**430**	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	**30**	**40**	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	**20**	----
>C10 - C16 Fraction	----	100	µg/L		**220**	**320**	**140**	<100	----
>C16 - C34 Fraction	----	100	µg/L		**320**	**2160**	**260**	**110**	----
>C34 - C40 Fraction	----	100	µg/L		<100	**2200**	**210**	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		**540**	**4680**	**610**	**110**	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		**220**	**320**	**140**	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	**14**	**17**	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	**14**	**17**	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**116**	**114**	**115**	----
Toluene-D8	2037-26-5	2	%		**98.8**	**97.2**	**97.1**	**104**	----
4-Bromofluorobenzene	460-00-4	2	%		**82.7**	**82.8**	**81.3**	**80.9**	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1714429**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 20-Dec-2017 13:55
Order number	: W81020-103	Date Analysis Commenced	: 20-Dec-2017
C-O-C number	: ----	Issue Date	: 29-Dec-2017 19:41
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 16		
No. of samples analysed	: 16		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG093: All samples were run on EG094 method due to low TDS content.
- It is recognised that total phosphorus (EK067G) is less than reactive phosphorus (EK071G) for sample 'GW-T3E-A'. However, the difference is within experimental variation of the methods.
- It is recognised that Total Kjeldahl Nitrogen (EK061G) is less than Ammonia (EK055G) for sample 'T3C'. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	GW-D5	T2F	T3C	BH10
				Client sampling date / time	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714429-001	EP1714429-002	EP1714429-003	EP1714429-004	EP1714429-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.31**	**0.46**	**0.05**	**0.03**	**0.43**
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	**0.005**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.007**	**0.002**	**0.056**	**0.012**	**0.014**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.34**	**2.10**	**2.51**	**0.97**	**3.62**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.37**	**0.11**	**0.43**	**0.12**	**0.18**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.05**	**0.03**	**0.02**	**0.04**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.05**	**0.03**	**0.02**	**0.04**	**0.02**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**0.4**	**0.9**	**0.1**	**0.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.8**	**0.4**	**0.9**	**0.1**	**0.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	<0.01	**0.06**	<0.01	**0.10**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.08**	<0.01	**0.02**	<0.01	**0.02**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	GW-D5	T2F	T3C	BH10
				Client sampling date / time	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00	20-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714429-001	EP1714429-002	EP1714429-003	EP1714429-004	EP1714429-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**81.7**	**80.9**	**82.7**	**82.8**	**83.9**
Toluene-D8	2037-26-5	2	%		**101**	**102**	**100**	**102**	**101**
4-Bromofluorobenzene	460-00-4	2	%		**104**	**104**	**104**	**104**	**106**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B	GW-D8	BH-12	D1	T4B
				Client sampling date / time	20-Dec-2017 00:00	20-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714429-006	EP1714429-007	EP1714429-008	EP1714429-009	EP1714429-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.37**	**0.25**	**0.02**	**0.10**	**0.33**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.004**	**0.002**	**0.001**	**0.005**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.005**	**0.002**	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.007**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.44**	**0.26**	<0.05	**0.36**	**0.10**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.11**	**0.14**	**0.03**	**0.04**	**0.84**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	**0.82**	**3.74**	**0.46**	**0.01**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.82**	**3.74**	**0.47**	**0.01**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**1.6**	**0.5**	**0.2**	**1.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	**2.4**	**4.2**	**0.7**	**1.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.07**	**0.12**	**0.03**	**0.32**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.03**	<0.01	<0.01	**0.31**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B	GW-D8	BH-12	D1	T4B
				Client sampling date / time	20-Dec-2017 00:00	20-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714429-006	EP1714429-007	EP1714429-008	EP1714429-009	EP1714429-010
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**82.9**	**87.1**	**82.8**	**85.3**	**85.4**
Toluene-D8	2037-26-5	2	%		**104**	**99.7**	**103**	**102**	**99.8**
4-Bromofluorobenzene	460-00-4	2	%		**102**	**104**	**101**	**102**	**103**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	D2	GW-D4	T4B	GW-D3	T4B-A
			Client sampling date / time	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	EP1714429-011	EP1714429-012	EP1714429-014	EP1714429-015	EP1714429-016
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.41**	**0.37**	**0.04**	**0.02**	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	**0.003**	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	<0.001	**0.002**	**0.006**	**0.006**	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L	**0.06**	**0.11**	**4.15**	**0.30**	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	<2	<2	<2	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.06**	**0.02**	**0.18**	**0.04**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**1.31**	**0.02**	**0.10**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	**1.31**	**0.02**	**0.10**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.1**	**0.7**	**0.3**	**0.3**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.1**	**2.0**	**0.3**	**0.4**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.03**	**0.06**	<0.01	**0.05**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D2	GW-D4	T4B	GW-D3	T4B-A
				Client sampling date / time	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00	19-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714429-011	EP1714429-012	EP1714429-014	EP1714429-015	EP1714429-016
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**86.1**	**87.1**	**88.1**	**85.9**	**88.1**
Toluene-D8	2037-26-5	2	%		**99.6**	**101**	**99.0**	**100.0**	**101**
4-Bromofluorobenzene	460-00-4	2	%		**104**	**102**	**101**	**100**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4B-B	----	----	----	----
				Client sampling date / time	19-Dec-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1714429-017	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**90.5**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**96.5**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**104**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1714152**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 14-Dec-2017 15:30
Order number	: W81020-103	Date Analysis Commenced	: 14-Dec-2017
C-O-C number	: ----	Issue Date	: 22-Dec-2017 14:37
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample EP1714152 - 001 (A1). However, the difference is within experimental variation of the methods.
- EK058G/EK059G (Nitrate/NOx): LOR raised for various samples due to possible sample matrix interference.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714152-001	EP1714152-002	EP1714152-003	EP1714152-004	EP1714152-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.05**	**0.03**	**0.05**	**0.11**
Arsenic	7440-38-2	0.001	mg/L		**0.005**	**0.005**	**0.005**	**0.005**	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.001**	**0.002**	**0.002**	**0.002**
Copper	7440-50-8	0.001	mg/L		**0.005**	**0.001**	<0.001	**0.009**	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.239**	**0.178**	**0.190**	**0.260**	**0.030**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.006**	**0.031**	<0.005	<0.005	**0.008**
Iron	7439-89-6	0.05	mg/L		**2.76**	**3.21**	**4.47**	**2.71**	**1.00**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.06**	**0.25**	**0.14**	**0.06**	**0.19**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.003**	**0.002**	**0.002**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.255**	**0.228**	**0.259**	**0.279**	**0.035**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.002**	**0.002**	<0.001	**0.002**
Zinc	7440-66-6	0.005	mg/L		**0.011**	**0.084**	**0.016**	**0.006**	**0.023**
Iron	7439-89-6	0.05	mg/L		**3.73**	**5.37**	**8.94**	**3.31**	**1.51**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.5**	**0.5**	**0.5**	**0.4**	**0.5**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	**0.08**	**0.05**	**0.14**	**0.26**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.02	<0.02	<0.02	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.02	<0.02	<0.02	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**4.3**	**5.0**	**5.9**	**4.0**	**4.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**4.3**	**5.0**	**5.9**	**4.0**	**4.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	FS2
				Client sampling date / time	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1714152-001	EP1714152-002	EP1714152-003	EP1714152-004	EP1714152-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.89**	**0.61**	**0.99**	**0.77**	**0.25**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.47**	**0.22**	**0.34**	**0.52**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**95**	**74**	**131**	**89**	**38**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	**130**	**100**	<100	**140**
C29 - C36 Fraction	----	50	µg/L		<50	**60**	**90**	<50	**70**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	**190**	**190**	<50	**210**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		**110**	**170**	**170**	<100	**190**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		**110**	**170**	**170**	<100	**190**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**126**	**124**	**128**	**127**	**125**
Toluene-D8	2037-26-5	2	%		**96.4**	**96.6**	**95.7**	**96.8**	**94.6**
4-Bromofluorobenzene	460-00-4	2	%		**94.7**	**92.1**	**95.4**	**95.2**	**94.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2S	BLNS-B1	A2	WQA02_131217	----
				Client sampling date / time	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1714152-006	EP1714152-007	EP1714152-008	EP1714152-009	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.09**	**0.08**	**0.08**	**0.09**	----
Arsenic	7440-38-2	0.001	mg/L		**0.003**	**0.004**	**0.003**	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.011**	**0.011**	**0.011**	**0.011**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.08**	**0.07**	**0.07**	**0.07**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.11**	**0.10**	**0.16**	**0.10**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.043**	**0.042**	**0.056**	**0.043**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.005**	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.19**	**0.18**	**0.44**	**0.19**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	<0.2	<0.2	<0.2	----
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.4**	**0.4**	**0.4**	**0.4**	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**5.2**	**5.0**	**5.5**	**4.7**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**5.2**	**5.0**	**5.5**	**4.7**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A2S	BLNS-B1	A2	WQA02_131217	----
				Client sampling date / time	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1714152-006	EP1714152-007	EP1714152-008	EP1714152-009	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.68**	**0.70**	**0.76**	**0.64**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.18**	**0.18**	**0.18**	**0.18**	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**127**	**139**	**121**	**131**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**120**	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	**120**	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**129**	**134**	**123**	**128**	----
Toluene-D8	2037-26-5	2	%		**101**	**96.3**	**94.9**	**96.4**	----
4-Bromofluorobenzene	460-00-4	2	%		**96.2**	**95.4**	**99.4**	**91.2**	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1801308**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 16-Jan-2018 16:30
Order number	: W81020-103	Date Analysis Commenced	: 17-Jan-2018
C-O-C number	: ----	Issue Date	: 25-Jan-2018 13:42
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC Metals conducted by ALS Brisbane, NATA Site No. 818.
- Inorganics, Organics and Nutrients conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- Chorophyll a conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EK061G: EP1801306 #4 Poor matrix spike recovery for total Kjeldhal Nitrogen due to sample matrix effects. Confirmed by re-extraction and re-analysis.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	GW-D8	BH12	----	----	----
				Client sampling date / time	16-Jan-2018 00:00	15-Jan-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1801308-005	EP1801308-006	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.28**	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.001**	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.19**	<0.05	----	----	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.7**	**0.6**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.16**	**0.61**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.31**	**5.56**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.32**	**5.56**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.0**	**0.6**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**1.3**	**6.2**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.11**	**0.21**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.05**	<0.01	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	GW-D8	BH12	----	----	----
				Client sampling date / time	16-Jan-2018 00:00	15-Jan-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1801308-005	EP1801308-006	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**95.8**	**96.6**	----	----	----
Toluene-D8	2037-26-5	2	%		**89.2**	**85.0**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**103**	**98.8**	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Client sample ID	A1	A1N	A1E	NLWS-N2	----
			Client sampling date / time	16-Jan-2018 00:00	16-Jan-2018 00:00	16-Jan-2018 00:00	16-Jan-2018 00:00	----
Compound	CAS Number	LOR	Unit	EP1801308-001	EP1801308-002	EP1801308-003	EP1801308-004	--------
				Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**0.05**	**0.02**	**0.04**	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	**0.003**	**0.003**	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.001**	**0.001**	**0.002**	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.199**	**0.201**	**0.128**	**0.210**	----
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	<0.001	**0.001**	----
Zinc	7440-66-6	0.005	mg/L	<0.005	**0.006**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L	**3.78**	**3.12**	**2.15**	**3.75**	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.07**	**1.36**	**0.05**	**0.07**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	**0.003**	**0.006**	**0.001**	**0.002**	----
Manganese	7439-96-5	0.001	mg/L	**0.242**	**0.269**	**0.155**	**0.254**	----
Nickel	7440-02-0	0.001	mg/L	**0.001**	**0.002**	<0.001	**0.001**	----
Zinc	7440-66-6	0.005	mg/L	**0.007**	**0.040**	**0.006**	**0.008**	----
Iron	7439-89-6	0.05	mg/L	**8.31**	**15.5**	**4.36**	**8.09**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS								
Selenium	7782-49-2	0.2	µg/L	**0.6**	**0.3**	**0.4**	**0.5**	----
EG094T: Total metals in Fresh water by ORC-ICPMS								
Selenium	7782-49-2	0.2	µg/L	**0.6**	**0.9**	**0.4**	**0.6**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.05**	**0.19**	**0.25**	**0.06**	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.01**	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.01**	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**3.6**	**5.0**	**2.7**	**3.2**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**3.6**	**5.0**	**2.7**	**3.2**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	----
				Client sampling date / time	16-Jan-2018 00:00	16-Jan-2018 00:00	16-Jan-2018 00:00	16-Jan-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1801308-001	EP1801308-002	EP1801308-003	EP1801308-004	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.40**	**0.70**	**0.47**	**0.92**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.07**	**0.10**	**0.08**	**0.08**	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**63**	**117**	**83**	**82**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		**170**	**130**	**110**	**160**	----
C29 - C36 Fraction	----	50	µg/L		**60**	**90**	**60**	**80**	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		**230**	**220**	**170**	**240**	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		**230**	**210**	**170**	**220**	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		**230**	**210**	**170**	**220**	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.3**	**95.7**	**94.5**	**96.3**	----
Toluene-D8	2037-26-5	2	%		**85.4**	**86.9**	**80.2**	**86.3**	----
4-Bromofluorobenzene	460-00-4	2	%		**100**	**103**	**98.0**	**98.4**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1801446**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 16-Jan-2018 06:20
Order number	: W81020-103	Date Analysis Commenced	: 16-Jan-2018
C-O-C number	: ----	Issue Date	: 24-Jan-2018 15:00
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	D1	GW03	GW05	T4C	D2
				Client sampling date / time	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		EM1801446-001	EM1801446-002	EM1801446-003	EM1801446-004	EM1801446-009
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.08**	**0.03**	**0.37**	**0.03**	**0.42**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	**0.002**	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L		**0.001**	**0.001**	**0.002**	<0.001	**0.004**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.002**	**0.006**	**0.005**	**0.006**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	**0.001**
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.008**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.42**	**0.24**	**3.44**	**3.41**	<0.05
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		<0.2	**0.3**	**0.2**	<0.2	**0.3**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.05**	**0.07**	**0.11**	**0.03**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	**0.01**	<0.01	**0.01**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.10**	**0.09**	**0.01**	<0.01	**0.04**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.11**	**0.10**	**0.01**	**0.01**	**0.04**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.0**	**0.2**	**0.7**	**0.2**	**1.7**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.1**	**0.3**	**0.7**	**0.2**	**1.7**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	**0.07**	**0.11**	**0.06**	**0.37**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.04**	**0.01**	**0.01**	**0.01**	**0.02**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	D1	GW03	GW05	T4C	D2
				Client sampling date / time	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		EM1801446-001	EM1801446-002	EM1801446-003	EM1801446-004	EM1801446-009
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**86.3**	**87.9**	**97.9**	**89.8**	**110**
Toluene-D8	2037-26-5	2	%		**93.0**	**93.1**	**106**	**94.9**	**102**
4-Bromofluorobenzene	460-00-4	2	%		**107**	**108**	**119**	**110**	**106**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	BLNS-B1	WQA02	A2S	A2	----
				Client sampling date / time	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1801446-005	EM1801446-006	EM1801446-007	EM1801446-008	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.03**	**0.03**	**0.03**	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.002**	**0.003**	**0.002**	**0.002**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.08**	**0.06**	**0.06**	**0.06**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.10**	**0.10**	**0.17**	**0.10**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.045**	**0.046**	**0.051**	**0.048**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.006**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.31**	**0.28**	**0.42**	**0.31**	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.4**	**0.3**	**0.2**	----
EG094T: Total metals in Fresh water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.3**	**0.4**	**0.4**	**0.4**	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.06**	**0.04**	**0.03**	**0.13**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	**0.01**	**0.01**	**0.01**	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	**0.01**	**0.01**	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.02**	**0.02**	**0.01**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.9**	**2.9**	**3.2**	**3.6**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.9**	**2.9**	**3.2**	**3.6**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	BLNS-B1	WQA02	A2S	A2	----
				Client sampling date / time	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	11-Jan-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1801446-005	EM1801446-006	EM1801446-007	EM1801446-008	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.30**	**0.32**	**0.38**	**0.36**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.04**	**0.03**	**0.03**	**0.03**	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**25**	**26**	**25**	**17**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	**110**	**120**	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	**110**	**120**	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		**100**	<100	**140**	**130**	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		**100**	<100	**140**	**130**	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**102**	**95.1**	**99.4**	**96.5**	----
Toluene-D8	2037-26-5	2	%		**108**	**99.2**	**102**	**104**	----
4-Bromofluorobenzene	460-00-4	2	%		**120**	**114**	**118**	**118**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1801303**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 12-Jan-2018 10:20
Order number	: W81020-103	Date Analysis Commenced	: 12-Jan-2018
C-O-C number	: ----	Issue Date	: 23-Jan-2018 14:08
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	T3B	BH10	T4B	T3C	T2F
			Client sampling date / time	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00
Compound	CAS Number	LOR	Unit	EM1801303-001	EM1801303-002	EM1801303-003	EM1801303-004	EM1801303-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.16**	**0.15**	**0.26**	**0.01**	**0.07**
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.002**	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.003**	**0.008**	**0.004**	**0.012**	**0.083**
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**0.007**
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	**0.010**
Iron	7439-89-6	0.05	mg/L	**0.15**	**1.50**	**0.08**	**0.15**	**10.7**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.08**	**0.20**	**0.91**	**0.10**	**0.56**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.8**	**1.2**	**0.1**	**1.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.2**	**0.8**	**1.2**	**0.1**	**1.2**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.09**	**1.45**	**0.32**	**0.02**	**0.04**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	**0.30**	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	**110**	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B	BH10	T4B	T3C	T2F
				Client sampling date / time	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00	10-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		EM1801303-001	EM1801303-002	EM1801303-003	EM1801303-004	EM1801303-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	110	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	160	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	160	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		97.3	104	95.9	98.9	101
Toluene-D8	2037-26-5	2	%		87.5	91.7	93.2	90.5	92.7
4-Bromofluorobenzene	460-00-4	2	%		110	112	115	113	115

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW-D4	GW-T3E-A	----	----	----
			Client sampling date / time	10-Jan-2018 00:00	10-Jan-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1801303-006	EM1801303-007	--------	--------	--------
				Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.33**	**0.61**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.002**	**0.008**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.002**	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.11**	**0.61**	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	<2	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.43**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**4.11**	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**4.11**	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.8**	**0.7**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**4.9**	**0.7**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.06**	**0.07**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**0.04**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4	GW-T3E-A	----	----	----
				Client sampling date / time	10-Jan-2018 00:00	10-Jan-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1801303-006	EM1801303-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	**102**	----	----	----
Toluene-D8	2037-26-5	2	%		**90.4**	**97.8**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**115**	**118**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1713111**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 21-Nov-2017 16:45
Order number	: W81020-103	Date Analysis Commenced	: 21-Nov-2017
C-O-C number	: ----	Issue Date	: 28-Nov-2017 16:15
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Analytical Results
- Surrogate Control Limits

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Signatories

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Signatories	*Position*	*Accreditation Category*
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Brisbane, NATA Site No. 818.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH10	T3C	GW-D7	GW-D8	T4C
				Client sampling date / time	20-Nov-2017 00:00	20-Nov-2017 00:00	20-Nov-2017 00:00	20-Nov-2017 00:00	21-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1713111-001	EP1713111-002	EP1713111-003	EP1713111-004	EP1713111-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.90**	**0.07**	**0.04**	**0.35**	**0.03**
Arsenic	7440-38-2	0.001	mg/L		**0.003**	<0.001	**0.002**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	**0.001**	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.002**	**0.002**	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.011**	**0.006**	**0.010**	**0.007**
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	**0.001**	**0.002**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**3.54**	**0.99**	**0.07**	**0.79**	**4.32**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.7**	<0.2	**0.5**	**0.9**	**0.2**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.38**	**0.06**	**0.03**	**0.28**	**0.19**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	**21.3**	**0.51**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	**21.3**	**0.51**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.8**	**0.2**	**4.8**	**1.5**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.8**	**0.2**	**26.1**	**2.0**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.12**	<0.01	**0.84**	**0.08**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.06**	<0.01	**0.20**	**0.02**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH10	T3C	GW-D7	GW-D8	T4C
				Client sampling date / time	20-Nov-2017 00:00	20-Nov-2017 00:00	20-Nov-2017 00:00	20-Nov-2017 00:00	21-Nov-2017 00:00
Compound	CAS Number	LOR	Unit		EP1713111-001	EP1713111-002	EP1713111-003	EP1713111-004	EP1713111-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**77.9**	**82.9**	**80.4**	**80.0**	**83.6**
Toluene-D8	2037-26-5	2	%		**110**	**107**	**110**	**109**	**108**
4-Bromofluorobenzene	460-00-4	2	%		**88.7**	**89.1**	**88.2**	**88.7**	**86.2**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	WQA01_201117	----	----	----
				Client sampling date / time	21-Nov-2017 00:00	20-Nov-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1713111-006	EP1713111-007	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.04**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.002**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.002**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.002**	**0.006**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.030**	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.06**	----	----	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Selenium	7782-49-2	0.2	µg/L		**0.6**	**0.5**	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	**0.02**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**4.67**	**15.8**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**4.67**	**15.8**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.6**	**4.8**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**5.3**	**20.6**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	**0.86**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.28**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	WQA01_201117	----	----	----
				Client sampling date / time	21-Nov-2017 00:00	20-Nov-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1713111-006	EP1713111-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**82.6**	**85.0**	----	----	----
Toluene-D8	2037-26-5	2	%		**107**	**109**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**87.0**	**84.3**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA06_DB TBW 1133	----	----	----	----
				Client sampling date / time	20-Nov-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1713111-008	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**83.1**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**108**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**86.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1802093**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 07-Feb-2018 16:30
Order number	: W81020-103	Date Analysis Commenced	: 07-Feb-2018
C-O-C number	: ----	Issue Date	: 15-Feb-2018 17:46
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG093: Samples were run under EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	GW-T3E-A
				Client sampling date / time	07-Feb-2018 00:00	07-Feb-2018 00:00	07-Feb-2018 00:00	07-Feb-2018 00:00	06-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802093-001	EP1802093-002	EP1802093-003	EP1802093-004	EP1802093-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.06**	**0.11**	**0.03**	**0.05**	**0.59**
Arsenic	7440-38-2	0.001	mg/L		**0.005**	**0.005**	**0.004**	**0.006**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.001**	**0.002**	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		**0.001**	**0.004**	<0.001	**0.001**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.351**	**0.180**	**0.142**	**0.338**	**0.007**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	<0.001	**0.001**	**0.001**
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**4.05**	**3.36**	**2.52**	**3.89**	**0.63**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.10**	**1.36**	**0.13**	**0.12**	**----**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	**----**
Chromium	7440-47-3	0.001	mg/L		**0.003**	**0.004**	**0.002**	**0.003**	**----**
Manganese	7439-96-5	0.001	mg/L		**0.391**	**0.230**	**0.202**	**0.389**	**----**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	**0.001**	**0.001**	**----**
Zinc	7440-66-6	0.005	mg/L		**0.006**	**0.062**	**0.006**	**0.011**	**----**
Iron	7439-89-6	0.05	mg/L		**7.08**	**11.5**	**6.01**	**8.45**	**----**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	**----**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.07**	**0.05**	**0.05**	**0.30**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**6.2**	**11.3**	**7.6**	**8.3**	**1.0**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**6.2**	**11.3**	**7.6**	**8.3**	**1.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A1	A1N	A1E	NLWS-N2	GW-T3E-A
				Client sampling date / time	07-Feb-2018 00:00	07-Feb-2018 00:00	07-Feb-2018 00:00	07-Feb-2018 00:00	06-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802093-001	EP1802093-002	EP1802093-003	EP1802093-004	EP1802093-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.55**	**0.95**	**0.82**	**1.00**	**0.06**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.10**	**0.03**	**0.07**	**0.14**	**0.03**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**153**	**80**	**95**	**308**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		**160**	**280**	**240**	**400**	<100
C29 - C36 Fraction	----	50	µg/L		**90**	**180**	**110**	**190**	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		**250**	**460**	**350**	**590**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		**220**	**410**	**310**	**550**	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		**220**	**410**	**310**	**550**	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**110**	**107**	**110**	**109**	**111**
Toluene-D8	2037-26-5	2	%		**99.0**	**102**	**98.1**	**99.2**	**99.0**
4-Bromofluorobenzene	460-00-4	2	%		**95.0**	**95.4**	**93.2**	**94.1**	**92.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5	T2F	WQA01_060218	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802093-006	EP1802093-007	EP1802093-008	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.30**	**0.05**	**0.63**	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	**0.001**	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.007**	**0.053**	**0.007**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	**0.001**	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**6.38**	**1.97**	**0.68**	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.12**	**0.44**	**0.31**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	<0.01	**0.02**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	<0.01	**0.02**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.6**	**1.1**	**1.1**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**1.1**	**1.1**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.01**	**0.05**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.01**	**0.03**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5	T2F	WQA01_060218	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802093-006	EP1802093-007	EP1802093-008	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	**110**	**109**	----	----
Toluene-D8	2037-26-5	2	%		**98.7**	**97.8**	**99.0**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**92.8**	**89.7**	**93.3**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1802224**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Feb-2018 16:00
Order number	: W81020-103	Date Analysis Commenced	: 09-Feb-2018
C-O-C number	: ----	Issue Date	: 19-Feb-2018 17:46
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	GW-D3	GW-D4	----	----
				Client sampling date / time	09-Feb-2018 00:00	09-Feb-2018 00:00	09-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802224-005	EP1802224-006	EP1802224-007	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	**0.02**	**0.66**	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.006**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.51**	**0.15**	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.04**	**0.03**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**4.84**	**0.37**	**2.16**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**4.84**	**0.37**	**2.16**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.9**	**0.2**	**0.5**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**5.7**	**0.6**	**2.7**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	<0.01	**0.01**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH12	GW-D3	GW-D4	----	----
				Client sampling date / time	09-Feb-2018 00:00	09-Feb-2018 00:00	09-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802224-005	EP1802224-006	EP1802224-007	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**137**	**114**	**110**	----	----
Toluene-D8	2037-26-5	2	%		**93.2**	**90.9**	**90.9**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**89.4**	**89.7**	**88.4**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	A2	A2S	BLNS-B1	WQA02_080218	----
				Client sampling date / time	08-Feb-2018 00:00	08-Feb-2018 00:00	08-Feb-2018 00:00	08-Feb-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1802224-001	EP1802224-002	EP1802224-003	EP1802224-004	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.05**	**0.05**	**0.05**	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.006**	**0.006**	**0.007**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.06**	**0.06**	<0.05	<0.05	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	**0.07**	**0.06**	**0.06**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.035**	**0.033**	**0.032**	**0.032**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.13**	**0.12**	**0.09**	**0.10**	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.01**	**0.01**	**0.01**	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**3.0**	**2.8**	**2.9**	**2.7**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.0**	**2.8**	**2.9**	**2.7**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	A2	A2S	BLNS-B1	WQA02_080218	----
				Client sampling date / time	08-Feb-2018 00:00	08-Feb-2018 00:00	08-Feb-2018 00:00	08-Feb-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1802224-001	EP1802224-002	EP1802224-003	EP1802224-004	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.15**	**0.10**	**0.10**	**0.08**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**73**	**25**	**26**	**25**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**106**	**110**	**140**	**136**	----
Toluene-D8	2037-26-5	2	%		**95.2**	**91.8**	**95.1**	**94.0**	----
4-Bromofluorobenzene	460-00-4	2	%		**90.4**	**89.5**	**88.4**	**88.9**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA04_DB TBW 999	WQA03_080218	WQA03_090218	----	----
				Client sampling date / time	09-Feb-2018 00:00	08-Feb-2018 00:00	09-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802224-008	EP1802224-009	EP1802224-010	--------	--------
					Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	<0.01	<0.01	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	<0.05	<0.05	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	<2	<2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		----	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		----	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		----	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		----	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		----	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		----	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		----	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		----	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		----	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA04_DB TBW 999	WQA03_080218	WQA03_090218	----	----
				Client sampling date / time	09-Feb-2018 00:00	08-Feb-2018 00:00	09-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1802224-008	EP1802224-009	EP1802224-010	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**137**	**136**	**141**	**----**	**----**
Toluene-D8	2037-26-5	2	%		**93.6**	**94.8**	**92.8**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**88.7**	**89.9**	**89.3**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1802359**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Feb-2018 16:20
Order number	: W81020-103	Date Analysis Commenced	: 13-Feb-2018
C-O-C number	: ----	Issue Date	: 20-Feb-2018 17:20
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG093: All samples were run on EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D8	T3B	T3C	T4B	T4C
				Client sampling date / time	12-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802359-001	EP1802359-002	EP1802359-003	EP1802359-004	EP1802359-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.16**	**0.04**	**0.05**	**0.24**	**0.03**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.004**	**0.015**	**0.004**	**0.006**
Nickel	7440-02-0	0.001	mg/L		**0.008**	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.18**	**0.70**	**1.29**	**0.09**	**3.90**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.14**	**0.04**	**0.09**	**1.04**	**0.19**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.57**	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.57**	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**0.2**	**0.2**	**1.4**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.4**	**0.2**	**0.2**	**1.4**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	<0.01	<0.01	**0.34**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.03**	<0.01	<0.01	**0.34**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D8	T3B	T3C	T4B	T4C
				Client sampling date / time	12-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802359-001	EP1802359-002	EP1802359-003	EP1802359-004	EP1802359-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**107**	**104**	**101**	**101**	**104**
Toluene-D8	2037-26-5	2	%		**96.8**	**97.0**	**99.4**	**95.3**	**98.6**
4-Bromofluorobenzene	460-00-4	2	%		**90.1**	**88.7**	**92.1**	**90.8**	**91.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA05_DB TBW 998	WQA03_130218	BH10
				Client sampling date / time	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802359-006	EP1802359-007	EP1802359-008	EP1802359-009	EP1802359-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.11**	**0.35**	----	----	**0.24**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	**0.003**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	**0.005**	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.001**	<0.001	----	----	**0.011**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	<0.005
Iron	7439-89-6	0.05	mg/L		**0.47**	**0.06**	----	----	**3.42**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	<0.01	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	----	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	----	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.05**	----	----	**0.16**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	<0.01	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.27**	**0.23**	----	----	**0.01**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.28**	**0.23**	----	----	**0.01**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**1.0**	----	----	**1.0**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.5**	**1.2**	----	----	**1.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA05_DB TBW 998	WQA03_130218	BH10
				Client sampling date / time	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00	13-Feb-2018 00:00
Compound	CAS Number	LOR	Unit		EP1802359-006	EP1802359-007	EP1802359-008	EP1802359-009	EP1802359-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.02**	**----**	**----**	**0.04**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**----**	**----**	**0.02**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	**----**	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	**----**	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	**----**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	**----**	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	**----**	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**99.2**	**104**	**110**	**105**	**105**
Toluene-D8	2037-26-5	2	%		**100**	**98.7**	**95.3**	**99.9**	**95.5**
4-Bromofluorobenzene	460-00-4	2	%		**88.6**	**90.3**	**88.0**	**88.0**	**89.2**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1804348**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 04-Apr-2018 16:14
Order number	: W81020-103	Date Analysis Commenced	: 04-Apr-2018
C-O-C number	: ----	Issue Date	: 13-Apr-2018 00:02
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 14		
No. of samples analysed	: 14		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC Metals analysis conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG093: All samples were run on EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	T2F	GW-D5	GW-D8	BH12
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804348-001	EP1804348-002	EP1804348-003	EP1804348-004	EP1804348-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.30**	**0.09**	**0.85**	**0.31**	<0.01
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.003**	**0.001**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.087**	<0.001	**0.003**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.005**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.38**	**9.92**	**0.98**	**0.23**	**0.05**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.36**	**0.44**	**0.05**	**0.10**	**0.03**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	**4.32**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	**4.32**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**1.3**	**0.6**	**1.2**	**0.9**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.8**	**1.3**	**0.6**	**1.2**	**5.2**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.02**	**0.20**	**0.05**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.06**	<0.01	<0.01	**0.02**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	T2F	GW-D5	GW-D8	BH12
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804348-001	EP1804348-002	EP1804348-003	EP1804348-004	EP1804348-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**120**	**120**	**125**	**117**	**114**
Toluene-D8	2037-26-5	2	%		**80.9**	**95.5**	**109**	**101**	**116**
4-Bromofluorobenzene	460-00-4	2	%		**83.0**	**87.9**	**93.0**	**88.1**	**94.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA03_040418	WQA05_DB TBW 404	WQA01_040418
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804348-006	EP1804348-007	EP1804348-008	EP1804348-009	EP1804348-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.08**	**0.23**	----	----	**0.32**
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.001**	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.002**	<0.001	----	----	**0.006**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	<0.005
Iron	7439-89-6	0.05	mg/L		**0.67**	**0.06**	----	----	**0.37**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	----	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	**0.06**	----	----	**0.37**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	----	----	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	----	----	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	**0.5**	----	----	**0.7**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	**0.5**	----	----	**0.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA03_040418	WQA05_DB TBW 404	WQA01_040418
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804348-006	EP1804348-007	EP1804348-008	EP1804348-009	EP1804348-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	<0.01	**----**	**----**	**0.06**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**----**	**----**	**0.05**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	**----**	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	**----**	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	**----**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	**----**	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	**----**	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	**----**	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**123**	**120**	**108**	**120**	**128**
Toluene-D8	2037-26-5	2	%		**117**	**89.4**	**101**	**83.7**	**92.9**
4-Bromofluorobenzene	460-00-4	2	%		**93.0**	**94.1**	**93.7**	**86.2**	**93.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1	A2	A2S	WAQ02_040418	----
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1804348-011	EP1804348-012	EP1804348-013	EP1804348-014	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.06**	**0.06**	**0.05**	**0.06**	----
Arsenic	7440-38-2	0.001	mg/L		**0.003**	**0.003**	**0.003**	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.014**	**0.017**	**0.014**	**0.015**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.07**	**0.07**	**0.14**	**0.08**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.35**	**0.07**	**0.14**	**0.11**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.047**	**0.041**	**0.042**	**0.041**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.006**	**0.011**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.83**	**0.14**	**0.34**	**0.28**	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.07**	**0.07**	**0.06**	**0.09**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**5.1**	**3.8**	**4.3**	**4.0**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**5.1**	**3.8**	**4.3**	**4.0**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1	A2	A2S	WAQ02_040418	----
				Client sampling date / time	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	04-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1804348-011	EP1804348-012	EP1804348-013	EP1804348-014	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.18**	**0.08**	**0.13**	**0.09**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**24**	**19**	**32**	**50**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	**120**	<100	**100**	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	**120**	<100	**100**	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	**121**	**124**	**124**	----
Toluene-D8	2037-26-5	2	%		**102**	**108**	**101**	**84.7**	----
4-Bromofluorobenzene	460-00-4	2	%		**84.9**	**103**	**81.1**	**84.6**	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1803361**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Mar-2018 15:20
Order number	: W81020-103	Date Analysis Commenced	: 09-Mar-2018
C-O-C number	: ----	Issue Date	: 16-Mar-2018 17:28
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B	T3C	BH10	NLWS-N2	A2S
				Client sampling date / time	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803361-001	EP1803361-002	EP1803361-003	EP1803361-004	EP1803361-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.02**	**0.28**	**0.01**	**0.05**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.003**	**0.003**	**0.002**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.022**	**0.011**	**0.490**	**0.012**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.76**	**1.95**	**2.99**	**1.04**	<0.05
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	**0.03**	**0.07**
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	----	----	**0.002**	<0.001
Manganese	7439-96-5	0.001	mg/L		----	----	----	**0.478**	**0.041**
Nickel	7440-02-0	0.001	mg/L		----	----	----	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		----	----	----	**7.31**	**0.14**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	----	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.07**	**0.12**	**0.02**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.01**	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.01**	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.2**	**1.0**	**6.1**	**3.5**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**0.2**	**1.0**	**6.1**	**3.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B	T3C	BH10	NLWS-N2	A2S
				Client sampling date / time	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803361-001	EP1803361-002	EP1803361-003	EP1803361-004	EP1803361-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.02**	**0.05**	**0.17**	**0.11**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**----**	**----**	**----**	**68**	**20**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**180**	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	**180**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**200**	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	**200**	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**123**	**126**	**137**	**135**	**138**
Toluene-D8	2037-26-5	2	%		**98.2**	**97.9**	**94.6**	**92.2**	**91.0**
4-Bromofluorobenzene	460-00-4	2	%		**73.3**	**73.4**	**72.5**	**76.8**	**74.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BLNS-B1	A2	WQA05_TBW119	WQA03_090318	WQA02_090318
			Client sampling date / time	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	EP1803361-006	EP1803361-007	EP1803361-008	EP1803361-009	EP1803361-010
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.05**	**0.04**	----	----	**0.05**
Arsenic	7440-38-2	0.001	mg/L	**0.002**	**0.003**	----	----	**0.003**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.015**	**0.014**	----	----	**0.015**
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	<0.005
Iron	7439-89-6	0.05	mg/L	**0.05**	<0.05	----	----	<0.05
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.08**	**0.07**	----	<0.01	**0.07**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.041**	**0.048**	----	<0.001	**0.038**
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.014**	<0.005	----	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L	**0.14**	**0.12**	----	<0.05	**0.13**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	<2	----	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	<2	----	<2	<2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	----	----	<0.01
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	<0.01	----	----	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	<0.01	----	----	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**3.5**	**3.6**	----	----	**3.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**3.5**	**3.6**	----	----	**3.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1	A2	WQA05_TBW119	WQA03_090318	WQA02_090318
				Client sampling date / time	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00	09-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803361-006	EP1803361-007	EP1803361-008	EP1803361-009	EP1803361-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.13**	**0.10**	**----**	**----**	**0.13**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**----**	**----**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**25**	**19**	**----**	**----**	**24**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	**----**	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	**----**	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	**----**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	**----**	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	**----**	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	**----**	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**138**	**136**	**124**	**127**	**139**
Toluene-D8	2037-26-5	2	%		**90.8**	**91.5**	**95.4**	**94.5**	**91.8**
4-Bromofluorobenzene	460-00-4	2	%		**72.3**	**72.3**	**71.8**	**71.8**	**72.5**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1803480**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Mar-2018 16:30
Order number	: W181020-103	Date Analysis Commenced	: 13-Mar-2018
C-O-C number	: ----	Issue Date	: 20-Mar-2018 08:51
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG093: All samples were run on EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	GW-D4	GW-D8	BH12	----	----
				Client sampling date / time	12-Mar-2018 00:00	13-Mar-2018 00:00	13-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1803480-001	EP1803480-002	EP1803480-003	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.38**	**0.16**	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.001**	**0.003**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.007**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.030**	**0.006**	**0.010**	----	----
Iron	7439-89-6	0.05	mg/L		**0.10**	**0.32**	<0.05	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	**0.10**	**0.02**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**4.19**	**0.05**	**4.72**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**4.20**	**0.05**	**4.72**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**1.0**	**0.5**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**4.5**	**1.0**	**5.2**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.05**	<0.02	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.02**	<0.01	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	GW-D4	GW-D8	BH12	----	----
				Client sampling date / time	12-Mar-2018 00:00	13-Mar-2018 00:00	13-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1803480-001	EP1803480-002	EP1803480-003	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**78.8**	**67.0**	**70.0**	----	----
Toluene-D8	2037-26-5	2	%		**109**	**121**	**109**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**87.1**	**79.5**	**87.4**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA04_TBW118	----	----	----	----
				Client sampling date / time	13-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1803480-004	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**68.6**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**110**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**87.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1803299**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 08-Mar-2018 14:55
Order number	: W81020-103	Date Analysis Commenced	: 08-Mar-2018
C-O-C number	: ----	Issue Date	: 16-Mar-2018 10:48
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Raymond Commodore	Instrument Chemist	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Samples EP1803299-001 and 010 are positive for the C6-C9 fraction due to compounds other than BTEX.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	GW-D3	GW-D5	T4B	T4C
				Client sampling date / time	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803299-001	EP1803299-002	EP1803299-003	EP1803299-004	EP1803299-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.40**	**0.02**	**0.51**	**0.23**	**0.02**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	**0.002**	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.007**	**0.006**	**0.003**	**0.004**	**0.006**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.44**	**0.58**	**3.97**	**0.08**	**3.94**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.36**	**0.03**	**0.09**	**0.83**	**0.20**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.22**	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.22**	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	<0.1	**0.5**	**1.0**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.8**	**0.2**	**0.5**	**1.0**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**1.11**	**0.01**	**0.27**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.05**	<0.01	**0.01**	**0.27**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		**30**	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A	GW-D3	GW-D5	T4B	T4C
				Client sampling date / time	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803299-001	EP1803299-002	EP1803299-003	EP1803299-004	EP1803299-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	**88.4**	**102**	**103**	**104**
Toluene-D8	2037-26-5	2	%		**95.6**	**103**	**97.1**	**96.7**	**94.8**
4-Bromofluorobenzene	460-00-4	2	%		**79.2**	**72.4**	**76.6**	**84.0**	**79.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA04_TBW 117	WQA03_080318	WQA01_080318
				Client sampling date / time	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803299-006	EP1803299-007	EP1803299-008	EP1803299-009	EP1803299-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	**0.30**	----	----	**0.41**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	**0.004**	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.002**	<0.001	----	----	**0.007**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	<0.005
Iron	7439-89-6	0.05	mg/L		**0.58**	**0.06**	----	----	**0.45**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	<0.01	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	----	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	----	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.04**	----	----	**0.36**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.06**	**0.26**	----	----	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.06**	**0.26**	----	----	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	**0.6**	----	----	**0.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	**0.9**	----	----	**0.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1	D2	WQA04_TBW 117	WQA03_080318	WQA01_080318
				Client sampling date / time	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00	08-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		EP1803299-006	EP1803299-007	EP1803299-008	EP1803299-009	EP1803299-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	----	----	**0.06**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	**0.05**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**30**
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.4**	**98.8**	**94.9**	**91.9**	**101**
Toluene-D8	2037-26-5	2	%		**98.2**	**97.9**	**97.6**	**101**	**99.8**
4-Bromofluorobenzene	460-00-4	2	%		**76.5**	**79.2**	**76.2**	**74.6**	**78.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2F	----	----	----	----
				Client sampling date / time	08-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1803299-011	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.045**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**1.63**	----	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.38**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.7**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.7**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2F	----	----	----	----
				Client sampling date / time	08-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1803299-011	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**93.2**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**79.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1804292**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 03-Apr-2018 17:05
Order number	: W81020-103	Date Analysis Commenced	: 03-Apr-2018
C-O-C number	: ----	Issue Date	: 11-Apr-2018 17:48
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ORC METALS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D4	BH10	T3B	T3C
				Client sampling date / time	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804292-001	EP1804292-002	EP1804292-003	EP1804292-004	EP1804292-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**3.55**	**0.02**	**0.04**	**0.01**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.004**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.004**	<0.001	**0.006**	**0.003**	**0.023**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.44**	**0.67**	**3.07**	**0.84**	**1.85**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	**0.02**	**0.09**	**0.05**	**0.10**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.30**	**4.44**	**0.03**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.30**	**4.44**	**0.03**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.1**	**0.8**	**0.4**	**0.1**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**5.2**	**0.4**	**0.1**	**0.2**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.08**	**0.04**	<0.01	**0.03**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.02**	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3	GW-D4	BH10	T3B	T3C
				Client sampling date / time	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EP1804292-001	EP1804292-002	EP1804292-003	EP1804292-004	EP1804292-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	**110**	**115**	**118**	**114**
Toluene-D8	2037-26-5	2	%		**101**	**101**	**99.9**	**99.0**	**99.2**
4-Bromofluorobenzene	460-00-4	2	%		**82.2**	**79.7**	**82.0**	**80.9**	**79.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4C	T4B	WQA03_030418	WQA04_DB TBW 246	----
				Client sampling date / time	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1804292-006	EP1804292-007	EP1804292-008	EP1804292-009	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.34**	**0.18**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.013**	**0.003**	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		**2.77**	**0.08**	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.23**	**0.78**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**0.9**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	**0.9**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4C	T4B	WQA03_030418	WQA04_DB TBW 246	----
				Client sampling date / time	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	03-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1804292-006	EP1804292-007	EP1804292-008	EP1804292-009	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.37**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.28**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**116**	**118**	**113**	**117**	----
Toluene-D8	2037-26-5	2	%		**97.5**	**97.9**	**103**	**99.5**	----
4-Bromofluorobenzene	460-00-4	2	%		**79.7**	**80.9**	**80.6**	**79.9**	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1805453**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 02-May-2018 03:45
Order number	: W81020-103	Date Analysis Commenced	: 02-May-2018
C-O-C number	: ----	Issue Date	: 10-May-2018 17:53
Sampler	: Danielle Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- EG093: Samples were run under EG094 method due to low TDS content.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_020518	A2_020518	A2S_020518	BH12_020518	GW-D3_020518
				Client sampling date / time	02-May-2018 09:33	02-May-2018 09:59	02-May-2018 09:31	02-May-2018 07:54	02-May-2018 13:13
Compound	CAS Number	LOR	Unit		EP1805453-001	EP1805453-002	EP1805453-003	EP1805453-004	EP1805453-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.04**	**0.05**	**0.08**	**0.03**
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.003**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.009**	**0.006**	**0.010**	**0.023**	**0.005**
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.001**	<0.001	**0.002**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	**0.013**	<0.005
Iron	7439-89-6	0.05	mg/L		**0.08**	**0.07**	**0.08**	<0.05	**0.65**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	**0.07**	**0.08**	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.026**	**0.023**	**0.027**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.019**	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**0.17**	**0.16**	**0.19**	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.10**	**0.04**	**0.04**	**0.03**	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**2.89**	**0.52**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**2.89**	**0.52**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**3.9**	**4.0**	**4.0**	**0.4**	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.9**	**4.0**	**4.0**	**3.3**	**0.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_020518	A2_020518	A2S_020518	BH12_020518	GW-D3_020518
				Client sampling date / time	02-May-2018 09:33	02-May-2018 09:59	02-May-2018 09:31	02-May-2018 07:54	02-May-2018 13:13
Compound	CAS Number	LOR	Unit		EP1805453-001	EP1805453-002	EP1805453-003	EP1805453-004	EP1805453-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.05**	**0.07**	**0.04**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**18**	**16**	**20**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**125**	**130**	**127**	**119**
Toluene-D8	2037-26-5	2	%		**99.0**	**92.0**	**93.5**	**93.6**	**95.9**
4-Bromofluorobenzene	460-00-4	2	%		**98.4**	**100**	**100**	**103**	**102**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4_020518	GW-D8_020518	WQA01_020518	WQA02_020518	D2_020518
				Client sampling date / time	02-May-2018 13:42	02-May-2018 09:00	02-May-2018 09:33	02-May-2018 12:40	02-May-2018 12:19
Compound	CAS Number	LOR	Unit		EP1805453-006	EP1805453-007	EP1805453-008	EP1805453-009	EP1805453-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.40**	**0.26**	**0.05**	----	**0.22**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.002**	----	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	**0.003**
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.003**	**0.010**	----	**0.001**
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	**0.001**	----	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	<0.005
Iron	7439-89-6	0.05	mg/L		**0.11**	**0.09**	**0.08**	----	**0.05**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	**0.07**	<0.01	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.026**	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		----	----	**0.16**	<0.05	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	<2	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	**0.11**	<0.01	----	**0.06**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**4.33**	<0.01	<0.01	----	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**4.33**	<0.01	<0.01	----	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**0.8**	**3.9**	----	**0.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**5.1**	**0.8**	**3.9**	----	**0.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D4_020518	GW-D8_020518	WQA01_020518	WQA02_020518	D2_020518
				Client sampling date / time	02-May-2018 13:42	02-May-2018 09:00	02-May-2018 09:33	02-May-2018 12:40	02-May-2018 12:19
Compound	CAS Number	LOR	Unit		EP1805453-006	EP1805453-007	EP1805453-008	EP1805453-009	EP1805453-010
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.03**	**0.07**	**----**	**0.10**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.02**	<0.01	**----**	<0.01
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**----**	**----**	**17**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**128**	**131**	**86.5**	**128**
Toluene-D8	2037-26-5	2	%		**97.0**	**91.3**	**90.0**	**78.7**	**93.8**
4-Bromofluorobenzene	460-00-4	2	%		**98.3**	**101**	**99.6**	**93.4**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_020518	----	----	----	----
				Client sampling date / time	02-May-2018 12:46	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1805453-011	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.07**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.73**	----	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.08**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.08**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.1**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.2**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_020518	----	----	----	----
				Client sampling date / time	02-May-2018 12:46	----	----	----	----
Compound	CAS Number	LOR	Unit		EP1805453-011	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**112**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**97.4**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**99.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1805524**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 03-May-2018 17:30
Order number	: W81020-103	Date Analysis Commenced	: 03-May-2018
C-O-C number	: ----	Issue Date	: 14-May-2018 21:06
Sampler	: Danielle Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Orc Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_030518	T4B_030518	T3C_030518	T4C_030518	GW-D5_030518
				Client sampling date / time	03-May-2018 10:19	03-May-2018 09:06	03-May-2018 11:23	03-May-2018 09:44	03-May-2018 12:00
Compound	CAS Number	LOR	Unit		EP1805524-001	EP1805524-002	EP1805524-003	EP1805524-004	EP1805524-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.13**	**0.22**	**0.01**	**0.03**	**0.78**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.003**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.005**	**0.004**	**0.013**	**0.006**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.94**	**0.08**	**1.03**	**4.36**	**0.77**
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.79**	**0.06**	**0.20**	**0.05**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.01**	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.01**	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.9**	<0.1	**0.3**	**0.7**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	**0.9**	<0.1	**0.3**	**0.7**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.42**	<0.01	<0.01	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.29**	<0.01	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3B_030518	T4B_030518	T3C_030518	T4C_030518	GW-D5_030518
				Client sampling date / time	03-May-2018 10:19	03-May-2018 09:06	03-May-2018 11:23	03-May-2018 09:44	03-May-2018 12:00
Compound	CAS Number	LOR	Unit		EP1805524-001	EP1805524-002	EP1805524-003	EP1805524-004	EP1805524-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**90.4**	**100**	**111**	**96.9**	**101**
Toluene-D8	2037-26-5	2	%		**102**	**95.2**	**91.7**	**96.0**	**94.2**
4-Bromofluorobenzene	460-00-4	2	%		**96.2**	**93.7**	**95.5**	**94.5**	**96.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A_030518	WQA01_030518	WQA03_030518	KA_030518	BH10_030518
				Client sampling date / time	03-May-2018 12:59	03-May-2018 00:00	03-May-2018 00:00	03-May-2018 14:02	03-May-2018 10:45
Compound	CAS Number	LOR	Unit		EP1805524-006	EP1805524-007	EP1805524-008	EP1805524-009	EP1805524-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	----	----	6.56	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	----	----	178	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	----	----	138	----
EA041: Colour (True)									
Colour (True)	----	1	PCU		----	----	----	<1	----
pH Colour	----	0.01	pH Unit		----	----	----	6.90	----
EA075: Redox Potential									
Redox Potential	----	0.1	mV		----	----	----	44.7	----
pH Redox	----	0.01	pH Unit		----	----	----	6.83	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	----	10	----
Total Alkalinity as CaCO3	----	1	mg/L		----	----	----	10	----
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L		----	----	----	7	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	----	----	19	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	----	----	14	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	----	6	----
Magnesium	7439-95-4	1	mg/L		----	----	----	4	----
Sodium	7440-23-5	1	mg/L		----	----	----	21	----
Potassium	7440-09-7	1	mg/L		----	----	----	2	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.32	0.32	----	----	0.23
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	0.002
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		0.001	<0.001	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A_030518	WQA01_030518	WQA03_030518	KA_030518	BH10_030518
				Client sampling date / time	03-May-2018 12:59	03-May-2018 00:00	03-May-2018 00:00	03-May-2018 14:02	03-May-2018 10:45
Compound	CAS Number	LOR	Unit		EP1805524-006	EP1805524-007	EP1805524-008	EP1805524-009	EP1805524-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.006**	----	----	**0.013**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	<0.005
Iron	7439-89-6	0.05	mg/L		**0.29**	**0.30**	----	----	**1.89**
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	----	----	<2
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	<2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.35**	**0.33**	----	----	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	----	----	**0.08**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	----	----	**0.08**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.9**	**0.7**	----	----	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.9**	**0.7**	----	----	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**0.03**	----	----	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.04**	**0.02**	----	----	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-T3E-A_030518	WQA01_030518	WQA03_030518	KA_030518	BH10_030518
				Client sampling date / time	03-May-2018 12:59	03-May-2018 00:00	03-May-2018 00:00	03-May-2018 14:02	03-May-2018 10:45
Compound	CAS Number	LOR	Unit		EP1805524-006	EP1805524-007	EP1805524-008	EP1805524-009	EP1805524-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	----	----	0.99	----
Total Cations	----	0.01	meq/L		----	----	----	1.59	----
EP025: Oxygen - Dissolved (DO)									
Dissolved Oxygen	----	0.1	mg/L		----	----	----	8.1	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		102	110	81.8	----	108
Toluene-D8	2037-26-5	2	%		93.3	92.2	100	----	95.8
4-Bromofluorobenzene	460-00-4	2	%		98.2	96.4	98.4	----	93.6

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1806724**	Page	: 1 of 5
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 31-May-2018 17:20
Order number	: W81020-103	Date Analysis Commenced	: 31-May-2018
C-O-C number	: ----	Issue Date	: 11-Jun-2018 16:50
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Analytical Results
- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Orc Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG020 : It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	BLNS-B1_31_05_18	A2_31_05_18	A2S_31_05_18	WQA02_31_05_18	WQA03_31_05_18
				Client sampling date / time	31-May-2018 10:49	31-May-2018 11:06	31-May-2018 10:44	31-May-2018 00:00	31-May-2018 10:26
					EP1806724-001	EP1806724-002	EP1806724-003	EP1806724-004	EP1806724-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.03**	**0.03**	**0.02**	**0.02**	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.002**	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.004**	**0.003**	**0.004**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.06**	**0.06**	**0.06**	**0.06**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.05**	**0.12**	**0.05**	**0.06**	<0.01
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.018**	**0.026**	**0.018**	**0.020**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.15**	**0.35**	**0.13**	**0.16**	<0.05
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	<0.01	<0.01	**0.02**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	<0.01	<0.01	**0.02**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.7**	**2.8**	**2.7**	**2.6**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.7**	**2.8**	**2.7**	**2.6**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_31_05_18	A2_31_05_18	A2S_31_05_18	WQA02_31_05_18	WQA03_31_05_18
				Client sampling date / time	31-May-2018 10:49	31-May-2018 11:06	31-May-2018 10:44	31-May-2018 00:00	31-May-2018 10:26
Compound	CAS Number	LOR	Unit		EP1806724-001	EP1806724-002	EP1806724-003	EP1806724-004	EP1806724-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.09**	**0.05**	**0.06**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**----**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**30**	**18**	**12**	**20**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**84.0**	**96.1**	**103**	**90.9**	**95.7**
Toluene-D8	2037-26-5	2	%		**104**	**101**	**96.2**	**98.6**	**96.4**
4-Bromofluorobenzene	460-00-4	2	%		**94.9**	**96.7**	**98.8**	**94.9**	**96.5**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1806777**	Page	: 1 of 4
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MDC	Date Samples Received	: 01-Jun-2018 17:15
Order number	: W81020-103	Date Analysis Commenced	: 06-Jun-2018
C-O-C number	: ----	Issue Date	: 08-Jun-2018 16:37
Sampler	: LF		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Orc Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	PB-East	----	----	----	----
			Client sampling date / time	01-Jun-2018 16:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1806777-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.64**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**219**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**164**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**30**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**30**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**15**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**38**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**11**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**4**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**23**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**2**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.21**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.001**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.009**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.001**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.015**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.54**	----	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	<2	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**1.98**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**PB-East**	----	----	----	----
				Client sampling date / time	01-Jun-2018 16:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP1806777-001**	--------	--------	--------	--------
					Result	----	----	----	----
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		**1.93**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1806776**	Page	: 1 of 9
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 01-Jun-2018 17:10
Order number	: W81020-103	Date Analysis Commenced	: 01-Jun-2018
C-O-C number	: ----	Issue Date	: 12-Jun-2018 12:18
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Analytical Results
- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK061G/EK067G (TKN/TP): LOR for sample 'BH12_01_06_18' raised due to possible sample matrix interference.
- Amendment (12/06/2018): This report has been amended to alter the client code. All analysis results are as per the previous report.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_01_06_18	GW-D4_01_06_18	GW-D5_01_06_18	GW-D8_01_06_18	T3B_01_06_18
				Client sampling date / time	01-Jun-2018 09:00	01-Jun-2018 09:50	01-Jun-2018 00:00	01-Jun-2018 10:45	01-Jun-2018 12:50
Compound	CAS Number	LOR	Unit		EP1806776-001	EP1806776-002	EP1806776-003	EP1806776-004	EP1806776-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.40**	**0.44**	**0.16**	**0.16**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.008**	<0.001	**0.001**	**0.002**	**0.005**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.80**	**0.10**	**0.95**	**0.07**	**0.97**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	**0.02**	**0.08**	**0.11**	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.35**	**0.67**	**0.02**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.35**	**0.67**	**0.02**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.6**	**0.5**	**0.7**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**1.3**	**0.5**	**0.7**	**0.2**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	**0.02**	<0.01	**0.05**	**0.01**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	**0.02**	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_01_06_18	GW-D4_01_06_18	GW-D5_01_06_18	GW-D8_01_06_18	T3B_01_06_18
				Client sampling date / time	01-Jun-2018 09:00	01-Jun-2018 09:50	01-Jun-2018 00:00	01-Jun-2018 10:45	01-Jun-2018 12:50
Compound	CAS Number	LOR	Unit		EP1806776-001	EP1806776-002	EP1806776-003	EP1806776-004	EP1806776-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.7**	**110**	**94.2**	**124**	**128**
Toluene-D8	2037-26-5	2	%		**78.5**	**74.6**	**87.2**	**88.9**	**86.7**
4-Bromofluorobenzene	460-00-4	2	%		**83.3**	**80.1**	**87.1**	**82.2**	**85.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3C_01_06_18	BH10_01_06_18	BH12_01_06_18	GW-T3E-A_01_06_18	WQA01_01_06_18
				Client sampling date / time	01-Jun-2018 13:45	01-Jun-2018 13:16	01-Jun-2018 08:04	01-Jun-2018 14:41	01-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		EP1806776-006	EP1806776-007	EP1806776-008	EP1806776-009	EP1806776-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	**0.19**	<0.01	**0.34**	**0.32**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.012**	**0.008**	**0.020**	**0.006**	**0.007**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	**0.016**	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.95**	**1.08**	<0.05	**0.47**	**0.48**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.07**	**0.03**	**0.02**	**0.36**	**0.35**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.08**	**3.22**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.08**	**3.22**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	**0.6**	**0.6**	**0.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	**3.8**	**0.6**	**0.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.03**	<0.02	**0.07**	**0.07**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	**0.05**	**0.05**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	**100**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T3C_01_06_18	BH10_01_06_18	BH12_01_06_18	GW-T3E-A_01_06_18	WQA01_01_06_18
				Client sampling date / time	01-Jun-2018 13:45	01-Jun-2018 13:16	01-Jun-2018 08:04	01-Jun-2018 14:41	01-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		EP1806776-006	EP1806776-007	EP1806776-008	EP1806776-009	EP1806776-010
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**100**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**100**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**78.0**	**88.6**	**136**	**124**	**110**
Toluene-D8	2037-26-5	2	%		**75.6**	**87.8**	**91.0**	**73.6**	**75.9**
4-Bromofluorobenzene	460-00-4	2	%		**82.4**	**81.6**	**87.1**	**80.5**	**82.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA03_01_06_18	D1_01_06_18	D2_01_06_18	----	----
				Client sampling date / time	01-Jun-2018 00:00	01-Jun-2018 11:49	01-Jun-2018 11:20	----	----
Compound	CAS Number	LOR	Unit		EP1806776-011	EP1806776-012	EP1806776-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	**0.06**	**0.26**	----	----
Arsenic	7440-38-2	0.001	mg/L		----	<0.001	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	**0.001**	----	----
Copper	7440-50-8	0.001	mg/L		----	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		----	<0.001	**0.005**	----	----
Manganese	7439-96-5	0.001	mg/L		----	**0.003**	**0.001**	----	----
Nickel	7440-02-0	0.001	mg/L		----	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		----	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		----	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		----	**0.51**	**0.06**	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	**0.03**	**0.07**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	**0.42**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	**0.42**	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	<0.1	**0.7**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA03_01_06_18	D1_01_06_18	D2_01_06_18	----	----
				Client sampling date / time	01-Jun-2018 00:00	01-Jun-2018 11:49	01-Jun-2018 11:20	----	----
Compound	CAS Number	LOR	Unit		EP1806776-011	EP1806776-012	EP1806776-013	--------	--------
					Result	Result	Result	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**----**	**0.4**	**0.7**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**----**	<0.01	**0.01**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**----**	<0.01	<0.01	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	**----**	**----**
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	**----**	**----**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	**----**	**----**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	**----**	**----**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	**----**	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	**----**	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	**----**	**----**
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	**----**	**----**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	**----**	**----**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	**----**	**----**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	**----**	**----**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	**----**	**----**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	**----**	**----**
Toluene	108-88-3	2	µg/L		<2	<2	<2	**----**	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	**----**	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	**----**	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	**----**	**----**
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	**----**	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	**----**	**----**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**114**	**121**	**91.0**	**----**	**----**
Toluene-D8	2037-26-5	2	%		**75.9**	**74.9**	**89.7**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**80.8**	**81.4**	**87.2**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1807736**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Jun-2018 17:50
Order number	: W81020-103	Date Analysis Commenced	: 27-Jun-2018
C-O-C number	: ----	Issue Date	: 04-Jul-2018 22:57
Sampler	: D. Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 12		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5_27_06_18	T3B_27_06_18	T4B_27_06_18	T4C_27_06_18	D2_27_06_18
				Client sampling date / time	27-Jun-2018 10:02	27-Jun-2018 11:38	27-Jun-2018 12:16	27-Jun-2018 12:41	27-Jun-2018 08:21
Compound	CAS Number	LOR	Unit		EP1807736-001	EP1807736-002	EP1807736-003	EP1807736-004	EP1807736-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.54**	**0.91**	**0.20**	**0.02**	**0.19**
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.003**
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.003**	**0.006**	**0.005**	**0.001**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.14**	**0.58**	**0.08**	**4.15**	<0.05
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.10**	**0.02**	**0.88**	**0.19**	**0.04**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**0.49**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**0.49**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.5**	**0.1**	**1.0**	**0.3**	**0.5**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.5**	**0.1**	**1.0**	**0.3**	**1.0**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.02**	**0.24**	<0.01	**0.03**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.01**	<0.01	**0.24**	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D5_27_06_18	T3B_27_06_18	T4B_27_06_18	T4C_27_06_18	D2_27_06_18
				Client sampling date / time	27-Jun-2018 10:02	27-Jun-2018 11:38	27-Jun-2018 12:16	27-Jun-2018 12:41	27-Jun-2018 08:21
Compound	CAS Number	LOR	Unit		EP1807736-001	EP1807736-002	EP1807736-003	EP1807736-004	EP1807736-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**89.4**	**70.0**	**86.4**	**69.2**	**78.8**
Toluene-D8	2037-26-5	2	%		**97.6**	**102**	**99.1**	**104**	**100**
4-Bromofluorobenzene	460-00-4	2	%		**99.6**	**93.0**	**98.4**	**94.5**	**96.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_27_06_18	GW-T3E-A_27_06_18	WQA01_27_06_18	WQA03_27_06_18	----
				Client sampling date / time	27-Jun-2018 08:46	27-Jun-2018 09:17	27-Jun-2018 00:00	27-Jun-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1807736-006	EP1807736-007	EP1807736-008	EP1807736-009	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.28**	**0.31**	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.003**	**0.002**	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.005**	**0.006**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.002**	**0.001**	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.41**	**0.40**	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	<0.01	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		----	----	----	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	**0.35**	**0.34**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.81**	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.83**	<0.01	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.7**	**0.6**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	**0.7**	**0.6**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	D1_27_06_18	GW-T3E-A_27_06_18	WQA01_27_06_18	WQA03_27_06_18	----
				Client sampling date / time	27-Jun-2018 08:46	27-Jun-2018 09:17	27-Jun-2018 00:00	27-Jun-2018 00:00	----
Compound	CAS Number	LOR	Unit		EP1807736-006	EP1807736-007	EP1807736-008	EP1807736-009	--------
					Result	Result	Result	Result	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.06**	**0.05**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.05**	**0.05**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**----**
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	**----**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	**----**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	**----**
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**----**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	**----**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	**----**
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	**----**
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	**----**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**67.4**	**74.4**	**130**	**69.0**	**----**
Toluene-D8	2037-26-5	2	%		**105**	**101**	**84.9**	**106**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**92.0**	**96.7**	**112**	**93.7**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1807774**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 28-Jun-2018 16:00
Order number	: W81020-103	Date Analysis Commenced	: 28-Jun-2018
C-O-C number	: ----	Issue Date	: 05-Jul-2018 13:24
Sampler	: D Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020: It is recognised that total nickel is less than dissolved nickel for sample 'BLNS-B1_28_06_18'. However, the difference is within experimental variation of the methods.
- EK061G/EK067G (TKN/TP): LOR for sample EP1807774-005 raised due to possible sample matrix interference.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_28_06_18	GW-D4_28_06_18	GW-D8_28_06_18	BH10_28_06_18	BH12_28_06_18
				Client sampling date / time	28-Jun-2018 08:11	28-Jun-2018 10:59	28-Jun-2018 10:16	28-Jun-2018 11:27	28-Jun-2018 07:36
Compound	CAS Number	LOR	Unit		EP1807774-001	EP1807774-002	EP1807774-003	EP1807774-004	EP1807774-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.28**	**0.14**	**0.07**	<0.01
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.009**	<0.001	**0.001**	<0.001	**0.017**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	**0.002**
Zinc	7440-66-6	0.005	mg/L		**0.008**	<0.005	<0.005	<0.005	**0.014**
Iron	7439-89-6	0.05	mg/L		**0.59**	**0.16**	<0.05	<0.05	<0.05
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	<2
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.07**	**0.02**	**0.10**	**0.06**	**0.02**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.26**	**0.20**	**0.07**	**0.13**	**2.91**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.26**	**0.20**	**0.07**	**0.13**	**2.91**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**1.8**	**0.6**	**0.4**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**2.0**	**0.7**	**0.5**	**3.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.06**	**0.06**	**0.07**	<0.02
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	**0.02**	<0.01	<0.01
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-D3_28_06_18	GW-D4_28_06_18	GW-D8_28_06_18	BH10_28_06_18	BH12_28_06_18
				Client sampling date / time	28-Jun-2018 08:11	28-Jun-2018 10:59	28-Jun-2018 10:16	28-Jun-2018 11:27	28-Jun-2018 07:36
Compound	CAS Number	LOR	Unit		EP1807774-001	EP1807774-002	EP1807774-003	EP1807774-004	EP1807774-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**118**	**114**	**120**	**115**
Toluene-D8	2037-26-5	2	%		**98.3**	**96.7**	**93.2**	**97.0**	**98.6**
4-Bromofluorobenzene	460-00-4	2	%		**104**	**106**	**104**	**105**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_28_06_18	A2_28_06_18	A2S_28_06_18	WQA02_28_06_18	WQA03_28_06_18
				Client sampling date / time	28-Jun-2018 09:00	28-Jun-2018 09:17	28-Jun-2018 08:55	28-Jun-2018 00:00	28-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		EP1807774-006	EP1807774-007	EP1807774-008	EP1807774-009	EP1807774-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	**0.02**	**0.02**	**0.02**	----
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.001**	**0.002**	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.036**	**0.030**	**0.035**	**0.034**	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**0.14**	**0.13**	**0.15**	**0.14**	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.03**	**0.04**	**0.05**	<0.01
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.040**	**0.036**	**0.043**	**0.040**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		----	----	----	----	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Iron	7439-89-6	0.05	mg/L		**0.22**	**0.18**	**0.24**	**0.22**	<0.05
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Selenium	7782-49-2	2	µg/L		<2	<2	<2	<2	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.56**	**0.38**	**0.55**	**0.53**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.04**	**0.03**	**0.02**	**0.05**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.04**	**0.03**	**0.02**	**0.05**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.3**	**2.0**	**2.4**	**2.4**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_28_06_18	A2_28_06_18	A2S_28_06_18	WQA02_28_06_18	WQA03_28_06_18
				Client sampling date / time	28-Jun-2018 09:00	28-Jun-2018 09:17	28-Jun-2018 08:55	28-Jun-2018 00:00	28-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		EP1807774-006	EP1807774-007	EP1807774-008	EP1807774-009	EP1807774-010
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**2.3**	**2.0**	**2.4**	**2.4**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.09**	**0.08**	**0.10**	**0.10**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.04**	**0.03**	**0.05**	**0.04**	**----**
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m³		**1**	<1	**1**	<1	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**121**	**117**	**112**	**126**	**120**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BLNS-B1_28_06_18	A2_28_06_18	A2S_28_06_18	WQA02_28_06_18	WQA03_28_06_18
				Client sampling date / time	28-Jun-2018 09:00	28-Jun-2018 09:17	28-Jun-2018 08:55	28-Jun-2018 00:00	28-Jun-2018 00:00
Compound	CAS Number	LOR	Unit		EP1807774-006	EP1807774-007	EP1807774-008	EP1807774-009	EP1807774-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**95.8**	**95.9**	**96.8**	**96.6**	**96.4**
4-Bromofluorobenzene	460-00-4	2	%		**108**	**104**	**104**	**104**	**104**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP1806725**	Page	: 1 of 5
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 31-May-2018 17:20
Order number	: W81020-103	Date Analysis Commenced	: 31-May-2018
C-O-C number	: ----	Issue Date	: 13-Jun-2018 12:36
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Amendment (13/06/2018): This report has been amended to alter the client code. All analysis results are as per the previous report.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	T4B_31_05_18	T4C_31_05_18	----	----	----
			Client sampling date / time	31-May-2018 09:28	31-May-2018 10:07	----	----	----
Compound	CAS Number	LOR	Unit	EP1806725-001	EP1806725-002	--------	--------	--------
				Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.22**	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.005**	**0.008**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.10**	**4.01**	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.79**	**0.20**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.9**	**0.3**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.9**	**0.3**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.25**	<0.01	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.25**	<0.01	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T4B_31_05_18	T4C_31_05_18	----	----	----
				Client sampling date / time	31-May-2018 09:28	31-May-2018 10:07	----	----	----
Compound	CAS Number	LOR	Unit		EP1806725-001	EP1806725-002	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**110**	**110**	----	----	----
Toluene-D8	2037-26-5	2	%		**97.9**	**96.5**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**99.6**	**98.9**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1706873**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 28-Jun-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jun-2017
C-O-C number	: ----	Issue Date	: 05-Jul-2017
Sampler	: TIM WILLIAMSON		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 974524)									
EP1706873-007	WQA02_280617	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.013	0.013	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	0.14	0.00	No Limit
EP1706817-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.117	0.117	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 976328)									
EP1706873-004	BLNS-B1_	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 976328) - continued									
EP1706873-004	BLNS-B1_	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.024	0.024	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.04	0.07	44.6	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.28	0.31	10.4	No Limit
EP1706876-004	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0047	0.0056	18.3	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.106	0.105	1.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	15.9	16.0	0.454	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.226	0.245	7.99	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.128	0.128	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.100	<0.100	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.44	<0.20	75.7	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.20	<0.20	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	2.22	2.28	2.59	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 970045)									
EP1706849-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	<0.01	68.4	No Limit
EP1706849-011	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 970044)									
EP1706851-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1706873-001	T3B_	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 970046)									
EP1706849-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	22.7	22.5	1.04	0% - 20%
EP1706849-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 973887)									
EP1706818-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.1	0.00	No Limit
EP1706873-002	T3C_	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 973886)									
EP1706818-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	17.4	No Limit
EP1706873-002	T3C_	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 970043)									
EP1706851-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1706873-001	T3B_	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 971131)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 971131) - continued									
EP1706873-004	BLNS-B1_	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP1706881-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 973791)									
EP1706869-022	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1706884-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 971131)									
EP1706873-004	BLNS-B1_	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP1706881-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 973791)									
EP1706869-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1706884-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 973791)									
EP1706869-022	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1706884-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 974524)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.5	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.3	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.2	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.1	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.7	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.4	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.7	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.8	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.7	84	112
EG020T: Total Metals by ICP-MS (QCLot: 976328)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.2	84	103
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	104
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	84	101
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	85	101
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.6	83	98
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.1	86	99
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.5	85	102
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.4	83	100
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	83	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.2	84	109
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.8	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 970045)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 970044)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 970046)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 973887)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.9	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 973886)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.8	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 970043)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	109	87	115
EP008: Chlorophyll (QCLot: 971424)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	95.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 971131)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	75.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	95.6	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	86.8	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 973791)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	88.8	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 971131)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	81.1	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	93.6	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	74.2	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 973791)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	91.2	74	115
EP080: BTEXN (QCLot: 973791)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	85.4	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	98.5	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	106	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	108	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	110	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	95.2	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 974524)							
EP1706817-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	98.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	94.2	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	92.9	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.2	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.0	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	94.3	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 974524) - continued							
EP1706817-002	Anonymous	EG020A-F: Nickel	7440-02-0	0.2 mg/L	92.2	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	94.8	70	130
EG020T: Total Metals by ICP-MS (QCLot: 976328)							
EP1706818-005	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	109	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.2	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	86.4	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	98.8	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	98.6	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	99.8	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	106	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 970045)							
EP1706849-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	100	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 970044)							
EP1706851-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 970046)							
EP1706849-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	121	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 973887)							
EP1706818-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	94.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 973886)							
EP1706818-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	92.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 970043)							
EP1706851-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	113	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 971131)							
EP1706873-004	BLNS-B1_	EP071: C10 - C14 Fraction	----	400 µg/L	71.9	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	96.9	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	86.2	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 973791)							
EP1706873-001	T3B_	EP080: C6 - C9 Fraction	----	240 µg/L	133	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 971131)							
EP1706873-004	BLNS-B1_	EP071: >C10 - C16 Fraction	----	400 µg/L	78.2	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	94.9	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	77.3	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 973791)							
EP1706873-001	T3B_	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	125	77	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 973791)							
EP1706873-001	T3B_	EP080: Benzene	71-43-2	20 µg/L	103	77	122
		EP080: Toluene	108-88-3	20 µg/L	96.7	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1706851**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jun-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jun-2017
C-O-C number	: ----	Issue Date	: 03-Jul-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 971588)									
EP1706824-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.20	0.20	0.00	No Limit
EP1706820-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.017	0.017	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.033	0.034	3.45	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 971591)									
EP1706851-002	GW-D4_	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 971591) - continued									
EP1706851-002	GW-D4_	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1706851-010	WQA01_270617	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.043	0.043	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.022	0.019	12.1	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.17	0.17	0.00	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.31	0.30	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 973415)									
EP1706812-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.026	0.023	11.9	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1706854-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.004	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.017	0.016	0.00	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.008	0.007	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.032	0.034	5.46	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 973415) - continued									
EP1706854-001	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	7.22	7.05	2.39	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	2.70	2.70	0.00	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 969865)									
EP1706851-001	GW-D3_	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	0.00	No Limit
EP1706851-010	WQA01_270617	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.22	0.22	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 970044)									
EP1706851-002	GW-D4_	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1706873-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 969866)									
EP1706851-001	GW-D3_	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.11	0.12	0.00	0% - 50%
EP1706851-010	WQA01_270617	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 969470)									
EP1706851-001	GW-D3_	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 969469)									
EP1706851-001	GW-D3_	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.03	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 970043)									
EP1706851-002	GW-D4_	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1706873-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 971089)									
EP1706851-005	GW-D8_	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 971237)									
EP1706851-001	GW-D3_	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1706851-005	GW-D8_	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 971089)									
EP1706851-005	GW-D8_	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 971237)									
EP1706851-001	GW-D3_	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1706851-005	GW-D8_	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 971237)									
EP1706851-001	GW-D3_	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 971237) - continued									
EP1706851-001	GW-D3_	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1706851-005	GW-D8_	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 971588)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.7	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.9	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.6	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.2	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.4	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.0	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.0	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.3	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	84	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 971591)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.6	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.5	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.6	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.0	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.4	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.6	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.0	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.3	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	84	112
EG020T: Total Metals by ICP-MS (QCLot: 973415)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	91.4	84	103
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.1	85	104
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.7	84	101
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.7	85	101
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	88.1	83	98
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.7	86	99
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.5	85	102
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	84.9	83	100
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.9	83	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.4	84	109

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 973415) - continued								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.4	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 969865)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 970044)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 969866)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	110	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 969470)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	82.3	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 969469)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 970043)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	109	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 971089)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	46.0	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	87.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	72.3	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 971237)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	99.6	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 971089)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	52.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	87.0	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	50.7	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 971237)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	99.0	74	115
EP080: BTEXN (QCLot: 971237)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	86.8	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.3	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	94.6	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	95.5	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	94.0	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	91.1	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 971588)							
EP1706820-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	97.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.9	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.9	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	87.0	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	92.1	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.1	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	94.7	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 971591)							
EP1706851-003	GW-D5_	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	89.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.3	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	87.6	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	93.6	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	89.1	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	92.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 973415)							
EP1706812-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.8	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	97.8	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	97.3	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	93.6	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	114	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	99.2	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	92.5	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	97.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 969865)							
EP1706835-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 970044)							
EP1706851-001	GW-D3_	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 969866)							
EP1706835-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 969470)							
EP1706851-003	GW-D5_	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	86.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 969469)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 969469) - continued							
EP1706851-003	GW-D5_	EK067G: Total Phosphorus as P	----	1 mg/L	103	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 970043)							
EP1706851-001	GW-D3_	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	113	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 971089)							
EP1706851-005	GW-D8_	EP071: C10 - C14 Fraction	----	400 µg/L	55.0	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	71.2	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	80.9	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 971089)							
EP1706851-005	GW-D8_	EP071: >C10 - C16 Fraction	----	400 µg/L	58.3	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	79.0	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	80.8	54	128

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1707992**	Page	: 1 of 10
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 26-Jul-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 27-Jul-2017
C-O-C number	: ----	Issue Date	: 01-Aug-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1025443)									
EP1707942-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.50	<0.50	0.00	No Limit
EP1707984-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.038	0.038	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.010	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.02	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1025446)									
EP1707992-008	BH10_260717	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1025446) - continued									
EP1707992-008	BH10_260717	EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.025	0.026	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	1.40	1.44	2.68	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.25	1.29	3.35	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1022731)									
EP1707746-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.014	0.013	9.73	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1707864-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1021357)									
EP1707988-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1707990-008	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1021360)									
EP1707992-007	T4B_260717	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.92	0.90	1.88	0% - 20%
EP1707996-007	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.32	0.30	3.55	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1021787)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1021787) - continued									
EP1707992-002	GW-D4_260717	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1708034-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1021358)									
EP1707988-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1707990-008	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1021359)									
EP1707992-007	T4B_260717	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1707996-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.13	2.12	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1025722)									
EP1707928-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.00	No Limit
EP1707942-006	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.4	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1025724)									
EP1707992-009	WQA01_260717	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	0.7	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1025721)									
EP1707928-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.02	<0.02	0.00	No Limit
EP1707942-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1025723)									
EP1707993-007	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.07	29.2	No Limit
EP1707992-009	WQA01_260717	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.06	19.6	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1021786)									
EP1707992-002	GW-D4_260717	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1708034-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1019995)									
EP1707992-004	GW-D8_260717	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1020012)									
EP1707930-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1707992-002	GW-D4_260717	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1019995)									
EP1707992-004	GW-D8_260717	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1020012)									
EP1707930-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1707992-002	GW-D4_260717	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1020012)									
EP1707930-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1020012) - continued									
EP1707930-004	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1707992-002	GW-D4_260717	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1025443)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	108	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	105	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	112	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	111	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.9	84	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 1025446)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.0	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.5	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	110	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	84	112
EG020T: Total Metals by ICP-MS (QCLot: 1022731)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.8	84	103
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	85	104
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.8	84	101
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.9	85	101
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.6	83	98
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.6	86	99
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.7	85	102
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.3	83	100
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	83	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	84	109

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1022731) - continued								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	82.4	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1021357)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.1	87	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1021360)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.6	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1021787)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	93.0	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1021358)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	92	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1021359)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	97.3	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1025722)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.9	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1025724)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.8	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1025721)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1025723)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1021786)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	107	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1019995)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	80.7	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	102	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	78.2	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1020012)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	97.6	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1019995)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	87.1	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	92.8	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	75.3	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1020012)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	98.2	74	115
EP080: BTEXN (QCLot: 1020012)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	98.1	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	96.0	81	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: BTEXN (QCLot: 1020012) - continued								
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	95.3	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	99.0	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.9	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	112	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1025443)							
EP1707942-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	125	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	113	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	97.5	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	109	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	107	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	103	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	115	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	120	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1025446)							
EP1707992-009	WQA01_260717	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	95.4	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	100	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	99.0	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	93.3	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	96.7	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	98.4	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	105	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1022731)							
EP1707746-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	104	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	94.8	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.3	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	92.0	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	92.5	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1022731) - continued							
EP1707746-002	Anonymous	EG020A-T: Nickel	7440-02-0	1 mg/L	96.2	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	107	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1021357)							
EP1707988-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	97.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1021360)							
EP1707992-006	T3C_260717	EK055G: Ammonia as N	7664-41-7	1 mg/L	96.9	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1021787)							
EP1707992-001	GW-D3_260717	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1021358)							
EP1707988-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1021359)							
EP1707992-006	T3C_260717	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	109	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1025722)							
EP1707928-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.5	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1025724)							
EP1707992-009	WQA01_260717	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1025721)							
EP1707928-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	95.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1025723)							
EP1707992-009	WQA01_260717	EK067G: Total Phosphorus as P	----	1 mg/L	98.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1021786)							
EP1707992-001	GW-D3_260717	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	109	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1019995)							
EP1707992-004	GW-D8_260717	EP071: C10 - C14 Fraction	----	400 µg/L	84.2	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	99.3	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	102	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1020012)							
EP1707923-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	86.9	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1019995)							
EP1707992-004	GW-D8_260717	EP071: >C10 - C16 Fraction	----	400 µg/L	88.6	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	101	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	115	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1020012)							
EP1707923-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	83.5	77	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 1020012)							
EP1707923-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	95.7	77	122
		EP080: Toluene	108-88-3	20 µg/L	90.6	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1708050**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: 6432 2000	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jul-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 28-Jul-2017
C-O-C number	: ----	Issue Date	: 07-Aug-2017
Sampler	: TIM WILLIAMSON		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 15		
No. of samples analysed	: 15		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1029627)									
EP1708050-001	GW-D5_270717	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.031	0.031	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.82	0.81	1.30	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.07	2.05	0.821	0% - 20%
EP1708050-011	FS2_270717	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.013	7.89	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.010	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.49	0.50	0.00	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.00	1.02	2.32	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1027425)									
EP1708050-006	BLNS-B1_270717	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1027425) - continued									
EP1708050-006	BLNS-B1_270717	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.08	0.09	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.45	0.46	0.00	No Limit
EP1708080-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.036	0.036	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.76	0.73	3.31	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.60	0.60	0.00	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1023904)									
EP1708042-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.05	0.00	No Limit
EP1708048-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	679	732	7.51	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1023906)									
EP1708050-003	T3C_270717	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.20	0.19	0.00	0% - 50%
EP1708050-012	RD1_270717	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.21	0.20	6.44	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1023859)									
EP1708050-002	T2F_270717	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1708050-011	FS2_270717	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1023905)									
EP1708042-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.00	No Limit
EP1708048-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.14	0.14	0.00	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1023907)									
EP1708050-003	T3C_270717	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1708050-012	RD1_270717	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.03	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1030979)									
EP1708050-001	GW-D5_270717	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.9	0.00	No Limit
EP1708050-011	FS2_270717	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.8	1.8	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1030978)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1030978) - continued									
EP1708050-001	GW-D5_270717	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.01	71.9	No Limit
EP1708050-011	FS2_270717	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	18.4	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1023858)									
EP1708050-002	T2F_270717	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.01	0.00	No Limit
EP1708050-011	FS2_270717	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1023226)									
EP1708058-007	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1025394)									
EP1708050-006	BLNS-B1_270717	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1025496)									
EP1708050-001	GW-D5_270717	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1708050-011	FS2_270717	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1023226)									
EP1708058-007	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1025394)									
EP1708050-006	BLNS-B1_270717	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1025496)									
EP1708050-001	GW-D5_270717	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1708050-011	FS2_270717	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1025496)									
EP1708050-001	GW-D5_270717	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1708050-011	FS2_270717	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1025496) - continued									
EP1708050-011	FS2_270717	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1029627)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	100	84	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	84	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	86	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	85	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.2	84	110
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	85	107
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	105	85	109
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.4	84	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	88	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.7	89	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	84	112
EG020T: Total Metals by ICP-MS (QCLot: 1027425)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.6	84	103
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	85	104
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.5	84	101
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.6	85	101
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.8	83	98
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.8	86	99
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.7	85	102
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.4	83	100
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	83	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	84	109
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.0	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1023904)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	87	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1023906)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	106	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1023859)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1023905)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	92	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1023907)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	92	112

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1030979)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.0	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1030978)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1023858)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	111	87	115
EP008: Chlorophyll (QCLot: 1032334)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	108	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1023226)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	83.3	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	80.7	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	77.6	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1025394)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	71.6	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	51.4	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	44.7	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1025496)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	96.9	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1023226)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	84.7	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	79.5	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	72.3	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1025394)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	71.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	46.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	34.1	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1025496)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	96.8	74	115
EP080: BTEXN (QCLot: 1025496)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	106	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	101	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	105	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1029627)							
EP1708050-002	T2F_270717	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	101	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	101	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.0	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.6	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.2	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	98.0	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	95.8	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1027425)							
EP1708050-007	A2_270717	EG020A-T: Arsenic	7440-38-2	1 mg/L	106	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.5	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	97.7	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.1	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	92.4	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	92.7	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	96.7	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	103	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1023904)							
EP1708042-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	111	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1023906)							
EP1708050-002	T2F_270717	EK055G: Ammonia as N	7664-41-7	1 mg/L	99.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1023859)							
EP1708050-001	GW-D5_270717	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.1	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1023905)							
EP1708042-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	75.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1023907)							
EP1708050-002	T2F_270717	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	106	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1030979)							
EP1708050-002	T2F_270717	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1030978)							
EP1708050-002	T2F_270717	EK067G: Total Phosphorus as P	----	1 mg/L	101	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1023858)							
EP1708050-001	GW-D5_270717	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	109	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1023226)							
EP1708058-007	Anonymous	EP071: C10 - C14 Fraction	----	400 µg/L	75.8	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	72.7	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	63.7	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1025394)							
EP1708050-006	BLNS-B1_270717	EP071: C10 - C14 Fraction	----	400 µg/L	89.0	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	85.5	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	89.0	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1025496)							
EP1708050-002	T2F_270717	EP080: C6 - C9 Fraction	----	240 µg/L	97.6	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1023226)							
EP1708058-007	Anonymous	EP071: >C10 - C16 Fraction	----	400 µg/L	76.5	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	67.7	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	63.2	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1025394)							
EP1708050-006	BLNS-B1_270717	EP071: >C10 - C16 Fraction	----	400 µg/L	87.6	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	87.2	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	101	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1025496)							
EP1708050-002	T2F_270717	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	96.3	77	137
EP080: BTEXN (QCLot: 1025496)							
EP1708050-002	T2F_270717	EP080: Benzene	71-43-2	20 µg/L	96.3	77	122
		EP080: Toluene	108-88-3	20 µg/L	88.8	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1709130**	Page	: 1 of 10
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 23-Aug-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 24-Aug-2017
C-O-C number	: ----	Issue Date	: 30-Aug-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 17		
No. of samples analysed	: 17		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1078181)									
EP1709106-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.057	0.058	2.21	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1709114-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.019	0.018	9.43	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.410	0.402	2.01	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.423	0.400	5.63	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	17.9	17.8	0.787	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.50	<0.50	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1078185)									
EP1709130-006	A1N_230817	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1078185) - continued									
EP1709130-006	A1N_230817	EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.777	0.772	0.727	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.05	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.69	0.68	1.74	0% - 50%
EP1709130-017	D2_230817	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.047	0.045	3.56	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.27	0.27	0.00	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.09	0.09	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1080112)									
EP1709048-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1709048-011	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1080112) - continued									
EP1709048-011	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1080113)									
EP1709130-003	A2S_230817	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.032	0.032	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.06	0.07	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.55	0.55	0.00	0% - 50%
EP1709178-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1073446)									
EP1709124-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1709130-008	FS4A_230817	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1073438)									
EP1709130-002	A2_230817	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.10	0.10	0.00	No Limit
EP1709130-011	S1_230817	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1073447)									
EP1709124-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.20	3.13	2.02	0% - 20%
EP1709130-008	FS4A_230817	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1075252)									
EP1709124-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.5	22.7	No Limit
EP1709130-008	FS4A_230817	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.5	1.3	11.5	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1075251)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1075251) - continued									
EP1709124-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.06	21.1	No Limit
EP1709130-008	FS4A_230817	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.16	0.16	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1073437)									
EP1709130-002	A2_230817	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EP1709130-011	S1_230817	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.11	0.11	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1074742)									
EP1709130-001	BLNS-B1_230817	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1075209)									
EP1709130-001	BLNS-B1_230817	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1709178-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1074742)									
EP1709130-001	BLNS-B1_230817	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1075209)									
EP1709130-001	BLNS-B1_230817	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1709178-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1075209)									
EP1709130-001	BLNS-B1_230817	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1709178-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1078181)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.0	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.0	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.4	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.1	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	106	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	84	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 1078185)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.3	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.5	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.7	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.2	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100.0	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	107	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	84	120
EG020T: Total Metals by ICP-MS (QCLot: 1080112)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.0	84	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.5	84	120
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.5	85	120
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.8	83	120
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	86	120
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	85	120
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.0	83	120
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	83	120
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	84	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1080112) - continued								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	116	77	120
EG020T: Total Metals by ICP-MS (QCLot: 1080113)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.7	84	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.2	84	120
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.2	85	120
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.6	83	120
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.6	86	120
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	85	120
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.1	83	120
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	107	83	120
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	84	120
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1073446)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	90.8	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1073438)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1073447)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	94.6	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1075252)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.2	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1075251)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1073437)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	87	115
EP008: Chlorophyll (QCLot: 1080588)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	97.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1074742)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	83.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	83.2	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	83.8	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1075209)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	93.2	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074742)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	85.7	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	81.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	108	11	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1075209)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	96.1	74	115
EP080: BTEXN (QCLot: 1075209)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	93.0	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	113	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	101	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	101	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	103	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1078181)							
EP1709106-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	97.6	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	99.5	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.0	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	105	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	102	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	109	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1078185)							
EP1709130-007	FS2_230817	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	105	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	97.8	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	99.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.2	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	100	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1080112)							
EP1709048-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.8	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	96.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1080112) - continued							
EP1709048-002	Anonymous	EG020A-T: Chromium	7440-47-3	1 mg/L	91.7	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	89.4	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	93.6	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	96.9	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	89.8	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	97.4	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1080113)							
EP1709130-004	NLWS-N2_230817	EG020A-T: Arsenic	7440-38-2	1 mg/L	112	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	106	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	93.3	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	99.0	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	100	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	108	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1073446)							
EP1709124-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	93.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1073438)							
EP1709130-001	BLNS-B1_230817	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	104	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1073447)							
EP1709124-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1075252)							
EP1709124-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	86.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1075251)							
EP1709124-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	107	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1073437)							
EP1709130-001	BLNS-B1_230817	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	106	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1074742)							
EP1709130-001	BLNS-B1_230817	EP071: C10 - C14 Fraction	----	400 µg/L	53.1	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	86.9	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	82.6	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1075209)							
EP1709130-002	A2_230817	EP080: C6 - C9 Fraction	----	240 µg/L	95.6	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074742)							
EP1709130-001	BLNS-B1_230817	EP071: >C10 - C16 Fraction	----	400 µg/L	58.1	45	122

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074742) - continued							
EP1709130-001	BLNS-B1_230817	EP071: >C16 - C34 Fraction	----	600 µg/L	89.3	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	82.9	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1075209)							
EP1709130-002	A2_230817	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	94.7	77	137
EP080: BTEXN (QCLot: 1075209)							
EP1709130-002	A2_230817	EP080: Benzene	71-43-2	20 µg/L	89.3	77	122
		EP080: Toluene	108-88-3	20 µg/L	102	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1709182**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 24-Aug-2017
Order number	: 60475410-2.06	Date Analysis Commenced	: 24-Aug-2017
C-O-C number	: ----	Issue Date	: 30-Aug-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1080637)									
EP1709177-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0029	0.0028	4.67	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.054	0.048	11.7	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.374	0.374	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	57.5	55.9	2.75	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	3.74	3.71	0.564	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	3.74	3.78	0.942	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	18.7	18.5	1.05	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.20	<0.20	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.70	1.74	2.19	No Limit
EP1709182-003	GW-D7_	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.034	0.032	5.52	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.020	0.021	5.35	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.57	1.60	1.90	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1073905)									
EP1709162-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1709182-003	GW-D7_	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.14	0.14	0.00	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1073896)									
EP1709182-003	GW-D7_	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.05	0.05	0.00	No Limit
EP1709162-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1073906)									
EP1709162-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.52	1.44	4.99	0% - 20%
EP1709182-003	GW-D7_	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.66	4.76	2.22	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1077712)									
EP1709140-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.0	3.0	0.00	No Limit
EP1709182-008	T4B_	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.1	24.5	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1077713)									
EP1709173-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.58	0.58	0.00	No Limit
EP1709140-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.78	1.77	0.733	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1077714)									
EP1709182-008	T4B_	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.29	0.27	6.75	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1073895)									
EP1709182-003	GW-D7_	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.26	0.26	0.00	0% - 20%
EP1709162-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1074751)									
EP1709182-003	GW-D7_	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1075227)									
EP1709168-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	160	160	0.00	No Limit
EP1709182-004	GW-D8_	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1074751)									
EP1709182-003	GW-D7_	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1075227)									
EP1709168-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	160	170	0.00	No Limit
EP1709182-004	GW-D8_	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1075227)									
EP1709168-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1075227) - continued									
EP1709182-004	GW-D8_	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1080637)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.7	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.3	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	115	84	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1073905)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.1	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1073896)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1073906)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1077712)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.5	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1077713)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1077714)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1073895)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1074751)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	62.4	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	62.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	66.5	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1074752)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	75.6	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	94.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	91.8	34	105

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1075227)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	90.2	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074751)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	64.9	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	63.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	73.9	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074752)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	79.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	97.9	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	71.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1075227)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	91.5	74	115
EP080: BTEXN (QCLot: 1075227)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	94.2	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	84.6	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	91.0	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	91.9	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	92.3	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	92.1	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1080637)							
EP1709178-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	105	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	103	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	96.9	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	97.1	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	94.0	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	96.2	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	99.5	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	104	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1073905)							
EP1709162-001	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1073905) - continued							
EP1709162-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1073896)							
EP1709162-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.8	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1073906)							
EP1709162-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1077712)							
EP1709140-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1077713)							
EP1709140-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	93.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1077714)							
EP1709182-009	BH10_	EK067G: Total Phosphorus as P	----	1 mg/L	95.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1073895)							
EP1709162-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	113	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1074751)							
EP1709182-003	GW-D7_	EP071: C10 - C14 Fraction	----	400 µg/L	55.9	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	70.1	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	65.4	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1075227)							
EP1709168-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	94.8	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1074751)							
EP1709182-003	GW-D7_	EP071: >C10 - C16 Fraction	----	400 µg/L	59.7	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	68.7	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	63.5	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1075227)							
EP1709168-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	97.2	77	137
EP080: BTEXN (QCLot: 1075227)							
EP1709168-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	88.6	77	122
		EP080: Toluene	108-88-3	20 µg/L	86.6	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1709224**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Contact	: ShukHui Li
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 25-Aug-2017
Order number	: 60478410-2.06	Date Analysis Commenced	: 25-Aug-2017
C-O-C number	: ----	Issue Date	: 31-Aug-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/1136/16 V2		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1082674)									
EP1709200-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1709229-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.082	0.083	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1082635)									
EP1709206-012	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1082635) - continued									
EP1709206-012	Anonymous	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1709206-024	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.060	0.062	1.71	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.06	0.05	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1076509)									
EP1709224-001	GW-D4_	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1076506)									
EP1709224-001	GW-D4_	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1709232-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1076510)									
EP1709230-009	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	6.51	6.53	0.176	0% - 20%
EP1709224-001	GW-D4_	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.22	2.20	1.04	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1080661)									
EP1709169-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.0	34.1	No Limit
EP1709226-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.2	5.1	3.07	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1080660)									
EP1709169-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	<0.05	34.7	No Limit
EP1709226-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.53	0.55	2.41	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1076507)									
EP1709224-001	GW-D4_	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1079252)									
EP1709196-008	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1709225-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	60	60	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1079252)									
EP1709196-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1709225-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	50	50	0.00	No Limit
EP080: BTEXN (QC Lot: 1079252)									
EP1709196-008	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1709225-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1082674)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.5	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	110	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	107	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	106	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	105	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	109	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	105	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	115	84	120
EG020T: Total Metals by ICP-MS (QCLot: 1082635)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.0	84	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.3	85	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.1	84	120
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.7	85	120
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.3	83	120
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	86	120
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	120
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.4	83	120
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.0	83	120
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.0	84	120
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1076509)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1076506)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	105	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1076510)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1080661)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.4	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1080660)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.2	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1076507)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	102	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1077728)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	77.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	95.0	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	99.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1079252)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	96.5	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1077728)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	81.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	98.9	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	99.4	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1079252)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	99.4	74	115
EP080: BTEXN (QCLot: 1079252)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	91.2	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	110	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	98.0	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	98.9	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	97.4	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	100	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1082674)							
EP1709200-007	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	99.8	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	96.2	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	94.2	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	99.9	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	99.7	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.6	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 1082635)							
EP1709206-013	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.9	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.2	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	89.6	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	93.6	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	97.9	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	99.3	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.7	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1076509)							
EP1709224-001	GW-D4_	EK055G: Ammonia as N	7664-41-7	1 mg/L	101	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1076506)							
EP1709217-069	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	94.2	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1076510)							
EP1709224-001	GW-D4_	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1080661)							
EP1709169-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	82.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1080660)							
EP1709169-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	95.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1076507)							
EP1709217-069	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1079252)							
EP1709196-009	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	88.0	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1079252)							
EP1709196-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	92.3	77	137
EP080: BTEXN (QCLot: 1079252)							
EP1709196-009	Anonymous	EP080: Benzene	71-43-2	20 µg/L	87.4	77	122
		EP080: Toluene	108-88-3	20 µg/L	101	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1710701**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 28-Sep-2017
Order number	: W81020-103	Date Analysis Commenced	: 28-Sep-2017
C-O-C number	: ----	Issue Date	: 04-Oct-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1146154)									
EP1710701-001	D1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.025	0.022	12.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.09	0.09	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.28	0.27	0.00	No Limit
EP1710701-010	WQA01_260917	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1146153)									
EP1710701-001	D1	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EP1710701-010	WQA01_260917	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1143350)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1143350) - continued									
EP1710674-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.21	0.22	0.00	0% - 20%
EP1710676-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1143354)									
EP1710701-010	WQA01_260917	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1710723-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1143337)									
EP1710701-009	GW-D7	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1710701-001	D1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1143351)									
EP1710674-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1710676-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	7.75	7.77	0.227	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1143355)									
EP1710701-010	WQA01_260917	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	17.5	17.6	0.284	0% - 20%
EP1710723-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.68	4.73	1.11	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1148829)									
EP1710701-001	D1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EP1710711-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1148830)									
EP1710701-001	D1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EP1710711-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.11	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1143338)									
EP1710701-009	GW-D7	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.19	0.19	0.00	0% - 50%
EP1710701-001	D1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1144064)									
EP1710704-002	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1149393)									
EP1710594-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1710701-008	GW-D4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1144064)									
EP1710704-002	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1149393)									
EP1710594-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1710701-008	GW-D4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1149393)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1149393) - continued									
EP1710594-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1710701-008	GW-D4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1146154)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.2	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.8	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.3	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	99.2	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.7	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.4	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	101	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82	114
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1146153)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	95.8	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1143350)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	87	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1143354)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1143337)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1143351)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	92	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1143355)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1148829)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.2	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1148830)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1143338)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	103	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1144064)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	84.5	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	79.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	80.6	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1149393)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1149393) - continued								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1144064)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	85.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	78.0	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	89.9	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1149393)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	104	74	115
EP080: BTEXN (QCLot: 1149393)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	98.2	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	113	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	104	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	100	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1146154)							
EP1710701-002	D2	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	101	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	111	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	111	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	106	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	109	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	106	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	111	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	114	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1143350)							
EP1710674-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	81.9	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1143354)							
EP1710701-009	GW-D7	EK055G: Ammonia as N	7664-41-7	1 mg/L	101	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1143337)							
EP1710662-011	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	95.4	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1143351)							
EP1710674-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	84.7	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1143355)							
EP1710701-009	GW-D7	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1148829)							
EP1710701-002	D2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	99.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1148830)							
EP1710701-002	D2	EK067G: Total Phosphorus as P	----	1 mg/L	96.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1143338)							
EP1710701-001	D1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	113	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1144064)							
EP1710704-002	Anonymous	EP071: C10 - C14 Fraction	----	385 µg/L	71.0	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	81.2	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	65.5	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1149393)							
EP1710594-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	81.4	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1144064)							
EP1710704-002	Anonymous	EP071: >C10 - C16 Fraction	----	380 µg/L	73.6	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	73.3	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	71.9	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1149393)							
EP1710594-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	81.2	77	137
EP080: BTEXN (QCLot: 1149393)							
EP1710594-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	81.0	77	122
		EP080: Toluene	108-88-3	20 µg/L	97.8	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1710595**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 26-Sep-2017
Order number	: W81020-103	Date Analysis Commenced	: 26-Sep-2017
C-O-C number	: ----	Issue Date	: 04-Oct-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1143556)									
EB1720039-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.164	0.165	0.624	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.011	0.012	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.111	0.110	0.00	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	6.31	6.34	0.540	0% - 20%
ET1701227-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.291	0.294	1.06	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.040	0.040	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.024	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.072	0.072	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1143705)									
EP1710595-005	A1E	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.384	0.383	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1143705) - continued									
EP1710595-005	A1E	EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.008	0.007	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.17	0.17	0.00	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	3.90	3.90	0.00	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1151760)									
EP1710595-001	GW-D3	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.5	0.5	0.00	No Limit
EP1710595-010	S1	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1151766)									
EP1710595-005	A1E	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	0.4	31.7	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1137689)									
EP1710595-002	GW-D5	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.06	18.2	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1137663)									
EP1710595-007	A1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1710568-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1137690)									
EP1710596-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	25.4	25.6	0.862	0% - 20%
EP1710595-002	GW-D5	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1142599)									
EP1710550-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP1710550-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1142602)									
EP1710595-005	A1E	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.1	5.2	2.46	0% - 20%
EP1710601-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1142600)									
EP1710550-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.05	72.9	No Limit
EP1710550-007	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1142601)									
EP1710595-005	A1E	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.48	1.47	0.00	0% - 20%
EP1710601-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.10	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1137662)									
EP1710595-007	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	1.30	1.29	1.38	0% - 20%
EP1710568-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1138658)									
EP1710601-004	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1144023)									
EP1710504-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1710595-002	GW-D5	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1138658)									
EP1710601-004	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1144023)									
EP1710504-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1710595-002	GW-D5	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1144023)									
EP1710504-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1710595-002	GW-D5	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1143556)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.8	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.2	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.9	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	93.7	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.2	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.2	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	87.6	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	106	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1143705)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.4	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.6	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.6	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	92.1	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1151760)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	108	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1151766)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	115	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1137689)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.1	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1137663)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1137690)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	107	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1142599)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	88.8	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1142602)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	88.0	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1142600)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1142600) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1142601)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1137662)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.8	87	115
EP008: Chlorophyll (QCLot: 1147596)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	99.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1138658)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	57.0	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	66.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	64.4	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1144023)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	109	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1138658)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	58.9	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	70.4	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	41.1	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1144023)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	111	74	115
EP080: BTEXN (QCLot: 1144023)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	107	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	104	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	101	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	113	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1143556)							
EB1720039-002	Anonymous	EG020A-F: Aluminium	7429-90-5	2.5 mg/L	70.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1143556) - continued							
EB1720039-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.5 mg/L	79.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.5 mg/L	80.3	70	130
		EG020A-F: Chromium	7440-47-3	0.5 mg/L	82.4	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	76.0	70	130
		EG020A-F: Lead	7439-92-1	0.5 mg/L	73.5	70	130
		EG020A-F: Manganese	7439-96-5	0.5 mg/L	74.4	70	130
		EG020A-F: Nickel	7440-02-0	0.5 mg/L	78.8	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	72.4	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1143705)							
EP1710595-006	A1N	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	103	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	110	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	120	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.1	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1137689)							
EP1710595-001	GW-D3	EK055G: Ammonia as N	7664-41-7	1 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1137663)							
EP1710568-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1137690)							
EP1710595-001	GW-D3	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1142599)							
EP1710550-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	102	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1142602)							
EP1710595-006	A1N	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	91.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1142600)							
EP1710550-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	92.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1142601)							
EP1710595-006	A1N	EK067G: Total Phosphorus as P	----	1 mg/L	87.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1137662)							
EP1710568-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	108	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1138658)							
EP1710601-004	Anonymous	EP071: C10 - C14 Fraction	----	385 µg/L	91.8	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	125	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	108	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1144023)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1144023) - continued							
EP1710504-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	83.3	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1138658)							
EP1710601-004	Anonymous	EP071: >C10 - C16 Fraction	----	380 µg/L	102	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	118	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	125	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1144023)							
EP1710504-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	90.1	77	137
EP080: BTEXN (QCLot: 1144023)							
EP1710504-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	78.7	77	122
		EP080: Toluene	108-88-3	20 µg/L	81.0	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1710522**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 22-Sep-2017
Order number	: W81020-103	Date Analysis Commenced	: 22-Sep-2017
C-O-C number	: ----	Issue Date	: 03-Oct-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1141013)									
EP1710453-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.160	0.178	10.5	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.025	<0.025	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.03	1.98	2.26	0% - 20%
EP1710521-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.542	0.551	1.65	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.025	<0.025	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	14.4	14.6	1.75	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1146136)									
EP1710127-003	Anonymous	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.0020 mg/L	<2.0	0.00	No Limit
EP1710669-004	Anonymous	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.4	0.2	47.5	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1131888)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1131888) - continued									
EP1710492-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.81	1.83	1.48	0% - 20%
EP1710510-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.05	38.5	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1131779)									
EP1710517-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1710492-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.04	0.05	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1131889)									
EP1710492-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.07	0.00	No Limit
EP1710510-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.18	0.18	0.00	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1136787)									
EP1710454-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.00	No Limit
EP1710495-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	0.8	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1136786)									
EP1710454-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1710495-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.20	107	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1131780)									
EP1710517-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.06	0.06	0.00	No Limit
EP1710492-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1138449)									
EP1710473-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1710473-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1138449)									
EP1710473-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1710473-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1138449)									
EP1710473-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1710473-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1141013)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.8	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.7	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	89.4	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	105	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.7	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	105	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.1	82	114
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1146136)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	106	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1131888)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1131779)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	106	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1131889)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1136787)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.2	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1136786)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1131780)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1135737)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	50.0	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	55.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	56.2	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1138449)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1135737)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	52.0	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	56.6	35	108

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1135737) - continued								
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	52.8	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1138449)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	103	74	115
EP080: BTEXN (QCLot: 1138449)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	107	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	104	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	99.8	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1141013)							
EP1710453-002	Anonymous	EG020A-F: Aluminium	7429-90-5	2.5 mg/L	76.8	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	80.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.5 mg/L	83.7	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	123	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	70.6	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	125	70	130
		EG020A-F: Manganese	7439-96-5	0.5 mg/L	80.2	70	130
		EG020A-F: Nickel	7440-02-0	0.5 mg/L	73.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	73.9	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1131888)							
EP1710492-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	98.6	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1131779)							
EP1710492-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1131889)							
EP1710492-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1136787)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1136787) - continued							
EP1710454-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	90.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1136786)							
EP1710454-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	101	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1131780)							
EP1710492-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	110	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1138449)							
EP1710473-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	77.6	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1138449)							
EP1710473-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	77.6	77	137
EP080: BTEXN (QCLot: 1138449)							
EP1710473-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	79.8	77	122
		EP080: Toluene	108-88-3	20 µg/L	76.2	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1710339**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Water Monitoring	Date Samples Received	: 19-Sep-2017
Order number	: W81020-103	Date Analysis Commenced	: 20-Sep-2017
C-O-C number	: ----	Issue Date	: 27-Sep-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1132215)									
EP1710339-001	BLNS-B1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.041	0.041	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.27	0.29	5.52	No Limit
ES1723718-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.020	0.021	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.037	0.042	13.4	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.21	0.22	5.71	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1132231)									
EP1710339-001	BLNS-B1	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.043	0.045	4.30	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1132231) - continued									
EP1710339-001	BLNS-B1	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.39	0.39	0.00	No Limit
ES1723656-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1130015)									
EP1710339-001	BLNS-B1	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1130026)									
EP1710339-001	BLNS-B1	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1126239)									
EP1710340-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.03	84.9	No Limit
EP1710339-001	BLNS-B1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.47	0.47	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1126235)									
EP1710349-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	232	233	0.642	0% - 20%
EP1710339-002	A2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.08	0.08	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1126240)									
EP1710340-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.50	0.50	0.00	0% - 20%
EP1710339-001	BLNS-B1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.37	0.35	4.76	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1128509)									
EP1710326-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.00	No Limit
EP1710339-005	FS4A	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.9	4.4	10.4	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1128508)									
EP1710326-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.08	47.8	No Limit
EP1710339-005	FS4A	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.37	0.36	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1126236)									
EP1710339-002	A2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.22	0.22	0.00	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1127320)									
EP1710339-001	BLNS-B1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1135748)									
EP1710311-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1710317-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1127320)									
EP1710339-001	BLNS-B1	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1135748)									
EP1710311-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1710317-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1135748)									
EP1710311-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
EP1710317-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1132215)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	92.8	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.8	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.4	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.7	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.9	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1132231)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.6	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.9	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.9	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1130015)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	96.3	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1130026)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	95.0	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1126239)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1126235)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1126240)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	97.1	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1128509)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	93.2	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1128508)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.9	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1126236)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1126236) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	101	87	115
EP008: Chlorophyll (QCLot: 1130531)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	103	70	130
EP008: Chlorophyll (QCLot: 1130532)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	96.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127320)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	61.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	65.1	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	59.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1135748)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1127320)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	64.2	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	61.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	68.3	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1135748)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	100	74	115
EP080: BTEXN (QCLot: 1135748)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	100	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	101	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	99.4	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	99.5	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1132215)							
EP1710339-002	A2	EG020A-F: Arsenic	7440-38-2	1 mg/L	120	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	120	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	118	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1132215) - continued							
EP1710339-002	A2	EG020A-F: Copper	7440-50-8	1 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	116	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	115	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	121	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	120	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1132231)							
EP1710339-002	A2	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	96.8	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.5	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	96.0	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.0	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1126239)							
EP1710339-002	A2	EK055G: Ammonia as N	7664-41-7	1 mg/L	88.1	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1126235)							
EP1710339-001	BLNS-B1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1126240)							
EP1710339-002	A2	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	93.7	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1128509)							
EP1710326-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	96.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1128508)							
EP1710326-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	103	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1126236)							
EP1710339-001	BLNS-B1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127320)							
EP1710339-001	BLNS-B1	EP071: C10 - C14 Fraction	----	385 µg/L	59.2	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	61.6	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	59.1	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1135748)							
EP1710311-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	84.8	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1127320)							
EP1710339-001	BLNS-B1	EP071: >C10 - C16 Fraction	----	380 µg/L	60.9	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	59.1	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	72.4	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1135748)							
EP1710311-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	84.6	77	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 1135748)							
EP1710311-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	85.1	77	122
		EP080: Toluene	108-88-3	20 µg/L	83.4	74	126

QUALITY CONTROL REPORT

Work Order	: **EP1711669**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 19-Oct-2017
Order number	: W81020-103	Date Analysis Commenced	: 19-Oct-2017
C-O-C number	: ----	Issue Date	: 26-Oct-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1197172)									
EP1711669-001	A2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.011	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.23	0.23	0.00	No Limit
EP1711669-010	BH10	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	1.15	1.14	1.05	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.70	3.68	0.456	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1197178)									
EB1722086-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0011	0.0011	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	2.16	2.13	1.41	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1197178) - continued									
EB1722086-001	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.14	0.15	9.66	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.47	0.46	0.00	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1198510)									
EP1711669-001	A2	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EP1711669-010	BH10	EG094B-F: Selenium	7782-49-2	0.2	µg/L	1.0	1.1	13.4	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1198512)									
EP1711669-001	A2	EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1187050)									
EP1711664-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	5.46	5.66	3.61	0% - 20%
EP1711669-009	T3B	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.06	48.4	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1187039)									
EP1711669-005	T4C	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1711633-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1187051)									
EP1711664-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.31	0.29	8.20	0% - 20%
EP1711669-009	T3B	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1188686)									
EP1711653-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP1711573-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1188688)									
EP1711669-012	GW-D7	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.0	4.8	4.97	No Limit
EP1711669-009	T3B	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1188687)									
EP1711649-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EP1711573-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1188689)									
EP1711669-009	T3B	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1187040)									
EP1711669-005	T4C	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1711633-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1188023)									
EP1711669-012	GW-D7	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1188807)									
EP1711643-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1711669-004	WQA02_171017	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1188023)									
EP1711669-012	GW-D7	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1188807)									
EP1711643-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1711669-004	WQA02_171017	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1188807)									
EP1711643-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
EP1711669-004	WQA02_171017	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1197172)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	89.6	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.1	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	96.2	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.8	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.9	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.6	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	93.8	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.9	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1197178)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.8	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.5	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	98.9	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1198510)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	104	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1198512)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	107	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1187050)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1187039)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1187051)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1188686)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.2	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1188688)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.4	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1188687)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1188687) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1188689)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1187040)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	107	87	115
EP008: Chlorophyll (QCLot: 1194827)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	119	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1188023)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	39.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	50.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	46.4	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1188807)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	108	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1188023)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	42.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	49.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	51.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1188807)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	104	74	115
EP080: BTEXN (QCLot: 1188807)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.8	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	103	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	110	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	105	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	103	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1197172)							
EP1711669-002	A2S	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	91.0	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1197172) - continued							
EP1711669-002	A2S	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	98.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	99.5	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	97.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	96.8	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	96.9	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	94.7	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	94.2	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	95.1	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1197178)							
EB1722086-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	130	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	122	70	130
		EG020A-T: Manganese	7439-96-5	25 mg/L	90.2	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	105	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	124	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1187050)							
EP1711663-005	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	106	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1187039)							
EP1711633-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	110	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1187051)							
EP1711663-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.6	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1188686)							
EP1711573-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.3	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1188688)							
EP1711669-011	GW-D3	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	86.7	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1188687)							
EP1711573-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	98.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1188689)							
EP1711669-011	GW-D3	EK067G: Total Phosphorus as P	----	1 mg/L	92.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1187040)							
EP1711633-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	114	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1188023)							
EP1711669-012	GW-D7	EP071: C10 - C14 Fraction	----	385 µg/L	77.3	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	92.5	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	68.0	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1188807)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1188807) - continued							
EP1711643-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	113	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1188023)							
EP1711669-012	GW-D7	EP071: >C10 - C16 Fraction	----	380 µg/L	80.5	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	82.6	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	61.2	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1188807)							
EP1711643-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	106	77	137
EP080: BTEXN (QCLot: 1188807)							
EP1711643-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	103	77	122
		EP080: Toluene	108-88-3	20 µg/L	92.4	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1711878**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 24-Oct-2017
Order number	: W81020-103	Date Analysis Commenced	: 24-Oct-2017
C-O-C number	: ----	Issue Date	: 31-Oct-2017
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 15		
No. of samples analysed	: 15		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1203291)									
EB1722116-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EB1722116-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.025	0.024	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.011	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1203295)									
EP1711878-004	NLWS-N2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1203295) - continued									
EP1711878-004	NLWS-N2	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.267	0.262	1.72	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.07	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.91	3.83	2.22	0% - 20%
EP1711878-013	T3C	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	4.18	4.20	0.332	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1203342)									
EB1722346-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.388	0.386	0.357	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.37	0.35	5.20	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.66	1.75	5.47	0% - 20%
ET1701410-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	3.26	3.26	0.267	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.006	0.005	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.022	0.022	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	7.36	7.28	1.13	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	8.24	8.23	0.00	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1207784)									
EP1711878-001	A1	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.3	<0.2	0.00	No Limit
EP1711878-010	A3	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1207523)									
EP1711878-002	A1N	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	0.2	0.00	No Limit
EP1711878-009	S1	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	<0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1196918)									
EP1711800-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.04	58.5	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1196918) - continued									
EP1711878-007	RD1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.07	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1196899)									
EP1711878-002	A1N	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1711878-011	GW-D4	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1196919)									
EP1711800-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.03	0.00	No Limit
EP1711878-007	RD1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.03	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1207510)									
EP1711869-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	29.6	29.6	0.00	0% - 20%
EP1711878-003	A1E	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.9	5.7	2.63	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1207509)									
EP1711869-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.31	0.30	4.14	No Limit
EP1711878-003	A1E	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.56	1.57	0.00	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1207511)									
EP1711879-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	<0.05	26.8	No Limit
EP1711881-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.76	0.76	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1196898)									
EP1711878-002	A1N	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	1.06	1.05	0.00	0% - 20%
EP1711878-011	GW-D4	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1204835)									
EP1711878-001	A1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1711878-011	GW-D4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1204835)									
EP1711878-001	A1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1711878-011	GW-D4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1204835)									
EP1711878-001	A1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1711878-011	GW-D4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1204835) - continued									
EP1711878-011	GW-D4	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1203291)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.8	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.7	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	107	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	101	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 1203295)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	103	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.6	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.1	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	108	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	102	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1203342)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.2	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.5	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.9	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	85.2	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1207784)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	96.7	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1207523)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	113	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1196918)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1196918) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.5	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1196899)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1196919)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1207510)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.9	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1207509)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.7	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1207511)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.9	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1196898)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.9	87	115
EP008: Chlorophyll (QCLot: 1207636)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	110	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1197953)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	73.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	75.3	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	59.5	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1204835)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	86.4	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1197953)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	75.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	70.0	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	31.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1204835)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	90.1	74	115
EP080: BTEXN (QCLot: 1204835)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	85.6	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	98.2	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	99.9	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	104	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	104	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	116	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1203291)							
EB1722116-002	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	99.1	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	99.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	97.1	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	97.4	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	97.6	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	96.5	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	96.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	103	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1203295)							
EP1711878-005	FS2	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	99.6	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	97.4	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	97.8	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	103	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	98.4	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	97.1	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	96.5	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	103	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1203342)							
EP1711878-001	A1	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	104	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	98.2	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	106	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	101	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1196918)							
EP1711800-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	120	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1196899)							
EP1711878-001	A1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1196919)							
EP1711800-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.4	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1207510)							
EP1711869-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	94.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1207509)							
EP1711869-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	98.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1207511)							
EP1711879-003	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	105	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1196898)							
EP1711878-001	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1204835)							
EP1711878-002	A1N	EP080: C6 - C9 Fraction	----	240 µg/L	90.2	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1204835)							
EP1711878-002	A1N	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	92.5	77	137
EP080: BTEXN (QCLot: 1204835)							
EP1711878-002	A1N	EP080: Benzene	71-43-2	20 µg/L	85.5	77	122
		EP080: Toluene	108-88-3	20 µg/L	91.9	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1712054**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Oct-2017
Order number	: W81020-103	Date Analysis Commenced	: 27-Oct-2017
C-O-C number	: ----	Issue Date	: 06-Nov-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1212916)									
EP1712054-001	BH12	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.026	0.026	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1216998)									
EP1712054-001	BH12	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.5	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1205467)									
EP1712029-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.00	No Limit
EP1712030-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.10	0.00	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1206037)									
EP1712067-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1712053-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1205468)									
EP1712029-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	8.41	8.28	1.54	0% - 20%
EP1712030-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.50	0.52	2.50	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1217693)									
EP1712014-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	15.0	14.4	4.39	0% - 20%
EP1712063-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.4	4.4	19.2	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1217692)									
EP1712014-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.15	32.7	No Limit
EP1712063-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.15	122	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1206041)									
EP1712054-001	BH12	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1712067-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1216595)									
EP1712000-049	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1712060-023	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1216595)									
EP1712000-049	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1712060-023	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1216595)									
EP1712000-049	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1712060-023	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1212916)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.5	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.6	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.0	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100.0	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	102	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.1	82	114
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1216998)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	106	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1205467)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.5	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1206037)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	88.2	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1205468)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.4	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1217693)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.3	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1217692)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1206041)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1207626)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	37.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	43.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	40.1	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1216595)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	108	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1207626)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	38.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	40.1	35	108

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1207626) - continued								
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	25.0	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1216595)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	111	74	115
EP080: BTEXN (QCLot: 1216595)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	92.4	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	99.2	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	103	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	99.0	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	77.0	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1212916)							
EP1712054-002	GW-D8	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	94.7	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	99.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	89.0	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	94.9	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	95.0	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	95.8	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	97.4	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1205467)							
EP1712029-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	106	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1206037)							
EP1712035-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	94.8	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1205468)							
EP1712029-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1217693)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1217693) - continued							
EP1712014-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	91.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1217692)							
EP1712014-001	Anonymous	EK067G: Total Phosphorus as P	----	2 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1206041)							
EP1712054-001	BH12	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	110	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1216595)							
EP1712001-027	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	109	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1216595)							
EP1712001-027	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	109	77	137
EP080: BTEXN (QCLot: 1216595)							
EP1712001-027	Anonymous	EP080: Benzene	71-43-2	20 µg/L	96.4	77	122
		EP080: Toluene	108-88-3	20 µg/L	100	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1712990**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 17-Nov-2017
Order number	: W81020-103	Date Analysis Commenced	: 17-Nov-2017
C-O-C number	: ----	Issue Date	: 27-Nov-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
David Viner	SENIOR LAB TECH	Perth Organics, Malaga, WA
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA

General Comments

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Laboratory Duplicate (DUP) Report

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Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1259849)									
EP1712990-003	T2F	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.049	0.050	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.09	2.07	0.694	0% - 20%
EB1724360-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.093	0.093	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.20	0.20	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1259895)									
EP1712990-010	WQA02_151117	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.041	0.041	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1259895) - continued									
EP1712990-010	WQA02_151117	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.27	0.28	0.00	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1268118)									
EP1712990-001	D1	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.7	0.6	0.00	No Limit
EP1712990-010	WQA02_151117	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.2	<0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1268170)									
EP1712990-010	WQA02_151117	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	0.3	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1253009)									
EP1712990-001	D1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1712990-010	WQA02_151117	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1253002)									
EP1712990-001	D1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.06	0.07	0.00	No Limit
EP1712990-011	BLNS-B1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1253008)									
EP1712990-001	D1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.98	2.04	2.64	0% - 20%
EP1712990-010	WQA02_151117	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1255201)									
EP1712868-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.6	3.5	2.96	No Limit
EP1712964-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	89.9	85.4	5.15	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1255203)									
EP1712990-003	T2F	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	0.8	18.5	0% - 50%
EP1712990-013	A2S	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.9	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1255200)									
EP1712868-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.74	0.62	16.5	0% - 50%
EP1712964-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	16.6	15.9	4.47	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1255202)									
EP1712990-003	T2F	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.00	No Limit
EP1712990-013	A2S	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.36	0.35	3.47	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1253001)									
EP1712990-001	D1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1712990-011	BLNS-B1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.23	0.23	0.00	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1254611)									
EP1712868-003	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	120	210	52.4	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	100	180	60.2	No Limit
EP1712990-011	BLNS-B1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1254611) - continued									
EP1712990-011	BLNS-B1	EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1257772)									
EP1712935-010	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1712990-007	GW-D5	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1254611)									
EP1712868-003	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	200	360	57.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP1712990-011	BLNS-B1	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1257772)									
EP1712935-010	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1712990-007	GW-D5	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1257772)									
EP1712935-010	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1712990-007	GW-D5	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1259849)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.0	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.9	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.0	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	98.6	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.7	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1259895)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	108	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	109	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	109	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	103	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1268118)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	102	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1268170)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	104	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1253009)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1253002)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.0	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1253008)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1255201)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.2	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1255203)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.4	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1255200)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1255200) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.7	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1255202)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1253001)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115
EP008: Chlorophyll (QCLot: 1258027)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	113	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1254611)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	82.6	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	90.0	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	71.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1257772)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	105	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1254611)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	84.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	80.6	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	73.7	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1257772)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	108	74	115
EP080: BTEXN (QCLot: 1257772)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	98.5	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	103	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	110	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1259849)							
EB1724360-004	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	108	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1259849) - continued							
EB1724360-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	108	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	110	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	99.0	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	110	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	109	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1259895)							
EP1712990-011	BLNS-B1	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	105	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	107	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	108	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	107	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	106	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1253009)							
EP1712990-001	D1	EK055G: Ammonia as N	7664-41-7	1 mg/L	107	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1253002)							
EP1712990-001	D1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	111	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1253008)							
EP1712990-001	D1	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	87.0	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1255201)							
EP1712868-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	92.5	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1255203)							
EP1712990-005	GW-D3	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1255200)							
EP1712868-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	89.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1255202)							
EP1712990-005	GW-D3	EK067G: Total Phosphorus as P	----	1 mg/L	95.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1253001)							
EP1712990-001	D1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	109	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1254611)							
EP1712990-011	BLNS-B1	EP071: C10 - C14 Fraction	----	385 µg/L	66.4	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	70.5	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	60.1	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1257772)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1257772) - continued							
EP1712935-011	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	119	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1254611)							
EP1712990-011	BLNS-B1	EP071: >C10 - C16 Fraction	----	380 µg/L	69.9	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	64.7	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	64.2	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1257772)							
EP1712935-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	133	77	137
EP080: BTEXN (QCLot: 1257772)							
EP1712935-011	Anonymous	EP080: Benzene	71-43-2	20 µg/L	106	77	122
		EP080: Toluene	108-88-3	20 µg/L	100.0	74	126

QUALITY CONTROL REPORT

Work Order	: **EP1712847**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 15-Nov-2017
Order number	: W81020-103	Date Analysis Commenced	: 15-Nov-2017
C-O-C number	: ----	Issue Date	: 22-Nov-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1250660)									
EP1712847-006	FS4A	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.033	0.034	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.16	0.16	0.00	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.94	0.94	0.00	0% - 50%
EB1724036-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.064	0.063	1.82	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.40	0.40	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1250666)									
EP1712825-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.020	0.020	0.00	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1250666) - continued									
EP1712825-001	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.09	0.10	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.84	0.85	1.43	0% - 50%
EP1712847-009	A3	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.052	0.052	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.009	0.008	13.7	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.27	0.27	0.00	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	2.77	2.76	0.00	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1260541)									
EP1712825-001	Anonymous	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.3	0.3	0.00	No Limit
EP1712847-009	A3	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1260540)									
EP1712825-001	Anonymous	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	0.2	0.00	No Limit
EP1712847-009	A3	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.3	0.3	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1246398)									
EP1712825-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	48.4	No Limit
EP1712847-002	A1N	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.38	0.35	7.93	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1246391)									
EP1712847-001	A1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1712847-007	RD1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1246399)									
EP1712825-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.02	57.6	No Limit
EP1712847-002	A1N	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1251278)									
EP1712815-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP1712830-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	151	143	5.12	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1251280)									
EP1712847-009	A3	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.7	1.8	5.78	0% - 50%
EP1712867-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	9.9	10.4	4.82	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1251277)									
EP1712815-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.00	No Limit
EP1712830-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	12.0	11.4	5.18	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1251279)									
EP1712847-009	A3	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.07	0.00	No Limit
EP1712867-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.24	0.26	9.60	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1246390)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1246390) - continued									
EP1712847-007	RD1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.16	0.16	0.00	0% - 50%
EP1712824-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1251352)									
EP1712816-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1712890-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1251352)									
EP1712816-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1712890-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1251352)									
EP1712816-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1712890-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1250660)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	103	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.6	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.3	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	104	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.3	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	99.5	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1250666)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	107	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.9	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	105	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	101	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	114	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1260541)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	108	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1260540)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	114	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1246398)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	111	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1246391)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1246399)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1251278)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	88.7	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1251280)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.2	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1251277)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1251277) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1251279)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1246390)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115
EP008: Chlorophyll (QCLot: 1248851)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	105	70	130
EP008: Chlorophyll (QCLot: 1248852)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	106	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1247903)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	87.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	93.7	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	77.6	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1251352)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	78.3	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1247903)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	92.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	84.1	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	84.5	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1251352)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	85.7	74	115
EP080: BTEXN (QCLot: 1251352)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	95.6	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	89.6	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	93.2	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	96.5	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.7	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	101	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1250660)							
EB1724036-001	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	107	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	110	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	101	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	98.5	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	97.0	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	96.0	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1250666)							
EP1712847-001	A1	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	104	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	98.7	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	99.8	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	105	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1246398)							
EP1712825-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	80.0	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1246391)							
EP1712847-001	A1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1246399)							
EP1712825-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	97.2	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1251278)							
EP1712815-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	109	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1251280)							
EP1712848-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1251277)							
EP1712815-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1251279)							
EP1712848-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1246390)							
EP1712825-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1251352)							
EP1712847-001	A1	EP080: C6 - C9 Fraction	----	240 µg/L	91.1	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1251352)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1251352) - continued							
EP1712847-001	A1	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	96.6	77	137
EP080: BTEXN (QCLot: 1251352)							
EP1712847-001	A1	EP080: Benzene	71-43-2	20 µg/L	102	77	122
		EP080: Toluene	108-88-3	20 µg/L	88.6	74	126

QUALITY CONTROL REPORT

Work Order	: **EP1714429**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 20-Dec-2017
Order number	: W81020-103	Date Analysis Commenced	: 20-Dec-2017
C-O-C number	: ----	Issue Date	: 29-Dec-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 16		
No. of samples analysed	: 16		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1336878)									
EP1714429-001	GW-T3E-A	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.31	0.30	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.34	0.33	3.17	No Limit
ES1732146-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	6.10	6.19	1.40	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.027	0.031	12.7	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.025	0.026	4.84	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1337146)									
EP1714429-001	GW-T3E-A	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EP1714429-011	D2	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1332839)									

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1332839) - continued									
EP1714429-002	GW-D5	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.11	0.00	0% - 50%
EP1714429-005	BH10	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.18	0.19	6.71	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1332606)									
EP1714430-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1714390-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1332934)									
EP1714429-012	GW-D4	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1714429-004	T3C	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1332838)									
EP1714429-002	GW-D5	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1714429-005	BH10	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1342262)									
EP1714300-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	<0.1	0.00	No Limit
EP1714416-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1342264)									
EP1714429-004	T3C	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.00	No Limit
EP1714429-015	GW-D3	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1342261)									
EP1714300-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.09	0.00	No Limit
EP1714416-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.05	46.1	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1342263)									
EP1714429-004	T3C	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1714429-015	GW-D3	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1332607)									
EP1714430-003	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1714390-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.06	0.06	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1332935)									
EP1714429-012	GW-D4	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1714429-004	T3C	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1334064)									
EP1714429-001	GW-T3E-A	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1714429-011	D2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1334064)									
EP1714429-001	GW-T3E-A	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1714429-011	D2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1334064)									
EP1714429-001	GW-T3E-A	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1334064) - continued									
EP1714429-001	GW-T3E-A	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1714429-011	D2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1336878)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.5	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.1	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.0	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.8	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.3	82	112
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1337146)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	99.8	74	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1332839)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1332606)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1332934)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1332838)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1342262)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.0	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1342264)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.5	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1342261)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1342263)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	97.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1332607)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	107	87	115
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1332935)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	109	87	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1332641)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	78.3	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	77.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	71.1	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1334064)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	85.7	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1332641)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	81.6	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	74.5	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	45.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1334064)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	91.2	74	115
EP080: BTEXN (QCLot: 1334064)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	84.4	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.4	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	101	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	96.4	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1336878)							
EP1714429-002	GW-D5	EG020A-F: Arsenic	7440-38-2	1 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	98.6	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	103	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	98.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	103	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	104	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1332839)							
EP1714429-001	GW-T3E-A	EK055G: Ammonia as N	7664-41-7	1 mg/L	100	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1332606)							
EP1714390-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1332934)							
EP1714389-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1332838)							
EP1714429-001	GW-T3E-A	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	110	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1342262)							
EP1714300-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	94.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1342264)							
EP1714429-005	BH10	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	95.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1342261)							
EP1714300-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	100	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1342263)							
EP1714429-005	BH10	EK067G: Total Phosphorus as P	----	1 mg/L	99.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1332607)							
EP1714390-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	114	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1332935)							
EP1714429-004	T3C	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	111	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1334064)							
EP1714429-002	GW-D5	EP080: C6 - C9 Fraction	----	240 µg/L	96.4	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1334064)							
EP1714429-002	GW-D5	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	102	77	137
EP080: BTEXN (QCLot: 1334064)							
EP1714429-002	GW-D5	EP080: Benzene	71-43-2	20 µg/L	91.3	77	122
		EP080: Toluene	108-88-3	20 µg/L	95.2	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1714152**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 14-Dec-2017
Order number	: W81020-103	Date Analysis Commenced	: 14-Dec-2017
C-O-C number	: ----	Issue Date	: 22-Dec-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
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Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1323090)									
EP1714152-001	A1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	<0.001	130	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.239	0.240	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	85.6	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.76	2.74	0.624	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1322861)									
EP1714152-001	A1	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.255	0.260	1.80	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.011	0.010	10.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	3.73	3.88	4.02	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1330093)									
EP1714152-009	WQA02_131217	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EB1726447-006	Anonymous	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1332208)									
EP1714152-001	A1	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.5	0.5	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1317812)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1317812) - continued									
EP1714152-002	A1N	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.06	25.5	No Limit
EP1714152-003	A1E	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.06	32.1	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1317882)									
EP1714146-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1714152-001	A1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1317813)									
EP1714152-002	A1N	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.02	<0.02	0.00	No Limit
EP1714152-003	A1E	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.02	<0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1325078)									
EP1714107-013	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.2	0.00	0% - 50%
EP1714152-001	A1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.3	4.2	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1325080)									
EP1714185-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.8	0.00	0% - 50%
EP1714204-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.3	1.3	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1325079)									
EP1714107-013	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.78	0.75	4.52	0% - 20%
EP1714152-001	A1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.89	0.80	10.7	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1317883)									
EP1714152-001	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.47	0.47	0.00	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1319389)									
EP1714152-007	BLNS-B1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1323745)									
EP1714127-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1714152-003	A1E	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1319389)									
EP1714152-007	BLNS-B1	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1323745)									
EP1714127-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1714152-003	A1E	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1323745)									
EP1714127-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1323745) - continued									
EP1714127-001	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1714152-003	A1E	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1323090)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.1	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.8	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.8	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	100	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.1	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	92.9	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.0	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1322861)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.5	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.6	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	103	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1330093)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	91.2	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1332208)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	104	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1317812)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1317882)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.1	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1317813)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1325078)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.7	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1325080)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.3	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1325079)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1325079) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1317883)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	110	87	115
EP008: Chlorophyll (QCLot: 1326803)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	89.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1319389)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	92.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	105	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	87.3	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1323745)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	92.8	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1319389)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	99.0	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	94.8	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	101	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1323745)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	96.8	74	115
EP080: BTEXN (QCLot: 1323745)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	89.2	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	97.5	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	102	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	109	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	108	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	89.3	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1323090)							
EP1714152-002	A1N	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	109	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	99.5	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	100	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1323090) - continued							
EP1714152-002	A1N	EG020A-F: Chromium	7440-47-3	0.1 mg/L	97.4	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.8	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	95.6	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	99.3	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	92.2	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	91.2	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1322861)							
EP1714152-002	A1N	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	105	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1317812)							
EP1714152-001	A1	EK055G: Ammonia as N	7664-41-7	1 mg/L	87.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1317882)							
EP1714146-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1317813)							
EP1714152-001	A1	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	80.6	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1325078)							
EP1714107-014	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	84.6	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1325080)							
EP1714185-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	80.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1325079)							
EP1714107-014	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	110	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1317883)							
EP1714152-001	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	85.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1319389)							
EP1714152-007	BLNS-B1	EP071: C10 - C14 Fraction	----	385 µg/L	67.0	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	73.3	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	64.5	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1323745)							
EP1714127-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	122	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1319389)							
EP1714152-007	BLNS-B1	EP071: >C10 - C16 Fraction	----	380 µg/L	71.1	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	67.5	55	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1319389) - continued							
EP1714152-007	BLNS-B1	EP071: >C34 - C40 Fraction	----	168 µg/L	78.0	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1323745)							
EP1714127-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	122	77	137
EP080: BTEXN (QCLot: 1323745)							
EP1714127-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	104	77	122
		EP080: Toluene	108-88-3	20 µg/L	106	74	126

QUALITY CONTROL REPORT

Work Order	: **EP1801308**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 16-Jan-2018
Order number	: W81020-103	Date Analysis Commenced	: 17-Jan-2018
C-O-C number	: ----	Issue Date	: 25-Jan-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1384769)									
EP1801306-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.00	No Limit
EP1801308-005	GW-D8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.28	0.28	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.19	0.18	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1381637)									
EP1801306-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.010	0.011	0.00	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1381637) - continued									
EP1801306-001	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.015	0.015	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.07	0.09	18.7	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.18	0.18	0.00	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1388021)									
EP1801306-001	Anonymous	EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	<0.2	0.00	No Limit
EP1801308-005	GW-D8	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.7	0.6	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1388030)									
EM1801446-007	Anonymous	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.4	0.4	0.00	No Limit
EP1801308-001	A1	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.6	0.6	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1378731)									
EP1801292-007	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1801306-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1376988)									
EP1801303-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.01	0.00	No Limit
EP1801308-002	A1N	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1378732)									
EP1801294-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1801306-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1378913)									
EP1801306-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.0	2.2	11.2	0% - 20%
EP1801312-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.5	3.8	8.85	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1378914)									
EP1801306-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.20	0.20	0.00	0% - 20%
EP1801312-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.86	4.76	2.05	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1376989)									
EP1801303-008	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP1801308-002	A1N	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.10	0.10	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1378484)									
EM1801574-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	40	0.00	No Limit
EP1801306-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1378484)									
EM1801574-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	40	50	0.00	No Limit
EP1801306-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1378484)									
EM1801574-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	2	2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	10	11	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1378484) - continued									
EM1801574-001	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	4	5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	3	3	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1801306-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1384769)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.8	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.9	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.1	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.5	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	98.6	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.7	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	95.9	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1381637)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.8	80	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.4	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.8	89	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.9	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.0	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	93.4	84	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82	118
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1388021)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	103	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1388030)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	98.5	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1378731)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.0	80	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1376988)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	94	107
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1378732)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	112	89	114
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1378913)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	92.4	70	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1378914)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	93.9	70	120
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1376989)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1376989) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	94	108
EP008: Chlorophyll (QCLot: 1378805)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	102	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1377128)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	97.7	58	134
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	100	60	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	96.0	54	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1378484)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	79.6	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1377128)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	95.4	58	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	97.4	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	100	58	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1378484)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	78.8	66	123
EP080: BTEXN (QCLot: 1378484)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	82.9	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	81.0	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	84.1	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	87.2	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	87.7	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	82.0	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1384769)							
EP1801306-002	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	92.4	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	96.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	94.6	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	92.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.2	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	95.6	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Matrix Spike (MS) Report: Recovery Limits (%) Low	Matrix Spike (MS) Report: Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1384769) - continued							
EP1801306-002	Anonymous	EG020A-F: Manganese	7439-96-5	0.1 mg/L	93.0	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	91.4	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.5	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1381637)							
EP1801306-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.5 mg/L	98.1	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.9	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	103	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	100	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	98.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1378731)							
EP1801292-008	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	82.1	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1376988)							
EP1801303-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	80.9	80	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1378732)							
EP1801294-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	91.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1378913)							
EP1801306-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# 65.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1378914)							
EP1801306-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	92.9	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1376989)							
EP1801303-009	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	102	79	123
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1378484)							
EM1801577-001	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	65.1	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1378484)							
EM1801577-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	65.3	44	122
EP080: BTEXN (QCLot: 1378484)							
EM1801577-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	82.6	68	130
		EP080: Toluene	108-88-3	20 µg/L	77.5	72	132

QUALITY CONTROL REPORT

Work Order	: **EM1801446**	Page	: 1 of 11
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 16-Jan-2018
Order number	: W81020-103	Date Analysis Commenced	: 16-Jan-2018
C-O-C number	: ----	Issue Date	: 24-Jan-2018
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1373660)									
EM1801444-012	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0287	0.0241	17.5	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.100	<0.100	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.835	0.769	8.21	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.137	0.129	6.49	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	7.88	7.17	9.46	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	3.42	2.99	13.4	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.500	<0.500	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	95.8	89.2	7.08	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<5.00	<5.00	0.00	No Limit
EM1801446-004	T4C	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.41	3.54	3.61	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1381135)									
EM1801446-009	D2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.003	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1381135) - continued									
EM1801446-009	D2	EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.42	0.42	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM1801643-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.019	0.018	5.64	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.039	0.038	3.01	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.02	57.1	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1373661)									
EM1801442-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.010	0.011	12.4	0% - 50%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.003	0.004	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	2.92	3.09	5.58	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	2.00	1.94	3.04	0% - 20%
EM1801447-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.074	0.074	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.071	0.067	4.92	0% - 50%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.72	0.72	0.00	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	4.09	4.04	1.29	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1388029)									
EM1801446-003	GW05	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.2	0.2	0.00	No Limit
EG094T: Total metals in Fresh water by ORC-ICPMS (QC Lot: 1388030)									
EM1801446-007	A2S	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.4	0.4	0.00	No Limit
EP1801308-001	Anonymous	EG094B-T: Selenium	7782-49-2	0.2	µg/L	0.6	0.6	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1373745)									
EM1801446-003	GW05	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.06	0.00	No Limit
EM1801458-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1376265)									
EB1801877-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	10.6	10.1	4.65	0% - 20%
EB1801985-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.05	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1371592)									
EM1801447-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EM1801444-019	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1376230)									
EM1801446-009	D2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM1801526-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1373744)									
EM1801306-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.00	No Limit
EM1801446-003	GW05	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1376266)									
EB1801985-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EM1801526-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.84	4.75	1.75	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1374459)									
EB1801877-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	75.9	74.9	1.29	0% - 20%
EM1801455-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	170	173	1.98	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1376821)									
EB1801667-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1374460)									
EB1801877-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	16.3	14.5	11.8	0% - 20%
EM1801455-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	32.6	39.2	18.4	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1376822)									
EB1801667-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.42	0.38	9.86	0% - 20%
EB1801994-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.63	3.35	8.08	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1371586)									
EM1801446-008	A2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.03	0.00	No Limit
EM1801208-068	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	3.26	3.07	6.03	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1376231)									
EM1801446-009	D2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EM1801526-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.03	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1371383)									
EM1801446-006	WQA02	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1373768)									
EM1801446-001	D1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1801448-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1378457)									
EM1801631-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1371383)									
EM1801446-006	WQA02	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1373768)									
EM1801446-001	D1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1801448-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1378457)									
EM1801631-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1373768)									
EM1801446-001	D1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1801448-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 1378457)									
EM1801631-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1373660)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.8	93	105
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.5	91	107
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	87.3	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	87.6	83	103
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	86.9	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.4	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.3	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.7	82	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.1	85	109
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.0	94	106
EG020F: Dissolved Metals by ICP-MS (QCLot: 1381135)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	93	105
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.0	91	107
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.2	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.5	83	103
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.9	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.9	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.1	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.0	85	109
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.7	94	106
EG020T: Total Metals by ICP-MS (QCLot: 1373661)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	80	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	86	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.9	87	109
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.8	87	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	87	113
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	80	120
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1388029)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	98.8	80	120
EG094T: Total metals in Fresh water by ORC-ICPMS (QCLot: 1388030)								
EG094B-T: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	98.5	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1373745)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1373745) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	80	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1376265)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	94.9	80	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1371592)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	96.3	94	107
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1376230)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	96.4	94	107
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1373744)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	110	89	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1376266)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	113	89	114
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1374459)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	105	70	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1376821)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	82.8	70	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1374460)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	96.7	70	120
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1376822)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	88.8	70	120
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1371586)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	94	108
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1376231)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	103	94	108
EP008: Chlorophyll (QCLot: 1377269)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	100	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1371383)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	104	58	134
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	109	60	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	105	54	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1373768)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	94.1	68	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1376262)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	93.5	58	134
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	104	60	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	102	54	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1378457)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1378457) - continued								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	88.9	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1371383)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	104	58	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	107	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	113	58	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1373768)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	92.0	66	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1376262)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	99.1	58	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	101	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	112	58	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1378457)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	89.2	66	123
EP080: BTEXN (QCLot: 1373768)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	98.0	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.4	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	95.0	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	95.4	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.9	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	81.5	74	124
EP080: BTEXN (QCLot: 1378457)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	86.9	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.8	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	92.9	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	94.3	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	97.6	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	91.9	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1373660)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1373660) - continued							
EM1801444-012	Anonymous	EG020A-F: Arsenic	7440-38-2	2 mg/L	104	85	131
		EG020A-F: Cadmium	7440-43-9	5 mg/L	99.0	81	133
		EG020A-F: Chromium	7440-47-3	20 mg/L	95.7	71	135
		EG020A-F: Copper	7440-50-8	20 mg/L	100	76	130
		EG020A-F: Lead	7439-92-1	20 mg/L	103	75	133
		EG020A-F: Manganese	7439-96-5	20 mg/L	67.6	64	134
		EG020A-F: Nickel	7440-02-0	20 mg/L	98.4	73	131
		EG020A-F: Zinc	7440-66-6	20 mg/L	101	75	131
EG020F: Dissolved Metals by ICP-MS (QCLot: 1381135)							
EM1801446-009	D2	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	97.9	85	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	96.3	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	93.7	71	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.5	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	93.3	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	93.2	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.0	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	95.9	75	131
EG020T: Total Metals by ICP-MS (QCLot: 1373661)							
EM1801442-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	94.3	75	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	88.4	80	118
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.9	73	123
		EG020A-T: Nickel	7440-02-0	1 mg/L	90.4	80	118
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.5	74	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1373745)							
EM1801446-001	D1	EK055G: Ammonia as N	7664-41-7	1 mg/L	98.2	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1376265)							
EB1801928-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1371592)							
EM1801446-001	D1	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	86.2	80	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1376230)							
EM1801505-053	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	92.1	80	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1373744)							
EM1801306-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.4	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1376266)							
EB1801985-008	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	97.3	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1374459)							
EM1801446-001	D1	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	79.6	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1376821)							
EB1801667-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	107	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1374460)							
EM1801446-001	D1	EK067G: Total Phosphorus as P	----	1 mg/L	123	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1376822)							
EB1801667-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	87.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1371586)							
EM1801208-069	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	# Not Determined	79	123
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1376231)							
EM1801505-053	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	89.0	79	123
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1371383)							
EM1801446-006	WQA02	EP071: C10 - C14 Fraction	----	3368 µg/L	126	50	130
		EP071: C15 - C28 Fraction	----	14735 µg/L	129	54	136
		EP071: C29 - C36 Fraction	----	7856 µg/L	125	50	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1373768)							
EM1801441-001	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	107	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1378457)							
EM1801629-001	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	82.0	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1371383)							
EM1801446-006	WQA02	EP071: >C10 - C16 Fraction	----	5225 µg/L	125	50	128
		EP071: >C16 - C34 Fraction	----	19994 µg/L	127	50	150
		EP071: >C34 - C40 Fraction	----	1449 µg/L	133	51	159
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1373768)							
EM1801441-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	103	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1378457)							
EM1801629-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	80.6	44	122
EP080: BTEXN (QCLot: 1373768)							
EM1801441-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	116	68	130
		EP080: Toluene	108-88-3	20 µg/L	107	72	132
EP080: BTEXN (QCLot: 1378457)							
EM1801629-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	92.4	68	130
		EP080: Toluene	108-88-3	20 µg/L	91.2	72	132

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1801303**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 12-Jan-2018
Order number	: W81020-103	Date Analysis Commenced	: 12-Jan-2018
C-O-C number	: ----	Issue Date	: 23-Jan-2018
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1373504)									
EM1801303-004	T3C	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.011	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.15	0.14	0.00	No Limit
EB1801819-013	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.006	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.50	2.57	2.83	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1373499)									
EM1801303-002	BH10	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EB1801619-001	Anonymous	EG093B-F: Selenium	7782-49-2	2	µg/L	39	36	7.34	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1368290)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1368290) - continued									
EM1801302-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.34	0.36	5.18	0% - 20%
EM1801303-004	T3C	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.06	49.5	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1366481)									
EM1801297-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.00	No Limit
EM1801297-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.54	0.54	0.00	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1368289)									
EM1801297-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.55	0.54	0.00	0% - 20%
EM1801297-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	55.8	57.6	3.26	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1368291)									
EM1801303-004	T3C	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM1801352-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1371260)									
EB1801522-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.5	2.2	12.3	0% - 20%
EM1801303-004	T3C	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1371261)									
EB1801523-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	54.0	54.8	1.50	0% - 20%
EM1801303-004	T3C	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1366482)									
EM1801303-001	T3B	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1366474)									
EM1801297-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1801297-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1366474)									
EM1801297-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1801297-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1366474)									
EM1801297-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1801297-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1366474) - continued									
EM1801297-011	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1373504)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.1	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.4	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.8	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	98.4	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.8	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.7	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.5	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	97.8	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	110	82	114
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1373499)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	88.4	87	121
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1368290)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	80	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1366481)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	94	107
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1368289)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	89	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1368291)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.9	89	114
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1371260)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	102	70	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1371261)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	90.5	70	120
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1366482)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	108	94	108
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1366474)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	101	68	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1368137)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	85.5	58	134
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	102	60	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	101	54	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1366474)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1366474) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	97.4	66	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1368137)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	93.7	58	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	101	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	99.6	58	137
EP080: BTEXN (QCLot: 1366474)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	100	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	108	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	90.6	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1373504)							
EB1801819-014	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	95.9	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	94.5	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.1	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	99.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.1	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	97.0	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	96.8	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	95.1	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	95.9	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1368290)							
EM1801302-003	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	86.5	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1366481)							
EM1801297-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.6	80	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1368289)							
EM1801297-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.3	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1368291)							
EM1801303-005	T2F	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1371260)							
EB1801522-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	98.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1371261)							
EB1801523-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1366482)							
EM1801303-002	BH10	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	79	123
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1366474)							
EM1801297-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	91.8	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1366474)							
EM1801297-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	87.5	44	122
EP080: BTEXN (QCLot: 1366474)							
EM1801297-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	105	68	130
		EP080: Toluene	108-88-3	20 µg/L	106	72	132

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1713111**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 21-Nov-2017
Order number	: W81020-103	Date Analysis Commenced	: 21-Nov-2017
C-O-C number	: ----	Issue Date	: 28-Nov-2017
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Graduate Chemist	Perth Organics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1266824)									
EP1713111-001	BH10	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.90	0.91	1.12	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.54	3.62	2.28	0% - 20%
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 1271857)									
EP1713111-001	BH10	EG094B-F: Selenium	7782-49-2	0.2	µg/L	0.7	0.6	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1259525)									
EP1713106-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EP1713108-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1259643)									
EP1713111-001	BH10	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1713115-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1259524)									
EP1713106-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.55	0.56	0.00	0% - 20%
EP1713108-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.03	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1263723)									
EP1713087-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.2	0.00	No Limit
EP1713087-011	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	<0.1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1263722)									
EP1713087-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1713087-011	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.02	94.9	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1263724)									
EP1713115-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.67	0.65	3.17	0% - 20%
EP1713134-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.08	58.9	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1259644)									
EP1713111-001	BH10	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.06	0.06	0.00	No Limit
EP1713115-004	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	1.14	1.14	0.00	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1260681)									
EP1713111-003	GW-D7	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1267471)									
EP1713217-012	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1713154-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1260681)									
EP1713111-003	GW-D7	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1267471)									
EP1713217-012	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1713154-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1267471)									
EP1713217-012	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1713154-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1266824)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.7	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.6	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	101	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.7	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	98.8	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.6	82	114
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 1271857)								
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	105	80	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1259525)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1259643)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.4	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1259524)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1263723)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	82.6	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1263722)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	96.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1263724)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1259644)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	108	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1260681)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	76.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	104	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	81.3	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1267471)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	74.1	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1260681)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1260681) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	78.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	95.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	98.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1267471)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	76.8	74	115
EP080: BTEXN (QCLot: 1267471)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	98.6	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	86.1	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	103	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	105	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	83.5	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1266824)							
EP1713111-002	T3C	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	95.1	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	99.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	98.7	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	99.3	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	99.7	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	98.6	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	99.5	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1259525)							
EP1713106-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	91.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1259643)							
EP1713088-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	112	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1259524)							
EP1713106-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	105	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1263723)							
EP1713087-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1263722)							
EP1713087-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	105	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1263724)							
EP1713115-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	120	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1259644)							
EP1713111-001	BH10	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1260681)							
EP1713111-003	GW-D7	EP071: C10 - C14 Fraction	----	385 µg/L	70.6	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	92.2	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	72.5	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1267471)							
EP1713217-012	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	78.8	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1260681)							
EP1713111-003	GW-D7	EP071: >C10 - C16 Fraction	----	380 µg/L	74.0	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	83.7	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	84.3	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1267471)							
EP1713217-012	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	77.6	77	137
EP080: BTEXN (QCLot: 1267471)							
EP1713217-012	Anonymous	EP080: Benzene	71-43-2	20 µg/L	100	77	122
		EP080: Toluene	108-88-3	20 µg/L	93.1	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1802093**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 07-Feb-2018
Order number	: W81020-103	Date Analysis Commenced	: 07-Feb-2018
C-O-C number	: ----	Issue Date	: 15-Feb-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1426174)									
EP1802093-001	A1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.006	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.351	0.358	1.93	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	4.05	4.08	0.718	0% - 20%
ES1804094-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.051	0.050	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.042	0.041	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.025	0.024	5.06	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.37	0.32	14.5	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1426150)									
ES1804224-001	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.007	33.2	No Limit
ES1804237-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1426150) - continued									
ES1804237-002	Anonymous	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.071	0.079	9.76	0% - 50%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1804224-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1426490)									
EP1802090-001	Anonymous	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1426523)									
EP1802093-001	A1	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1418693)									
EP1802093-002	A1N	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.06	0.00	No Limit
EP1802093-003	A1E	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.05	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1418796)									
EP1802089-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802093-001	A1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1418692)									
EP1802093-002	A1N	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802093-003	A1E	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1420641)									
EP1802052-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.7	6.8	16.9	0% - 50%
EP1802093-004	NLWS-N2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	8.3	8.1	1.93	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1420640)									
EP1802052-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	5.11	5.35	4.52	0% - 20%
EP1802093-004	NLWS-N2	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.00	0.99	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1418797)									
EP1802093-001	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.10	0.10	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1426950)									
EP1802051-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1802093-001	A1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1426950)									
EP1802051-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1802093-001	A1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1426950)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1426950) - continued									
EP1802051-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
EP1802093-001	A1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1426174)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.1	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1426150)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	100	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.1	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.8	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.2	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1426490)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	82.7	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1426523)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	125	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1418693)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	91.8	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1418796)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.0	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1418692)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.7	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1420641)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.9	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1420640)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1418797)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1418797) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.2	87	115
EP008: Chlorophyll (QCLot: 1426567)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	114	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1419988)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	68.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	77.7	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	63.9	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1426950)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	108	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1419988)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	72.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	69.7	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	70.1	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1426950)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	111	74	115
EP080: BTEXN (QCLot: 1426950)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	85.5	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	99.2	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	96.7	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	97.0	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.4	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	104	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1426174)							
EP1802093-002	A1N	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	100	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.2	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	96.6	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1426174) - continued							
EP1802093-002	A1N	EG020A-F: Nickel	7440-02-0	1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	102	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1426150)							
EP1802093-001	A1	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	115	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	115	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	112	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	118	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	117	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1418693)							
EP1802093-001	A1	EK055G: Ammonia as N	7664-41-7	1 mg/L	77.6	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1418796)							
EP1802089-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	84.2	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1418692)							
EP1802093-001	A1	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	73.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1420641)							
EP1802052-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	95.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1420640)							
EP1802052-002	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	103	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1418797)							
EP1802093-001	A1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	94.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1426950)							
EP1802051-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	117	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1426950)							
EP1802051-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	102	77	137
EP080: BTEXN (QCLot: 1426950)							
EP1802051-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	77.1	77	122
		EP080: Toluene	108-88-3	20 µg/L	83.8	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1802224**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Feb-2018
Order number	: W81020-103	Date Analysis Commenced	: 09-Feb-2018
C-O-C number	: ----	Issue Date	: 19-Feb-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1432108)									
EP1802224-001	A2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.05	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.00	No Limit
ES1804607-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.31	0.29	6.39	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1432143)									
EP1802224-001	A2	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.035	0.034	4.32	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1432143) - continued									
EP1802224-001	A2	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.07	0.07	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.13	0.14	0.00	No Limit
ES1804714-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.645	0.646	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.267	0.264	1.04	0% - 20%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.07	0.07	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	51.7	51.4	0.519	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1432508)									
EP1802224-001	A2	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1432553)									
EP1802224-001	A2	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1425110)									
EP1802224-007	GW-D4	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1802221-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	3.51	3.40	3.24	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1424951)									
EP1802171-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802224-001	A2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1425109)									
EP1802224-007	GW-D4	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.16	2.04	5.66	0% - 20%
EP1802221-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.89	2.89	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1427588)									
EP1802204-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	33.8	35.2	4.07	0% - 20%
EP1802224-001	A2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.0	3.2	6.39	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1427587)									
EP1802204-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	7.05	7.62	7.78	0% - 20%
EP1802224-001	A2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.15	0.14	9.70	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1424950)									
EP1802171-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802224-001	A2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1427038)									
EP1802224-003	BLNS-B1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1436068)									
EP1802218-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1436068) - continued									
EP1802224-001	A2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1427038)									
EP1802224-003	BLNS-B1	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1436068)									
EP1802218-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1802224-001	A2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1436068)									
EP1802218-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1802224-001	A2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1432108)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.0	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.2	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.3	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.1	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1432143)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.2	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	110	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1432508)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	98.3	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1432553)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	110	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1425110)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.9	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1424951)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.0	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1425109)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.8	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1427588)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.5	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1427587)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.9	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1424950)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1424950) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.3	87	115
EP008: Chlorophyll (QCLot: 1427420)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	100	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1427038)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	54.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	69.2	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	57.7	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1436068)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	97.1	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1427038)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	57.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	62.9	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	76.1	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1436068)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	97.0	74	115
EP080: BTEXN (QCLot: 1436068)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	99.8	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	101	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	107	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1432108)							
EP1802224-002	A2S	EG020A-F: Arsenic	7440-38-2	1 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	99.5	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.6	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	100	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1432108) - continued							
EP1802224-002	A2S	EG020A-F: Nickel	7440-02-0	1 mg/L	103	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	103	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1432143)							
EP1802224-002	A2S	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	104	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	105	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1425110)							
EP1802190-003	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1424951)							
EP1802171-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1425109)							
EP1802175-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	81.8	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1427588)							
EP1802204-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	80.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1427587)							
EP1802204-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	80.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1424950)							
EP1802171-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	94.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1427038)							
EP1802224-003	BLNS-B1	EP071: C10 - C14 Fraction	----	385 µg/L	58.6	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	65.6	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	61.1	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1436068)							
EP1802218-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	109	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1427038)							
EP1802224-003	BLNS-B1	EP071: >C10 - C16 Fraction	----	380 µg/L	61.1	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	61.9	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	85.4	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1436068)							
EP1802218-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	105	77	137
EP080: BTEXN (QCLot: 1436068)							
EP1802218-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	79.8	77	122
		EP080: Toluene	108-88-3	20 µg/L	110	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1802359**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Feb-2018
Order number	: W81020-103	Date Analysis Commenced	: 13-Feb-2018
C-O-C number	: ----	Issue Date	: 20-Feb-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Graduate Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1438059)									
EP1802359-001	GW-D8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.16	0.16	0.00	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.18	0.16	6.93	No Limit
ES1804784-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.010	0.016	44.2	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.13	0.15	12.3	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1438901)									
EP1802359-009	WQA03_130218	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1438901) - continued									
EP1802359-009	WQA03_130218	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EW1800645-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.009	0.008	13.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.107	0.103	4.36	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.008	0.007	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.058	0.057	0.00	0% - 50%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	2.76	2.44	12.4	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	8.24	7.14	14.3	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1438449)									
EP1802359-001	GW-D8	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1438462)									
EP1802359-009	WQA03_130218	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1431806)									
EP1802359-002	T3B	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EP1802359-005	T4C	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.19	0.17	12.7	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1431757)									
EP1802359-003	T3C	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802363-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1431807)									
EP1802359-002	T3B	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802359-005	T4C	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1435963)									
EP1802359-006	D1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1435962)									
EP1802328-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.96	1.79	9.18	0% - 20%
EP1802358-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.07	20.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1435964)									
EP1802359-006	D1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	<0.01	85.7	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1431758)									
EP1802359-003	T3C	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1802363-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.09	0.09	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1433112)									
EP1802364-002	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1438834)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1438834) - continued									
EP1802359-001	GW-D8	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1802363-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1433112)									
EP1802364-002	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1438834)									
EP1802359-001	GW-D8	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1802363-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1438834)									
EP1802359-001	GW-D8	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1802363-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1438059)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.8	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.1	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.4	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.4	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.1	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.8	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1438901)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.3	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.5	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1438449)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	98.1	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1438462)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	91.8	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1431806)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1431757)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1431807)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	96.4	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1435963)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.8	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1435962)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1435964)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1435964) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1431758)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	102	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1433112)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	75.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	80.7	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	78.4	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1438834)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	92.2	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1433112)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	79.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	78.5	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	84.4	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1438834)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	89.8	74	115
EP080: BTEXN (QCLot: 1438834)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	100	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	96.7	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	97.6	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	97.7	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	99.6	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	87.2	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1438059)							
EP1802359-002	T3B	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	99.4	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	99.0	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.7	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	104	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1438059) - continued							
EP1802359-002	T3B	EG020A-F: Nickel	7440-02-0	1 mg/L	98.3	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.6	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1438901)							
ES1804766-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	97.1	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	100	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	96.8	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1431806)							
EP1802359-001	GW-D8	EK055G: Ammonia as N	7664-41-7	1 mg/L	106	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1431757)							
EP1802363-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1431807)							
EP1802359-001	GW-D8	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	85.8	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1435963)							
EP1802359-006	D1	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1435962)							
EP1802328-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	130	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1435964)							
EP1802359-006	D1	EK067G: Total Phosphorus as P	----	1 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1431758)							
EP1802363-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1433112)							
EP1802364-002	Anonymous	EP071: C10 - C14 Fraction	----	385 µg/L	78.9	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	91.0	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	84.6	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1438834)							
EP1802359-002	T3B	EP080: C6 - C9 Fraction	----	240 µg/L	99.8	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1433112)							
EP1802364-002	Anonymous	EP071: >C10 - C16 Fraction	----	380 µg/L	83.4	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	87.7	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	92.2	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1438834)							
EP1802359-002	T3B	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	84.6	77	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 1438834)							
EP1802359-002	T3B	EP080: Benzene	71-43-2	20 µg/L	80.4	77	122
		EP080: Toluene	108-88-3	20 µg/L	74.5	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1804348**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 04-Apr-2018
Order number	: W81020-103	Date Analysis Commenced	: 04-Apr-2018
C-O-C number	: ----	Issue Date	: 13-Apr-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1554880)									
EP1804348-001	GW-T3E-A	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.30	0.31	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.38	0.37	0.00	No Limit
EP1804350-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.06	27.4	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1554898)									
EP1804348-008	WQA03_040418	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1554898) - continued									
EP1804348-008	WQA03_040418	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1809764-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.044	0.044	2.39	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1551918)									
EP1804348-001	GW-T3E-A	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EP1804348-013	A2S	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1551933)									
EP1804348-008	WQA03_040418	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1559106)									
EP1804348-001	GW-T3E-A	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.36	0.37	0.00	0% - 20%
EP1804348-013	A2S	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1543653)									
EP1804348-002	T2F	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1804348-013	A2S	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1559107)									
EP1804348-001	GW-T3E-A	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1804348-013	A2S	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1558401)									
EP1804348-001	GW-T3E-A	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	0.7	0.00	No Limit
EP1804348-013	A2S	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.3	4.4	3.95	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1558400)									
EP1804348-001	GW-T3E-A	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00	No Limit
EP1804348-013	A2S	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.13	0.14	9.94	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1543652)									
EP1804348-002	T2F	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1804348-013	A2S	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1548834)									
EP1804347-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1804348-010	WQA01_040418	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1548834)									
EP1804347-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1548834) - continued									
EP1804348-010	WQA01_040418	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1548834)									
EP1804347-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1804348-010	WQA01_040418	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1554880)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.4	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.0	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.0	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.0	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.2	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.8	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.0	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.8	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1554898)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.1	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.5	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.0	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.6	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.9	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.1	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1551918)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	99.1	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1551933)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	109	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1559106)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	107	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1543653)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1559107)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.2	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1558401)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	84.6	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1558400)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	104	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1543652)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1543652) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	110	87	115
EP008: Chlorophyll (QCLot: 1551830)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	94.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1548801)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	54.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	62.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	52.4	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1548834)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	96.2	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1548801)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	57.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	57.4	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	52.5	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1548834)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	95.0	74	115
EP080: BTEXN (QCLot: 1548834)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	111	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	102	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	100	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1554880)							
EP1804348-002	T2F	EG020A-F: Arsenic	7440-38-2	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	106	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	102	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 1554880) - continued							
EP1804348-002	T2F	EG020A-F: Nickel	7440-02-0	1 mg/L	106	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	104	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1554898)							
EP1804348-011	BLNS-B1	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	103	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.4	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	96.0	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1559106)							
EP1804348-001	GW-T3E-A	EK055G: Ammonia as N	7664-41-7	1 mg/L	88.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1543653)							
EP1804348-001	GW-T3E-A	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	101	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1559107)							
EP1804348-001	GW-T3E-A	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.2	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1558401)							
EP1804348-002	T2F	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	90.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1558400)							
EP1804348-002	T2F	EK067G: Total Phosphorus as P	----	1 mg/L	97.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1543652)							
EP1804348-001	GW-T3E-A	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	109	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1548834)							
EP1804347-005	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	88.7	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1548834)							
EP1804347-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	86.3	77	137
EP080: BTEXN (QCLot: 1548834)							
EP1804347-005	Anonymous	EP080: Benzene	71-43-2	20 µg/L	103	77	122
		EP080: Toluene	108-88-3	20 µg/L	91.6	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1803361**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Mar-2018
Order number	: W81020-103	Date Analysis Commenced	: 09-Mar-2018
C-O-C number	: ----	Issue Date	: 16-Mar-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1493749)									
EP1803361-001	T3B	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.76	0.84	10.1	0% - 50%
ES1807416-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.370	0.367	0.837	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.17	0.16	8.85	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.29	0.36	21.4	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1493616)									
EP1803361-004	NLWS-N2	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.478	0.467	2.36	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1493616) - continued									
EP1803361-004	NLWS-N2	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.03	0.02	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	7.31	7.12	2.69	0% - 20%
ES1807455-019	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.01	<0.01	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1493823)									
EP1803361-001	T3B	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1493894)									
EP1803361-004	NLWS-N2	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1485969)									
EP1803267-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1803267-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1486195)									
EP1803361-001	T3B	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803370-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1485970)									
EP1803267-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803267-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1495599)									
EP1803348-006	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.4	14.9	No Limit
EP1803361-007	A2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.6	3.5	3.03	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1495597)									
EP1803019-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.03	0.00	No Limit
EP1803348-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.13	33.7	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1495600)									
EP1803361-007	A2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.10	0.00	0% - 50%
EP1803372-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.11	9.70	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1486192)									
EP1803361-001	T3B	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803370-003	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1487890)									
EP1803267-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1803267-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1488049)									
EP1803375-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP1803354-002	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	200	200	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1487890)									
EP1803267-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1803267-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1488049)									
EP1803375-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP1803354-002	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	200	190	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080: BTEXN (QC Lot: 1487890)									
EP1803267-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
EP1803267-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1493749)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.2	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.2	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.0	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1493616)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.5	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.9	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.4	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.5	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.7	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.6	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1493823)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	95.1	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1493894)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	95.6	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1485969)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.9	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1486195)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1485970)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1495599)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	90.0	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1495597)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1495600)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1495600) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1486192)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115
EP008: Chlorophyll (QCLot: 1487614)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	90.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1487890)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	94.3	74	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1488049)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	55.6	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	72.7	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	54.7	34	105
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1487890)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	94.9	74	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1488049)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	58.3	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	65.9	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	43.0	11	117
EP080: BTEXN (QCLot: 1487890)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	92.9	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	91.7	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	99.2	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	97.0	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	110	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1493749)							
EP1803361-002	T3C	EG020A-F: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	99.1	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	99.3	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1493749) - continued							
EP1803361-002	T3C	EG020A-F: Copper	7440-50-8	1 mg/L	98.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	104	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	98.5	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	98.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.1	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1493616)							
EP1803361-005	A2S	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.2	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	106	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1485969)							
EP1803267-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	123	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1486195)							
EP1803361-001	T3B	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1485970)							
EP1803267-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	83.5	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1495599)							
EP1803361-010	WQA02_090318	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1495597)							
EP1803348-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1495600)							
EP1803361-010	WQA02_090318	EK067G: Total Phosphorus as P	----	1 mg/L	101	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1486192)							
EP1803361-001	T3B	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	108	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1487890)							
EP1803267-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	106	77	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1488049)							
EP1803361-006	BLNS-B1	EP071: C10 - C14 Fraction	----	385 µg/L	67.6	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	70.9	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	60.0	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1487890)							
EP1803267-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	122	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1488049)							
EP1803361-006	BLNS-B1	EP071: >C10 - C16 Fraction	----	380 µg/L	68.7	45	122

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1488049) - continued							
EP1803361-006	BLNS-B1	EP071: >C16 - C34 Fraction	----	597 µg/L	65.3	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	55.6	54	128
EP080: BTEXN (QCLot: 1487890)							
EP1803267-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	77	122
		EP080: Toluene	108-88-3	20 µg/L	86.4	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1803480**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Mar-2018
Order number	: W181020-103	Date Analysis Commenced	: 13-Mar-2018
C-O-C number	: ----	Issue Date	: 20-Mar-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1500226)									
EP1803480-001	GW-D4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.030	0.018	49.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.38	0.40	6.30	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.10	0.10	0.00	No Limit
ES1807618-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.18	1.13	4.98	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.08	0.10	21.2	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1500465)									
EP1803480-001	GW-D4	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1492891)									
EP1803480-002	GW-D8	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.09	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1492891) - continued									
EP1803480-003	BH12	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1493264)									
EP1803493-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803493-011	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1492892)									
EP1803480-002	GW-D8	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.05	0.00	No Limit
EP1803480-003	BH12	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.72	4.68	0.744	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1498665)									
EP1803470-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP1803487-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	0.6	40.3	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1498664)									
EP1803470-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803487-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.02	0.03	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1493263)									
EP1803493-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1803493-011	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	0.04	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1494318)									
EP1803457-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1803470-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1494318)									
EP1803457-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1803470-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1494318)									
EP1803457-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1803470-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1500226)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	86.5	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.9	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	88.4	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.5	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.4	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.5	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.6	82	112
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1500465)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	100	74	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1492891)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1493264)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	105	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1492892)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1498665)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.0	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1498664)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1493263)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.5	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1494318)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	113	74	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1494356)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	72.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	83.3	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	53.7	34	105
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1494318)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	113	74	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1494356)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1494356) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	74.9	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	71.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	29.2	11	117
EP080: BTEXN (QCLot: 1494318)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	110	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	108	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	109	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	112	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	108	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	113	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1500226)							
EP1803480-002	GW-D8	EG020A-F: Arsenic	7440-38-2	1 mg/L	89.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	90.7	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	89.8	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.9	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	90.0	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	89.6	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.1	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1492891)							
EP1803480-001	GW-D4	EK055G: Ammonia as N	7664-41-7	1 mg/L	99.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1493264)							
EP1803493-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1492892)							
EP1803480-001	GW-D4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1498665)							
EP1803470-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.4	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1498664)							
EP1803470-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	97.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1493263)							
EP1803493-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	88.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1494318)							
EP1803457-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	91.9	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1494318)							
EP1803457-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	95.4	77	137
EP080: BTEXN (QCLot: 1494318)							
EP1803457-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	78.0	77	122
		EP080: Toluene	108-88-3	20 µg/L	86.6	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1803299**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 08-Mar-2018
Order number	: W81020-103	Date Analysis Commenced	: 08-Mar-2018
C-O-C number	: ----	Issue Date	: 16-Mar-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Raymond Commodore	Instrument Chemist	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1490230)									
EP1803299-001	GW-T3E-A	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.40	0.40	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.44	0.43	0.00	No Limit
EW1800786-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.136	0.136	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1487760)									
EP1803299-009	WQA03_080318	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1487760) - continued									
EP1803299-009	WQA03_080318	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1807310-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.002	0.005	81.1	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.008	0.009	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.10	0.07	39.7	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.11	0.40	112	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1487471)									
EP1803299-001	GW-T3E-A	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1487529)									
ES1807081-001	Anonymous	EG093B-T: Selenium	7782-49-2	2	µg/L	<1	<1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1482906)									
EP1803299-002	GW-D3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.00	No Limit
EP1803299-011	T2F	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.38	0.37	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1482801)									
EP1803299-005	T4C	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803265-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1482907)									
EP1803299-002	GW-D3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.22	0.22	0.00	0% - 20%
EP1803299-011	T2F	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1494436)									
EP1803289-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.2	53.8	No Limit
EP1803299-011	T2F	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1494435)									
EP1803289-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1803299-011	T2F	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1482802)									
EP1803299-005	T4C	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1803265-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1484283)									
EP1803283-014	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1803299-004	T4B	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1484317)									
EP1803299-001	GW-T3E-A	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1484317) - continued									
EP1803299-001	GW-T3E-A	EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1484283)									
EP1803283-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1803299-004	T4B	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1484317)									
EP1803299-001	GW-T3E-A	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080: BTEXN (QC Lot: 1484283)									
EP1803283-014	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1803299-004	T4B	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1490230)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.9	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.8	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.4	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.7	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.9	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1487760)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.9	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.4	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.8	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.7	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	115	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.1	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1487471)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	114	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1487529)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	118	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1482906)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.7	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1482801)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	105	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1482907)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1494436)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	82.5	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1494435)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1482802)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1482802) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	108	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1484283)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	107	74	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1484317)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	81.3	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	85.8	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	88.3	34	105
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1484283)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	109	74	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1484317)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	84.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	84.2	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	111	11	117
EP080: BTEXN (QCLot: 1484283)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	103	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	106	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	105	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	104	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	105	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1490230)							
EP1803299-001	GW-T3E-A	EG020A-F: Arsenic	7440-38-2	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	103	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	112	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	103	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	103	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 1487760)							
ES1807288-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.3	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.3	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	# Not Determined	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.4	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	97.1	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1482906)							
EP1803299-001	GW-T3E-A	EK055G: Ammonia as N	7664-41-7	1 mg/L	92.1	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1482801)							
EP1803299-001	GW-T3E-A	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	111	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1482907)							
EP1803299-001	GW-T3E-A	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.7	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1494436)							
EP1803299-001	GW-T3E-A	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	88.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1494435)							
EP1803299-001	GW-T3E-A	EK067G: Total Phosphorus as P	----	1 mg/L	99.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1482802)							
EP1803299-001	GW-T3E-A	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	97.8	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1484283)							
EP1803283-015	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	103	77	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1484317)							
EP1803299-001	GW-T3E-A	EP071: C10 - C14 Fraction	----	385 µg/L	83.9	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	85.0	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	67.6	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1484283)							
EP1803283-015	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	83.2	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1484317)							
EP1803299-001	GW-T3E-A	EP071: >C10 - C16 Fraction	----	380 µg/L	86.0	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	76.9	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	58.2	54	128
EP080: BTEXN (QCLot: 1484283)							
EP1803283-015	Anonymous	EP080: Benzene	71-43-2	20 µg/L	119	77	122
		EP080: Toluene	108-88-3	20 µg/L	88.4	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1804292**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 03-Apr-2018
Order number	: W81020-103	Date Analysis Commenced	: 03-Apr-2018
C-O-C number	: ----	Issue Date	: 11-Apr-2018
Sampler	: Rachel Champion		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Jeremy Truong	Laboratory Manager	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1551707)									
EP1804292-001	GW-D3	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.44	0.40	10.8	No Limit
EP1804332-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.027	0.026	4.37	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1551721)									
EP1804292-008	WQA03_030418	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1551721) - continued									
EP1804292-008	WQA03_030418	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1809713-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.025	0.025	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.04	0.05	30.2	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1547807)									
EP1804292-001	GW-D3	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1548435)									
EP1804292-008	WQA03_030418	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1556952)									
EP1804292-001	GW-D3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EP1804298-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1540575)									
EP1804282-009	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1804282-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1556953)									
EP1804292-001	GW-D3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.30	0.31	0.00	0% - 20%
EP1804298-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1552670)									
EP1804282-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.3	2.1	8.12	No Limit
EP1804298-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.4	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1552669)									
EP1804282-009	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	<0.05	56.6	No Limit
EP1804298-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.22	0.19	17.6	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1540574)									
EP1804282-009	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	<0.01	0.00	No Limit
EP1804282-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1549724)									
EP1804292-001	GW-D3	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1804326-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1549724)									
EP1804292-001	GW-D3	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1804326-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1549724)									
EP1804292-001	GW-D3	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1804326-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1551707)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	89.9	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.7	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.0	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.0	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	85.6	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	87.2	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	86.6	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1551721)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.8	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.0	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.7	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.1	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.3	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.4	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.7	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1547807)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	92.9	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1548435)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	87.5	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1556952)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1540575)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1556953)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1552670)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.3	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1552669)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1540574)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1540574) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	109	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1541642)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	65.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	65.1	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	76.2	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1549724)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1541642)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	68.0	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	69.7	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	65.5	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1549724)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	111	74	115
EP080: BTEXN (QCLot: 1549724)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	107	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	108	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	113	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	102	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1551707)							
EP1804292-002	GW-D4	EG020A-F: Arsenic	7440-38-2	1 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.3	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.0	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	103	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	106	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 1551721)							
EP1804335-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	101	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.3	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.6	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	102	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1556952)							
EP1804292-001	GW-D3	EK055G: Ammonia as N	7664-41-7	1 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1540575)							
EP1804282-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1556953)							
EP1804292-001	GW-D3	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.2	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1552670)							
EP1804282-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	85.7	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1552669)							
EP1804282-009	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	93.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1540574)							
EP1804277-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	110	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1549724)							
EP1804292-002	GW-D4	EP080: C6 - C9 Fraction	----	240 µg/L	95.3	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1549724)							
EP1804292-002	GW-D4	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	92.4	77	137
EP080: BTEXN (QCLot: 1549724)							
EP1804292-002	GW-D4	EP080: Benzene	71-43-2	20 µg/L	93.4	77	122
		EP080: Toluene	108-88-3	20 µg/L	86.3	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1805453**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 02-May-2018
Order number	: W81020-103	Date Analysis Commenced	: 02-May-2018
C-O-C number	: ----	Issue Date	: 10-May-2018
Sampler	: Danielle Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1623371)									
EN1802775-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.606	0.610	0.718	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.017	0.018	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.026	0.019	34.6	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1805453-006	GW-D4_020518	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.40	0.43	5.96	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.11	0.11	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1621795)									
EP1805453-001	BLNS-B1_020518	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.026	0.024	11.4	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1621795) - continued									
EP1805453-001	BLNS-B1_020518	EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.019	<0.005	115	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.07	0.08	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.17	0.17	0.00	No Limit
ES1812735-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.150	0.141	6.31	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.03	0.02	44.4	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.27	0.24	8.28	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1620555)									
EP1805453-001	BLNS-B1_020518	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1620577)									
EP1805453-001	BLNS-B1_020518	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1612393)									
EP1805453-002	A2_020518	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EP1805453-006	GW-D4_020518	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1612549)									
EP1805453-002	A2_020518	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805453-011	D1_020518	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1612394)									
EP1805453-002	A2_020518	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805453-006	GW-D4_020518	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.33	4.32	0.254	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1621867)									
EP1805423-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP1805423-011	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.5	<0.5	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1621869)									
EP1805453-002	A2_020518	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.0	3.9	0.00	0% - 20%
EP1805526-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.5	2.4	4.22	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1621866)									
EP1805423-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805423-011	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.34	0.23	38.5	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1621868)									
EP1805453-002	A2_020518	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.07	23.3	No Limit
EP1805526-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.84	0.85	1.32	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1612548)									
EP1805453-002	A2_020518	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805453-011	D1_020518	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1613641)									
EP1805453-005	GW-D3_020518	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1621693)									
EP1805422-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	202000	186000	8.11	0% - 20%
EP1805446-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1624513)									
EP1805447-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1805453-011	D1_020518	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1613641)									
EP1805453-005	GW-D3_020518	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1621693)									
EP1805422-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	238000	218000	8.69	0% - 20%
EP1805446-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1624513)									
EP1805447-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1805453-011	D1_020518	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1621693)									
EP1805422-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	24000	22200	7.76	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	110000	108000	1.58	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	6330	5360	16.5	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	23600	21400	9.30	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	9630	9050	6.28	0% - 20%
		EP080: Naphthalene	91-20-3	5	µg/L	266	232	14.1	No Limit
EP1805446-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 1624513)									
EP1805447-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1624513) - continued									
EP1805447-002	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1805453-011	D1_020518	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1623371)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.6	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.6	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.0	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.1	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.9	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.8	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1621795)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.6	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.5	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.0	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.3	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.6	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.3	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.9	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1620555)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	107	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1620577)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	91.2	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1612393)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1612549)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1612394)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1621867)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	95.5	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1621869)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	93.7	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1621866)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1621866) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1621868)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	83.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1612548)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	96.9	87	115
EP008: Chlorophyll (QCLot: 1621727)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	115	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1613640)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	58.0	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	72.4	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	76.8	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1613641)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	58.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	71.0	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	66.5	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1621693)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	99.6	74	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1624513)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	90.1	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1613640)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	63.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	75.8	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	62.2	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1613641)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	63.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	69.8	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	56.9	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1621693)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	75.3	74	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1624513)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	88.2	74	115
EP080: BTEXN (QCLot: 1621693)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	96.5	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	99.6	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	90.1	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	92.6	84	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: BTEXN (QCLot: 1621693) - continued								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	102	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	103	77	118
EP080: BTEXN (QCLot: 1624513)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	100	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	98.5	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	99.1	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	105	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	114	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1623371)							
EN1802775-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	93.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.1	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	94.9	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.9	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	93.6	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.7	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	93.6	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1621795)							
EP1805453-002	A2_020518	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	92.9	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	93.4	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	88.9	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.8	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.3	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1612393)							
EP1805453-001	BLNS-B1_020518	EK055G: Ammonia as N	7664-41-7	1 mg/L	93.5	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1612549)							
EP1805453-001	BLNS-B1_020518	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1612394)							
EP1805453-001	BLNS-B1_020518	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	101	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1621867)							
EP1805423-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	96.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1621869)							
EP1805453-003	A2S_020518	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	99.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1621866)							
EP1805423-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	85.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1621868)							
EP1805453-003	A2S_020518	EK067G: Total Phosphorus as P	----	1 mg/L	93.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1612548)							
EP1805453-001	BLNS-B1_020518	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	115	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1613641)							
EP1805467-001	Anonymous	EP071: C10 - C14 Fraction	----	400 µg/L	69.3	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	64.4	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	61.3	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1621693)							
EP1805422-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	# Not Determined	77	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1624513)							
EP1805453-001	BLNS-B1_020518	EP080: C6 - C9 Fraction	----	240 µg/L	84.5	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1613641)							
EP1805467-001	Anonymous	EP071: >C10 - C16 Fraction	----	400 µg/L	66.8	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	63.5	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	57.5	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1621693)							
EP1805422-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	# Not Determined	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1624513)							
EP1805453-001	BLNS-B1_020518	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	81.8	77	137
EP080: BTEXN (QCLot: 1621693)							
EP1805422-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	# Not Determined	77	122
		EP080: Toluene	108-88-3	20 µg/L	# Not Determined	74	126

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 1624513)							
EP1805453-001	BLNS-B1_020518	EP080: Benzene	71-43-2	20 µg/L	93.3	77	122
		EP080: Toluene	108-88-3	20 µg/L	86.6	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1805524**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 03-May-2018
Order number	: W81020-103	Date Analysis Commenced	: 03-May-2018
C-O-C number	: ----	Issue Date	: 14-May-2018
Sampler	: Danielle Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 1624837)									
EP1805521-026	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.80	7.82	0.256	0% - 20%
EP1805521-036	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.91	7.96	0.630	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1624838)									
EP1805521-036	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1260	1260	0.471	0% - 20%
EP1805533-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1280	1300	1.38	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1625891)									
EP1805549-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	424	422	0.473	0% - 20%
EP1805475-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4190	4230	0.950	0% - 20%
EA041: Colour (True) (QC Lot: 1616023)									
EP1805489-001	Anonymous	EA041: Colour (True)	----	1	PCU	<1	<1	0.00	No Limit
		EA041: pH Colour	----	0.01	pH Unit	8.08	8.10	0.247	0% - 20%
EA075: Redox Potential (QC Lot: 1616024)									
EP1805524-009	KA_030518	EA075: Redox Potential	----	0.1	mV	44.7	44.5	0.448	0% - 20%
		EA075: pH Redox	----	0.01	pH Unit	6.83	6.85	0.292	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1624839)									
EP1805651-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	835	826	1.13	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	130	132	1.57	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	965	957	0.764	0% - 20%
EP1805569-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	214	198	7.71	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	214	198	7.71	0% - 20%
ED038A: Acidity (QC Lot: 1624785)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED038A: Acidity (QC Lot: 1624785) - continued									
EP1805242-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	23	25	8.00	0% - 20%
EP1805520-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	20	20	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1630401)									
EP1805520-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	733	794	7.95	0% - 20%
EP1805542-017	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	301	298	1.06	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1630402)									
EP1805520-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	5960	5920	0.678	0% - 20%
EP1805542-017	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3550	3280	7.85	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1626141)									
EP1805519-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	75	78	3.64	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	337	345	2.20	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	17	17	0.00	0% - 50%
EP1805616-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	443	438	1.26	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1380	1360	1.06	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9810	9720	0.926	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	539	539	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1625651)									
EP1805524-001	T3B_030518	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.13	0.13	0.00	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.94	0.94	0.00	0% - 50%
ES1812921-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.453	0.451	0.444	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.26	0.26	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1625647)									

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1625647) - continued									
EN1802829-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.219	0.227	3.70	0% - 20%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1812997-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	1.66	1.62	1.91	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.180	0.183	1.76	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.024	0.024	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.08	0.08	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	19.8	19.8	0.240	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1625904)									
EP1805524-001	T3B_030518	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1625939)									
EP1805524-008	WQA03_030518	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1615963)									
EP1805519-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.20	0.19	0.00	0% - 50%
EP1805524-010	BH10_030518	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1615951)									
EP1805524-002	T4B_030518	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805526-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1615964)									
EP1805519-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1805524-010	BH10_030518	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.08	0.08	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1627038)									
EP1805242-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.3	1.2	0.00	No Limit
EP1805520-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	0.8	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1627037)									
EP1805242-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.08	0.00	No Limit
EP1805520-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1615952)									
EP1805524-002	T4B_030518	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.29	0.30	4.50	0% - 20%
EP1805526-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	<0.01	0.00	No Limit
EP025: Oxygen - Dissolved (DO) (QC Lot: 1616021)									
EP1805495-001	Anonymous	EP025: Dissolved Oxygen	----	0.1	mg/L	5.8	5.9	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP025: Oxygen - Dissolved (DO) (QC Lot: 1616021) - continued									
EP1805495-011	Anonymous	EP025: Dissolved Oxygen	----	0.1	mg/L	8.0	8.0	0.00	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1617171)									
EP1805524-006	GW-T3E-A_030518	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1626602)									
EP1805524-001	T3B_030518	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1805528-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1617171)									
EP1805524-006	GW-T3E-A_030518	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1626602)									
EP1805524-001	T3B_030518	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1805528-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1626602)									
EP1805524-001	T3B_030518	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1805528-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 1624837)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	99	102
				----	7 pH Unit	99.7	99	102
EA010P: Conductivity by PC Titrator (QCLot: 1624838)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	97.1	95	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1625891)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	105	83	111
				<10	1000 mg/L	105	70	130
EA041: Colour (True) (QCLot: 1616023)								
EA041: Colour (True)	----	1	PCU	<1	20 PCU	100	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 1624839)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	76	126
				<1	200 mg/L	99.0	90	106
ED038A: Acidity (QCLot: 1624785)								
ED038: Acidity as CaCO3	----	----	mg/L	----	20 mg/L	96.0	85	119
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1630401)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	89	113
				<1	100 mg/L	99.6	79	121
ED045G: Chloride by Discrete Analyser (QCLot: 1630402)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	90.9	84	120
				<1	1000 mg/L	108	84	110
ED093F: Dissolved Major Cations (QCLot: 1626141)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.8	91	109
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	90	108
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	87	111
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.5	90	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 1625651)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.8	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.2	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.2	84	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1625651) - continued								
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.4	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.0	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.5	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.3	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.3	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1625647)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.8	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.2	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.8	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.4	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.5	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.5	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.3	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1625904)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	110	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1625939)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	110	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1615963)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1615951)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1615964)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1627038)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	90.7	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1627037)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1615952)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	110	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1617171)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	66.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	67.1	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	398 µg/L	66.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1626602)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	74	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1617171)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	380 µg/L	68.1	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	65.6	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	74.2	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1626602)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	103	74	115
EP080: BTEXN (QCLot: 1626602)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	101	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	106	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	109	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	109	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	110	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	118	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1630401)							
EP1805520-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1630402)							
EP1805520-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1625651)							
EP1805524-002	T4B_030518	EG020A-F: Arsenic	7440-38-2	1 mg/L	94.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	97.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.1	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	96.9	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	105	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	96.3	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	97.9	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	97.4	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1625647)							
EN1802829-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.8	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Matrix Spike (MS) Report: Recovery Limits (%) Low	Matrix Spike (MS) Report: Recovery Limits (%) High
EG020T: Total Metals by ICP-MS (QCLot: 1625647) - continued							
EN1802829-002	Anonymous	EG020A-T: Chromium	7440-47-3	1 mg/L	105	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	100.0	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.9	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1615963)							
EP1805519-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	99.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1615951)							
EP1805524-001	T3B_030518	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	112	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1615964)							
EP1805519-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	103	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1627038)							
EP1805242-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	97.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1627037)							
EP1805242-001	Anonymous	EK067G: Total Phosphorus as P	----	2 mg/L	87.7	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1615952)							
EP1805524-001	T3B_030518	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	111	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1617171)							
EP1805524-007	WQA01_030518	EP071: C10 - C14 Fraction	----	385 µg/L	71.2	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	77.8	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	83.7	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1626602)							
EP1805524-002	T4B_030518	EP080: C6 - C9 Fraction	----	240 µg/L	101	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1617171)							
EP1805524-007	WQA01_030518	EP071: >C10 - C16 Fraction	----	380 µg/L	72.4	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	81.0	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	93.2	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1626602)							
EP1805524-002	T4B_030518	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	110	77	137
EP080: BTEXN (QCLot: 1626602)							
EP1805524-002	T4B_030518	EP080: Benzene	71-43-2	20 µg/L	97.9	77	122
		EP080: Toluene	108-88-3	20 µg/L	97.8	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1806724**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 31-May-2018
Order number	: W81020-103	Date Analysis Commenced	: 31-May-2018
C-O-C number	: ----	Issue Date	: 11-Jun-2018
Sampler	: ----		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1707462)									
ES1816333-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.012	13.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1816445-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.028	0.028	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	3.43	3.41	0.448	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.503	0.494	1.68	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.694	0.694	0.00	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.30	0.31	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.24	2.22	1.13	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1707517)									
EP1806724-001	BLNS-B1_31_05_18	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.018	0.019	0.00	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1707517) - continued									
EP1806724-001	BLNS-B1_31_05_18	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.15	0.16	0.00	No Limit
ES1816233-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.044	0.043	3.56	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.020	0.018	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.04	0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.15	0.15	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1707820)									
EP1806724-001	BLNS-B1_31_05_18	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1707847)									
EP1806724-001	BLNS-B1_31_05_18	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1692912)									
EP1806717-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1806722-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.31	0.30	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1692899)									
EP1806730-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.07	0.07	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1692913)									
EP1806717-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.83	4.79	0.707	0% - 20%
EP1806722-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.11	0.11	0.00	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1704612)									
EP1806719-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EP1806738-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.3	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1704611)									
EP1806719-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1806738-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.06	17.7	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1692898)									
EP1806730-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.09	0.09	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1693851)									
EP1806717-003	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP1806718-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1701663)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1701663) - continued									
EP1806687-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1806687-013	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	20	20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1693851)									
EP1806717-003	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP1806718-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1701663)									
EP1806687-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1806687-013	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1701663)									
EP1806687-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1806687-013	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.4	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.3	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.8	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.0	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1707517)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	100	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.1	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.2	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.0	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.1	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.9	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.9	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1707820)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	129	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1707847)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	136	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1692912)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1692899)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1692913)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1704612)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.8	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1704611)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	87	115
EP008: Chlorophyll (QCLot: 1707712)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1693851)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	73.9	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	85.4	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	74.5	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1701663)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	86.3	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1693851)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	75.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	77.3	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	86.2	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1701663)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	86.6	74	115
EP080: BTEXN (QCLot: 1701663)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	92.8	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	87.0	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	86.2	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	84.7	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	88.9	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	77.2	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462)							
EP1806724-001	BLNS-B1_31_05_18	EG020A-F: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.7	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	94.4	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.7	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	90.7	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	90.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462) - continued							
EP1806724-001	BLNS-B1_31_05_18	EG020A-F: Nickel	7440-02-0	1 mg/L	97.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	98.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1707517)							
EP1806724-002	A2_31_05_18	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.9	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	97.9	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	94.7	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	99.9	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	102	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1692912)							
EP1806717-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	113	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1692899)							
EP1806722-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1692913)							
EP1806717-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.2	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1704612)							
EP1806719-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1704611)							
EP1806719-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	105	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898)							
EP1806722-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1693851)							
EP1806717-003	Anonymous	EP071: C10 - C14 Fraction	----	385 µg/L	79.7	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	91.0	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	75.0	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1701663)							
EP1806687-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	108	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1693851)							
EP1806717-003	Anonymous	EP071: >C10 - C16 Fraction	----	380 µg/L	85.1	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	81.8	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	89.4	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1701663)							
EP1806687-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	119	77	137
EP080: BTEXN (QCLot: 1701663)							
EP1806687-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	82.2	77	122
		EP080: Toluene	108-88-3	20 µg/L	112	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1806777**	Page	: 1 of 5
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MDC	Date Samples Received	: 01-Jun-2018
Order number	: W81020-103	Date Analysis Commenced	: 06-Jun-2018
C-O-C number	: ----	Issue Date	: 08-Jun-2018
Sampler	: LF		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 1709308)									
EP1806803-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.61	8.71	1.15	0% - 20%
EP1806777-001	PB-East	EA005-P: pH Value	----	0.01	pH Unit	6.64	6.63	0.151	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1709309)									
EP1806777-001	PB-East	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	219	215	1.86	0% - 20%
EP1806876-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.00	No Limit
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1708042)									
EP1806791-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	89000	90600	1.72	0% - 20%
EP1806753-006	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1020	997	1.79	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1709304)									
EP1806763-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	108	116	7.18	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	108	116	7.18	0% - 20%
EP1806763-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	273	265	3.17	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	273	265	3.17	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1706278)									
EP1806777-001	PB-East	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	15	14	0.00	0% - 50%
EP1806812-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	78	78	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1706279)									
EP1806777-001	PB-East	ED045G: Chloride	16887-00-6	1	mg/L	38	36	3.60	0% - 20%
EP1806812-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	201	200	0.582	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1704229)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 1704229) - continued									
EP1806752-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	125	136	8.30	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	139	151	8.10	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2060	2250	8.93	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	67	74	10.2	0% - 20%
EP1806782-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	27	26	4.78	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	8	7	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	78	74	5.86	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1707462)									
ES1816333-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.012	13.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1816445-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.028	0.028	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	3.43	3.41	0.448	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.503	0.494	1.68	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.694	0.694	0.00	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.30	0.31	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.24	2.22	1.13	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1707820)									
EP1806724-001	Anonymous	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 1709308)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	99	102
				----	7 pH Unit	99.8	99	102
EA010P: Conductivity by PC Titrator (QCLot: 1709309)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	97.4	95	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1708042)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	106	83	111
				<10	1000 mg/L	108	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 1709304)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	116	76	126
				<1	200 mg/L	101	90	106
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1706278)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	89	113
				<1	100 mg/L	99.6	79	121
ED045G: Chloride by Discrete Analyser (QCLot: 1706279)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.7	84	120
				<1	1000 mg/L	104	84	110
ED093F: Dissolved Major Cations (QCLot: 1704229)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.2	91	109
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	90	108
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	87	111
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.2	90	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.4	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.3	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.9	82	112

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.8	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.0	82	112
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1707820)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	129	74	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1706278)							
EP1806777-001	PB-East	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1706279)							
EP1806777-001	PB-East	ED045G: Chloride	16887-00-6	1000 mg/L	104	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707462)							
EP1806724-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.7	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	94.4	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.7	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	90.7	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	90.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	97.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	98.0	70	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1806776**	Page	: 1 of 8
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 01-Jun-2018
Order number	: W81020-103	Date Analysis Commenced	: 01-Jun-2018
C-O-C number	: ----	Issue Date	: 12-Jun-2018
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1707772)									
EP1806773-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0020	<0.0020	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.029	0.029	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.020	<0.020	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	2.10	1.99	5.07	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	6.67	6.49	2.74	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.100	<0.100	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.20	<0.20	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.20	<0.20	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<1.00	<1.00	0.00	No Limit
EP1806776-010	WQA01_01_06_18	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.32	0.32	0.00	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.48	0.48	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1707796)									
EP1806889-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1707796) - continued									
EP1806889-006	Anonymous	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	1.18	1.19	0.858	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.102	0.101	0.00	0% - 20%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.007	0.008	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	1.72	1.72	0.418	0% - 20%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EP1806683-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1696231)									
EP1806774-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
EP1806776-008	BH12_01_06_18	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1696217)									
EP1806776-002	GW-D4_01_06_18	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1806778-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.02	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1696232)									
EP1806774-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.06	0.00	No Limit
EP1806776-008	BH12_01_06_18	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.22	3.25	0.989	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1708618)									
EP1806708-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EP1806737-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.3	0.00	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1708620)									
EP1806776-002	GW-D4_01_06_18	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.00	No Limit
EP1806803-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	9.2	9.3	1.71	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1708617)									
EP1806708-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EP1806737-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.07	15.2	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1708619)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1708619) - continued									
EP1806776-002	GW-D4_01_06_18	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.03	0.00	No Limit
EP1806803-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.91	2.92	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1696216)									
EP1806776-002	GW-D4_01_06_18	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1806778-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1708258)									
EP1806776-001	GW-D3_01_06_18	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1806776-011	WQA03_01_06_18	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1708258)									
EP1806776-001	GW-D3_01_06_18	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1806776-011	WQA03_01_06_18	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1708258)									
EP1806776-001	GW-D3_01_06_18	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1806776-011	WQA03_01_06_18	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707772)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	91.8	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.7	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.7	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.0	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.6	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.0	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	84	120
EG020T: Total Metals by ICP-MS (QCLot: 1707796)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	92.4	84	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.0	85	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.7	84	120
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.4	85	120
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.1	83	120
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.7	86	120
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.3	85	120
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.1	83	120
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.5	83	120
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.7	84	120
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	77	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1696231)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1696217)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1696232)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	107	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1708618)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.3	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1708620)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.2	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1708617)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	84.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1708619)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1696216)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	109	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1700906)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	76.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	102	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	104	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1708258)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	104	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1700906)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	86.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	105	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	109	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1708258)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	107	74	115
EP080: BTEXN (QCLot: 1708258)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	110	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.8	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	88.2	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	108	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	82.2	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707772)							
EP1806776-001	GW-D3_01_06_18	EG020A-F: Arsenic	7440-38-2	0.4 mg/L	97.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.2	70	130
		EG020A-F: Chromium	7440-47-3	0.4 mg/L	91.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1707772) - continued							
EP1806776-001	GW-D3_01_06_18	EG020A-F: Copper	7440-50-8	0.4 mg/L	93.7	70	130
		EG020A-F: Lead	7439-92-1	0.4 mg/L	91.3	70	130
		EG020A-F: Manganese	7439-96-5	0.4 mg/L	95.2	70	130
		EG020A-F: Nickel	7440-02-0	0.4 mg/L	94.6	70	130
		EG020A-F: Zinc	7440-66-6	0.4 mg/L	100	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1707796)							
EP1806683-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.8	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	94.7	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	93.7	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	92.7	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	101	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	95.9	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.6	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	96.2	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1696231)							
EP1806771-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1696217)							
EP1806776-001	GW-D3_01_06_18	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1696232)							
EP1806771-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	113	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1708618)							
EP1806708-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	82.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1708620)							
EP1806803-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	116	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1708617)							
EP1806708-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	91.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1708619)							
EP1806803-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	79.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1696216)							
EP1806776-001	GW-D3_01_06_18	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	108	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1700906)							
EP1806776-001	GW-D3_01_06_18	EP071: C10 - C14 Fraction	----	385 µg/L	61.4	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	74.5	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	81.6	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1708258)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1708258) - continued							
EP1806776-002	GW-D4_01_06_18	EP080: C6 - C9 Fraction	----	240 µg/L	93.6	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1700906)							
EP1806776-001	GW-D3_01_06_18	EP071: >C10 - C16 Fraction	----	380 µg/L	66.1	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	78.6	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	83.6	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1708258)							
EP1806776-002	GW-D4_01_06_18	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	99.5	77	137
EP080: BTEXN (QCLot: 1708258)							
EP1806776-002	GW-D4_01_06_18	EP080: Benzene	71-43-2	20 µg/L	106	77	122
		EP080: Toluene	108-88-3	20 µg/L	89.7	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1807736**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Jun-2018
Order number	: W81020-103	Date Analysis Commenced	: 27-Jun-2018
C-O-C number	: ----	Issue Date	: 04-Jul-2018
Sampler	: D. Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 12		
No. of samples analysed	: 9		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1774492)									
EP1807736-001	GW-D5_27_06_18	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.54	0.54	1.95	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	<0.05	97.2	No Limit
EP1807774-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.14	0.14	0.00	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1774497)									
EP1807736-009	WQA03_27_06_18	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1774497) - continued									
EP1807736-009	WQA03_27_06_18	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1819442-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.006	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.048	0.049	2.20	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	61.8	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.017	0.015	7.80	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	7.83	8.51	8.35	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	5.66	5.89	4.12	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1774822)									
EP1807736-001	GW-D5_27_06_18	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EP1807774-003	Anonymous	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1774855)									
EP1807736-009	WQA03_27_06_18	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1760105)									
EP1807691-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.16	0.17	0.00	0% - 50%
EP1807736-001	GW-D5_27_06_18	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.09	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1760108)									
EP1807736-002	T3B_27_06_18	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1760104)									
EP1807691-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.75	0.75	0.00	0% - 20%
EP1807736-001	GW-D5_27_06_18	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1772082)									
EP1807734-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EP1807758-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1772083)									
EP1807734-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	26.6	No Limit
EP1807758-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1760107)									
EP1807736-002	T3B_27_06_18	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1764586)									
EP1807736-001	GW-D5_27_06_18	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1764586)									
EP1807736-001	GW-D5_27_06_18	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1764586)									
EP1807736-001	GW-D5_27_06_18	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1764586) - continued									
EP1807736-001	GW-D5_27_06_18	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1774492)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	90.9	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.3	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.4	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.2	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	89.3	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1774497)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.8	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.6	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.2	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.6	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1774822)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	109	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1774855)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	103	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1760105)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1760108)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1760104)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	96.6	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772082)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	84.0	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772083)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1760107)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1760107) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1760967)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	51.2	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	68.9	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	63.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1764586)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	90.6	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1760967)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	55.0	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	66.6	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	47.0	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1764586)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	86.4	74	115
EP080: BTEXN (QCLot: 1764586)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	90.5	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	98.1	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	95.0	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	99.3	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	93.6	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1774492)							
EP1807736-002	T3B_27_06_18	EG020A-F: Arsenic	7440-38-2	1 mg/L	89.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	90.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.5	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.2	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	96.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	89.7	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.1	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 1774497)							
EP1807774-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	105	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	104	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	107	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	107	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1760105)							
EP1807691-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1760108)							
EP1807736-001	GW-D5_27_06_18	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1760104)							
EP1807691-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772082)							
EP1807734-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	87.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772083)							
EP1807734-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	95.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1760107)							
EP1807736-001	GW-D5_27_06_18	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	107	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1764586)							
EP1807736-002	T3B_27_06_18	EP080: C6 - C9 Fraction	----	240 µg/L	87.1	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1764586)							
EP1807736-002	T3B_27_06_18	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	90.0	77	137
EP080: BTEXN (QCLot: 1764586)							
EP1807736-002	T3B_27_06_18	EP080: Benzene	71-43-2	20 µg/L	78.4	77	122
		EP080: Toluene	108-88-3	20 µg/L	78.4	74	126

QUALITY CONTROL REPORT

Work Order	: **EP1807774**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 28-Jun-2018
Order number	: W81020-103	Date Analysis Commenced	: 28-Jun-2018
C-O-C number	: ----	Issue Date	: 05-Jul-2018
Sampler	: D Sullivan		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1774492)									
EP1807736-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.54	0.54	1.95	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	<0.05	97.2	No Limit
EP1807774-003	GW-D8_28_06_18	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.14	0.14	0.00	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1771440)									
EP1807728-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 1771440) - continued									
EP1807728-005	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1774497)									
EP1807736-009	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1819442-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.006	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.048	0.049	2.20	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	61.8	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.017	0.015	7.80	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	7.83	8.51	8.35	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	5.66	5.89	4.12	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 1774822)									
EP1807736-001	Anonymous	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EP1807774-003	GW-D8_28_06_18	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 1774855)									
EP1807736-009	Anonymous	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1763620)									
EP1807774-002	GW-D4_28_06_18	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1807776-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.85	1.86	0.753	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1763613)									
EP1807776-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1807776-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.15	0.15	0.00	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1763621)									
EP1807774-002	GW-D4_28_06_18	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.20	0.20	0.00	0% - 20%
EP1807776-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.93	1.89	2.10	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1772517)									
EP1807761-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	250	258	3.45	0% - 20%
EP1807770-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1772520)									

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1772520) - continued									
EP1807774-008	A2S_28_06_18	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.4	2.4	0.00	0% - 20%
EP1807799-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	7.6	7.6	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1772518)									
EP1807761-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	51.0	49.9	2.11	0% - 20%
EP1807770-009	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1772519)									
EP1807774-008	A2S_28_06_18	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.09	0.00	No Limit
EP1807799-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.59	3.33	7.37	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1763612)									
EP1807776-003	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1807776-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.02	<0.02	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1764410)									
EP1807774-001	GW-D3_28_06_18	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1771878)									
EP1807774-001	GW-D3_28_06_18	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1807797-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1764410)									
EP1807774-001	GW-D3_28_06_18	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1771878)									
EP1807774-001	GW-D3_28_06_18	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1807797-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1771878)									
EP1807774-001	GW-D3_28_06_18	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1807797-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1771878) - continued									
EP1807797-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1774492)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	90.9	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.3	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.4	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.2	81	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	89.3	82	112
EG020T: Total Metals by ICP-MS (QCLot: 1771440)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	84	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	107	84	120
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	85	120
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	120
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	83	120
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	111	83	120
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	114	84	120
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	77	120
EG020T: Total Metals by ICP-MS (QCLot: 1774497)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	82	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.8	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	86	116
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.6	84	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	68	126
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.2	79	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.6	85	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 1774822)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	109	74	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 1774855)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	103	80	138
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1763620)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	87	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1763613)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1763621)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.0	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772517)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	95.4	82	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772520)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.6	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772518)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772519)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1763612)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	87	115
EP008: Chlorophyll (QCLot: 1768061)								
EP008: Chlorophyll a	----	1	mg/m³	<1	20 mg/m³	124	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1764410)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	63.6	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	77.9	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	91.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1771878)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	99.2	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1764410)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	66.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	81.5	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	91.7	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1771878)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	97.6	74	115
EP080: BTEXN (QCLot: 1771878)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	103	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	104	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	103	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	102	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	104	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1774492)							
EP1807736-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	89.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	90.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.5	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.2	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	96.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	89.7	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.1	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1771440)							
EP1807774-010	WQA03_28_06_18	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	108	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	94.7	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	103	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.2	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1774497)							
EP1807774-006	BLNS-B1_28_06_18	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	105	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	104	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	107	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	107	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1763620)							
EP1807774-001	GW-D3_28_06_18	EK055G: Ammonia as N	7664-41-7	1 mg/L	109	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1763613)							
EP1807774-001	GW-D3_28_06_18	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1763621)							
EP1807774-001	GW-D3_28_06_18	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.8	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772517)							
EP1807761-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1772520)							
EP1807774-008	A2S_28_06_18	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	85.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772518)							
EP1807761-002	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772518) - continued							
EP1807761-002	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1772519)							
EP1807774-008	A2S_28_06_18	EK067G: Total Phosphorus as P	----	1 mg/L	95.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1763612)							
EP1807774-001	GW-D3_28_06_18	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	107	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1764410)							
EP1807774-007	A2_28_06_18	EP071: C10 - C14 Fraction	----	385 µg/L	65.9	45	122
		EP071: C15 - C28 Fraction	----	385 µg/L	72.8	55	143
		EP071: C29 - C36 Fraction	----	398 µg/L	77.2	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1771878)							
EP1807774-002	GW-D4_28_06_18	EP080: C6 - C9 Fraction	----	240 µg/L	96.1	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1764410)							
EP1807774-007	A2_28_06_18	EP071: >C10 - C16 Fraction	----	380 µg/L	70.4	45	122
		EP071: >C16 - C34 Fraction	----	597 µg/L	73.8	55	143
		EP071: >C34 - C40 Fraction	----	168 µg/L	83.0	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1771878)							
EP1807774-002	GW-D4_28_06_18	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	95.3	77	137
EP080: BTEXN (QCLot: 1771878)							
EP1807774-002	GW-D4_28_06_18	EP080: Benzene	71-43-2	20 µg/L	104	77	122
		EP080: Toluene	108-88-3	20 µg/L	95.5	74	126

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP1806725**	Page	: 1 of 6
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Contact	: Brandon Ovens
Address	: 202 Pier Street Perth, Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 31-May-2018
Order number	: W81020-103	Date Analysis Commenced	: 31-May-2018
C-O-C number	: ----	Issue Date	: 13-Jun-2018
Sampler	: Tim Williamson		
Site	: ----		
Quote number	: EP/840/17		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Santusha Pandra	Organic Supervisor	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1704220)									
EP1806700-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.049	0.049	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.42	0.42	0.00	No Limit
EP1806716-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.135	0.137	1.84	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.014	0.014	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.08	34.6	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	7.64	7.53	1.46	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1692912)									
EP1806717-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1806722-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.31	0.30	0.00	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1692899)									
EP1806730-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.07	0.07	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1692913)									
EP1806717-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	4.83	4.79	0.707	0% - 20%
EP1806722-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.11	0.11	0.00	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1704612)									
EP1806719-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EP1806738-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.3	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1704611)									
EP1806719-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1806738-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.06	17.7	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1692898)									
EP1806730-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.09	0.09	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1704359)									
EP1806700-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1806774-008	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1704359)									
EP1806700-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1806774-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1704359)									
EP1806700-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1806774-008	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	3	2	39.7	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1704220)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.6	84	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	84	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.0	86	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	85	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.4	84	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.0	85	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	85	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	84	120
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.8	88	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	89	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	84	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1692912)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	87	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1692899)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1692913)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	92	112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1704612)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.8	82	110
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1704611)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	89.1	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	87	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1693852)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	79.8	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	97.6	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	95.8	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1704359)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	95.5	74	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1693852)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	81.5	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	95.0	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	97.4	11	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1704359)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	94.9	74	115
EP080: BTEXN (QCLot: 1704359)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	84	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	99.7	81	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	96.8	84	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	99.0	84	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	87	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	111	77	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1704220)							
EP1806700-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.3 mg/L	94.9	70	130
		EG020A-F: Cadmium	7440-43-9	0.075 mg/L	95.9	70	130
		EG020A-F: Chromium	7440-47-3	0.3 mg/L	93.0	70	130
		EG020A-F: Copper	7440-50-8	0.3 mg/L	91.7	70	130
		EG020A-F: Lead	7439-92-1	0.3 mg/L	90.9	70	130
		EG020A-F: Manganese	7439-96-5	0.3 mg/L	96.3	70	130
		EG020A-F: Nickel	7440-02-0	0.3 mg/L	93.6	70	130
		EG020A-F: Zinc	7440-66-6	0.3 mg/L	98.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1692912)							
EP1806717-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	113	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1692899)							
EP1806722-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1692913)							
EP1806717-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.2	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1704612)							
EP1806719-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.3	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1704611)							
EP1806719-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	105	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1692898) - continued							
EP1806722-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1704359)							
EP1806718-001	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	82.0	77	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1704359)							
EP1806718-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	89.1	77	137
EP080: BTEXN (QCLot: 1704359)							
EP1806718-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	87.0	77	122
		EP080: Toluene	108-88-3	20 µg/L	81.7	74	126

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1706873**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 28-Jun-2017
Site	: ----	Issue Date	: 05-Jul-2017
Sampler	: TIM WILLIAMSON	No. of samples received	: 8
Order number	: 60478410-2.06	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**30-Jun-2017**	25-Dec-2017	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**03-Jul-2017**	25-Dec-2017	✓	**03-Jul-2017**	25-Dec-2017	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**28-Jun-2017**	26-Jul-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**28-Jun-2017**	30-Jun-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**28-Jun-2017**	26-Jul-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**03-Jul-2017**	26-Jul-2017	✓	**03-Jul-2017**	26-Jul-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**03-Jul-2017**	26-Jul-2017	✓	**03-Jul-2017**	26-Jul-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**28-Jun-2017**	30-Jun-2017	✓
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**----**	----	----	**29-Jun-2017**	30-Jun-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**30-Jun-2017**	05-Jul-2017	✓	**30-Jun-2017**	09-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617, DB TBW 575	**28-Jun-2017**	**03-Jul-2017**	12-Jul-2017	✓	**03-Jul-2017**	12-Jul-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617	**28-Jun-2017**	**30-Jun-2017**	05-Jul-2017	✓	**30-Jun-2017**	09-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617, DB TBW 575	**28-Jun-2017**	**03-Jul-2017**	12-Jul-2017	✓	**03-Jul-2017**	12-Jul-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_, T3C_, BH10_, BLNS-B1_, A2_, A2S_, WQA02_280617, DB TBW 575	**28-Jun-2017**	**03-Jul-2017**	12-Jul-2017	✓	**03-Jul-2017**	12-Jul-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1706851**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jun-2017
Site	: ----	Issue Date	: 03-Jul-2017
Sampler	: Tim Williamson	No. of samples received	: 12
Order number	: 60478410-2.06	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	15	6.67	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617	**27-Jun-2017**	**----**	----	----	**29-Jun-2017**	24-Dec-2017	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_270617	**27-Jun-2017**	**30-Jun-2017**	24-Dec-2017	✓	**30-Jun-2017**	24-Dec-2017	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617	**27-Jun-2017**	**----**	----	----	**28-Jun-2017**	25-Jul-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617	**27-Jun-2017**	**----**	----	----	**28-Jun-2017**	29-Jun-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
GW-D3_,	GW-D4_,	**27-Jun-2017**	**----**	----	----	**28-Jun-2017**	25-Jul-2017	✓
GW-D5_,	GW-D7_,							
GW-D8_,	T2F_,							
T4B_,	T4C_,							
GW-T3E-A,	WQA01_270617							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
GW-D3_,	GW-D4_,	**27-Jun-2017**	**29-Jun-2017**	25-Jul-2017	✓	**29-Jun-2017**	25-Jul-2017	✓
GW-D5_,	GW-D7_,							
GW-D8_,	T2F_,							
T4B_,	T4C_,							
GW-T3E-A,	WQA01_270617							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
GW-D3_,	GW-D4_,	**27-Jun-2017**	**29-Jun-2017**	25-Jul-2017	✓	**29-Jun-2017**	25-Jul-2017	✓
GW-D5_,	GW-D7_,							
GW-D8_,	T2F_,							
T4B_,	T4C_,							
GW-T3E-A,	WQA01_270617							
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
GW-D3_,	GW-D4_,	**27-Jun-2017**	**----**	----	----	**28-Jun-2017**	29-Jun-2017	✓
GW-D5_,	GW-D7_,							
GW-D8_,	T2F_,							
T4B_,	T4C_,							
GW-T3E-A,	WQA01_270617							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617, WQA03_270617	**27-Jun-2017**	**29-Jun-2017**	04-Jul-2017	✓	**29-Jun-2017**	08-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617, WQA03_270617, WQA04_DB TBW 576	**27-Jun-2017**	**30-Jun-2017**	11-Jul-2017	✓	**30-Jun-2017**	11-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617, WQA03_270617	**27-Jun-2017**	**29-Jun-2017**	04-Jul-2017	✓	**29-Jun-2017**	08-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617, WQA03_270617, WQA04_DB TBW 576	**27-Jun-2017**	**30-Jun-2017**	11-Jul-2017	✓	**30-Jun-2017**	11-Jul-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D4_, GW-D5_, GW-D7_, GW-D8_, T2F_, T4B_, T4C_, GW-T3E-A, WQA01_270617, WQA03_270617, WQA04_DB TBW 576	**27-Jun-2017**	**30-Jun-2017**	11-Jul-2017	✓	**30-Jun-2017**	11-Jul-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1707992**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 26-Jul-2017
Site	: ----	Issue Date	: 01-Aug-2017
Sampler	: Tim Williamson	No. of samples received	: 11
Order number	: 60478410-2.06	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**----**	----	----	**31-Jul-2017**	22-Jan-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_260717	**26-Jul-2017**	**28-Jul-2017**	22-Jan-2018	✓	**28-Jul-2017**	22-Jan-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**----**	----	----	**27-Jul-2017**	23-Aug-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**----**	----	----	**27-Jul-2017**	28-Jul-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**----**	----	----	**27-Jul-2017**	23-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**01-Aug-2017**	23-Aug-2017	✓	**01-Aug-2017**	23-Aug-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**01-Aug-2017**	23-Aug-2017	✓	**01-Aug-2017**	23-Aug-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717	**26-Jul-2017**	**----**	----	----	**27-Jul-2017**	28-Jul-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717, WQA03_260717	**26-Jul-2017**	**27-Jul-2017**	02-Aug-2017	✓	**27-Jul-2017**	05-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717, WQA03_260717, WQA04_LR TBW701	**26-Jul-2017**	**27-Jul-2017**	09-Aug-2017	✓	**27-Jul-2017**	09-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717, WQA03_260717	**26-Jul-2017**	**27-Jul-2017**	02-Aug-2017	✓	**27-Jul-2017**	05-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717, WQA03_260717, WQA04_LR TBW701	**26-Jul-2017**	**27-Jul-2017**	09-Aug-2017	✓	**27-Jul-2017**	09-Aug-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_260717, GW-D4_260717, GW-D7_260717, GW-D8_260717, T3B_260717, T3C_260717, T4B_260717, BH10_260717, WQA01_260717, WQA03_260717, WQA04_LR TBW701	**26-Jul-2017**	**27-Jul-2017**	09-Aug-2017	✓	**27-Jul-2017**	09-Aug-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	30	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1708050**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MICHELLE OROURKE	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 27-Jul-2017
Site	: ----	Issue Date	: 07-Aug-2017
Sampler	: TIM WILLIAMSON	No. of samples received	: 15
Order number	: 60478410-2.06	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	2	37	5.41	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**02-Aug-2017**	23-Jan-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**02-Aug-2017**	23-Jan-2018	✓	**02-Aug-2017**	23-Jan-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**28-Jul-2017**	24-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D5_270717, T3C_270717, GW-T3E-A_270717, A2_270717, NLWS-N2_270717, FS2_270717, S1_270717, T2F_270717, BH12_270717, BLNS-B1_270717, A2S_270717, A1_270717, RD1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**28-Jul-2017**	29-Jul-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D5_270717, T3C_270717, GW-T3E-A_270717, A2_270717, NLWS-N2_270717, FS2_270717, S1_270717, T2F_270717, BH12_270717, BLNS-B1_270717, A2S_270717, A1_270717, RD1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**28-Jul-2017**	24-Aug-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D5_270717, T3C_270717, GW-T3E-A_270717, A2_270717, NLWS-N2_270717, FS2_270717, S1_270717, T2F_270717, BH12_270717, BLNS-B1_270717, A2S_270717, A1_270717, RD1_270717, WQA02_270717	**27-Jul-2017**	**04-Aug-2017**	24-Aug-2017	✓	**04-Aug-2017**	24-Aug-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D5_270717, T3C_270717, GW-T3E-A_270717, A2_270717, NLWS-N2_270717, FS2_270717, S1_270717, T2F_270717, BH12_270717, BLNS-B1_270717, A2S_270717, A1_270717, RD1_270717, WQA02_270717	**27-Jul-2017**	**04-Aug-2017**	24-Aug-2017	✓	**04-Aug-2017**	24-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**28-Jul-2017**	29-Jul-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**----**	----	----	**03-Aug-2017**	17-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_270717	**27-Jul-2017**	**01-Aug-2017**	03-Aug-2017	✓	**01-Aug-2017**	10-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH12_270717, GW-T3E-A_270717	**27-Jul-2017**	**31-Jul-2017**	03-Aug-2017	✓	**01-Aug-2017**	09-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D5_270717, T2F_270717, T3C_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**31-Jul-2017**	03-Aug-2017	✓	**31-Jul-2017**	09-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717, WQA05_LRTBW700_270717	**27-Jul-2017**	**01-Aug-2017**	10-Aug-2017	✓	**02-Aug-2017**	10-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_270717	**27-Jul-2017**	**01-Aug-2017**	03-Aug-2017	✓	**01-Aug-2017**	10-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH12_270717, GW-T3E-A_270717	**27-Jul-2017**	**31-Jul-2017**	03-Aug-2017	✓	**01-Aug-2017**	09-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D5_270717, T2F_270717, T3C_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717	**27-Jul-2017**	**31-Jul-2017**	03-Aug-2017	✓	**31-Jul-2017**	09-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717, WQA05_LRTBW700_270717	**27-Jul-2017**	**01-Aug-2017**	10-Aug-2017	✓	**02-Aug-2017**	10-Aug-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_270717, T2F_270717, T3C_270717, BH12_270717, GW-T3E-A_270717, BLNS-B1_270717, A2_270717, A2S_270717, NLWS-N2_270717, A1_270717, FS2_270717, RD1_270717, S1_270717, WQA02_270717, WQA05_LRTBW700_270717	**27-Jul-2017**	**01-Aug-2017**	10-Aug-2017	✓	**02-Aug-2017**	10-Aug-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	37	**5.41**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1709130**	Page	: 1 of 10
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 23-Aug-2017
Site	: ----	Issue Date	: 30-Aug-2017
Sampler	: Tim Williamson	No. of samples received	: 17
Order number	: 60478410-2.06	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1709124--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP008: Chlorophyll a & Pheophytin a						
White Plastic Bottle - Unpreserved						
AIE_230817	----	----	----	29-Aug-2017	25-Aug-2017	**4**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**----**	----	----	**28-Aug-2017**	19-Feb-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817	**23-Aug-2017**	**29-Aug-2017**	19-Feb-2018	✓	**29-Aug-2017**	19-Feb-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**----**	----	----	**24-Aug-2017**	20-Sep-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**----**	----	----	**24-Aug-2017**	25-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**----**	----	----	**24-Aug-2017**	20-Sep-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**28-Aug-2017**	20-Sep-2017	✓	**28-Aug-2017**	20-Sep-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**28-Aug-2017**	20-Sep-2017	✓	**28-Aug-2017**	20-Sep-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**----**	----	----	**24-Aug-2017**	25-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817	**23-Aug-2017**	**----**	----	----	**29-Aug-2017**	13-Sep-2017	✓
White Plastic Bottle - Unpreserved (EP008)							
AIE_230817	**23-Aug-2017**	**----**	----	----	**29-Aug-2017**	25-Aug-2017	×
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**25-Aug-2017**	30-Aug-2017	✓	**28-Aug-2017**	04-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, DBTBW780_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**28-Aug-2017**	06-Sep-2017	✓	**28-Aug-2017**	06-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**25-Aug-2017**	30-Aug-2017	✓	**28-Aug-2017**	04-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, DBTBW780_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**28-Aug-2017**	06-Sep-2017	✓	**28-Aug-2017**	06-Sep-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_230817, A2_230817, A2S_230817, NLWS-N2_230817, A1_230817, A1N_230817, FS2_230817, FS4A_230817, RD1_230817, RD1A_230817, S1_230817, A3_230817, WQA02_230817, DBTBW780_230817, AIE_230817, D1_230817, D2_230817	**23-Aug-2017**	**28-Aug-2017**	06-Sep-2017	✓	**28-Aug-2017**	06-Sep-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	16	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1709182**	Page	: 1 of 9
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 24-Aug-2017
Site	: ----	Issue Date	: 30-Aug-2017
Sampler	: Tim Williamson	No. of samples received	: 13
Order number	: 60475410-2.06	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	EP1709162--001	Anonymous	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1709162--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	25	4.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	1	25	4.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**----**	----	----	**29-Aug-2017**	20-Feb-2018	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**----**	----	----	**24-Aug-2017**	21-Sep-2017	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**----**	----	----	**24-Aug-2017**	26-Aug-2017	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**----**	----	----	**24-Aug-2017**	21-Sep-2017	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**29-Aug-2017**	21-Sep-2017	✓	**29-Aug-2017**	21-Sep-2017	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
GW-D3_,	GW-D5_,	**24-Aug-2017**	**29-Aug-2017**	21-Sep-2017	✓	**29-Aug-2017**	21-Sep-2017	✓
GW-D7_,	GW-D8_,							
T2F_,	T3B_,							
T3C_,	T4B_,							
BH10_,	BH12_,							
GW-T3E-A,	WQA01_240817							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817	**24-Aug-2017**	**----**	----	----	**24-Aug-2017**	26-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817	**24-Aug-2017**	**25-Aug-2017**	31-Aug-2017	✓	**28-Aug-2017**	04-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817, WQA06_DBTBW779 - TBW 779	**24-Aug-2017**	**25-Aug-2017**	07-Sep-2017	✓	**25-Aug-2017**	07-Sep-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817	**24-Aug-2017**	**25-Aug-2017**	31-Aug-2017	✓	**28-Aug-2017**	04-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817, WQA06_DBTBW779 - TBW 779	**24-Aug-2017**	**25-Aug-2017**	07-Sep-2017	✓	**25-Aug-2017**	07-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_, GW-D5_, GW-D7_, GW-D8_, T2F_, T3B_, T3C_, T4B_, BH10_, BH12_, GW-T3E-A, WQA01_240817, WQA06_DBTBW779 - TBW 779	**24-Aug-2017**	**25-Aug-2017**	07-Sep-2017	✓	**25-Aug-2017**	07-Sep-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	25	**4.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	25	**4.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1709224**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: MR CHRIS MCGRAGHAN	Telephone	: 08 9209 7655
Project	: 60478410	Date Samples Received	: 25-Aug-2017
Site	: ----	Issue Date	: 31-Aug-2017
Sampler	: Tim Williamson	No. of samples received	: 3
Order number	: 60478410-2.06	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1709224--001	GW-D4_	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D4_, T4C_	**25-Aug-2017**	**----**	----	----	**30-Aug-2017**	21-Feb-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_	**25-Aug-2017**	**30-Aug-2017**	21-Feb-2018	✓	**30-Aug-2017**	21-Feb-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D4_, T4C_	**25-Aug-2017**	**----**	----	----	**25-Aug-2017**	22-Sep-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D4_, T4C_	**25-Aug-2017**	**----**	----	----	**25-Aug-2017**	27-Aug-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D4_, T4C_	**25-Aug-2017**	**----**	----	----	**25-Aug-2017**	22-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D4_, T4C_	**25-Aug-2017**	**30-Aug-2017**	22-Sep-2017	✓	**30-Aug-2017**	22-Sep-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D4_, T4C_	**25-Aug-2017**	**30-Aug-2017**	22-Sep-2017	✓	**30-Aug-2017**	22-Sep-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D4_, T4C_	**25-Aug-2017**	**----**	----	----	**25-Aug-2017**	27-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D4_, T4C_, WQA03_	**25-Aug-2017**	**28-Aug-2017**	01-Sep-2017	✓	**29-Aug-2017**	07-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4_, T4C_, WQA03_	**25-Aug-2017**	**30-Aug-2017**	08-Sep-2017	✓	**30-Aug-2017**	08-Sep-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D4_, T4C_, WQA03_	**25-Aug-2017**	**28-Aug-2017**	01-Sep-2017	✓	**29-Aug-2017**	07-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4_, T4C_, WQA03_	**25-Aug-2017**	**30-Aug-2017**	08-Sep-2017	✓	**30-Aug-2017**	08-Sep-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4_, T4C_, WQA03_	**25-Aug-2017**	**30-Aug-2017**	08-Sep-2017	✓	**30-Aug-2017**	08-Sep-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	3	**66.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1710701**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 28-Sep-2017
Site	: ----	Issue Date	: 04-Oct-2017
Sampler	: Tim Williamson	No. of samples received	: 11
Order number	: W81020-103	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1710701--009	GW-D7	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)								
D1,	D2,	**27-Sep-2017**	**----**	----	----	**03-Oct-2017**	26-Mar-2018	✓
BH10,	T3B,							
T3C,	T4B,							
T4C,	GW-D4,							
GW-D7,	WQA01_260917							
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)								
D1,	D2,	**27-Sep-2017**	**----**	----	----	**03-Oct-2017**	26-Mar-2018	✓
BH10,	T3B,							
T3C,	T4B,							
T4C,	GW-D4,							
GW-D7,	WQA01_260917							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**----**	----	----	**28-Sep-2017**	25-Oct-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**----**	----	----	**28-Sep-2017**	29-Sep-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**----**	----	----	**28-Sep-2017**	25-Oct-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**04-Oct-2017**	25-Oct-2017	✓	**04-Oct-2017**	25-Oct-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**04-Oct-2017**	25-Oct-2017	✓	**04-Oct-2017**	25-Oct-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**----**	----	----	**28-Sep-2017**	29-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
D1, D2	**27-Sep-2017**	**02-Oct-2017**	04-Oct-2017	✓	**03-Oct-2017**	11-Nov-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**03-Oct-2017**	04-Oct-2017	✓	**03-Oct-2017**	12-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917, WQA06_DB TBW 869	**27-Sep-2017**	**03-Oct-2017**	11-Oct-2017	✓	**03-Oct-2017**	11-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
D1, D2	**27-Sep-2017**	**02-Oct-2017**	04-Oct-2017	✓	**03-Oct-2017**	11-Nov-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917	**27-Sep-2017**	**03-Oct-2017**	04-Oct-2017	✓	**03-Oct-2017**	12-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917, WQA06_DB TBW 869	**27-Sep-2017**	**03-Oct-2017**	11-Oct-2017	✓	**03-Oct-2017**	11-Oct-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, BH10, T3B, T3C, T4B, T4C, GW-D4, GW-D7, WQA01_260917, WQA06_DB TBW 869	**27-Sep-2017**	**03-Oct-2017**	11-Oct-2017	✓	**03-Oct-2017**	11-Oct-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1710595**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 26-Sep-2017
Site	: ----	Issue Date	: 04-Oct-2017
Sampler	: Tim Williamson	No. of samples received	: 11
Order number	: W81020-103	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**29-Sep-2017**	25-Mar-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**29-Sep-2017**	25-Mar-2018	✓	**29-Sep-2017**	25-Mar-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**04-Oct-2017**	25-Mar-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG094B-T)							
A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**04-Oct-2017**	25-Mar-2018	✓	**04-Oct-2017**	25-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**26-Sep-2017**	24-Oct-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**26-Sep-2017**	28-Sep-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**26-Sep-2017**	24-Oct-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**02-Oct-2017**	24-Oct-2017	✓	**02-Oct-2017**	24-Oct-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**02-Oct-2017**	24-Oct-2017	✓	**02-Oct-2017**	24-Oct-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**26-Sep-2017**	28-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**----**	----	----	**02-Oct-2017**	17-Oct-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**29-Sep-2017**	03-Oct-2017	✓	**29-Sep-2017**	08-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1, WQA05_BD TBW 868	**26-Sep-2017**	**29-Sep-2017**	10-Oct-2017	✓	**29-Sep-2017**	10-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1	**26-Sep-2017**	**29-Sep-2017**	03-Oct-2017	✓	**29-Sep-2017**	08-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1, WQA05_BD TBW 868	**26-Sep-2017**	**29-Sep-2017**	10-Oct-2017	✓	**29-Sep-2017**	10-Oct-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D5, T2F, GW-T3E-A, A1E, A1N, A1, NLWS-N2, A3, S1, WQA05_BD TBW 868	**26-Sep-2017**	**29-Sep-2017**	10-Oct-2017	✓	**29-Sep-2017**	10-Oct-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1710522**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 22-Sep-2017
Site	: ----	Issue Date	: 03-Oct-2017
Sampler	: Tim Williamson	No. of samples received	: 2
Order number	: W81020-103	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1710492--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
BH12, GW-D8	**22-Sep-2017**	**----**	----	----	**28-Sep-2017**	21-Mar-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
BH12, GW-D8	**22-Sep-2017**	**----**	----	----	**30-Sep-2017**	21-Mar-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH12, GW-D8	**22-Sep-2017**	**----**	----	----	**22-Sep-2017**	20-Oct-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH12, GW-D8	**22-Sep-2017**	**----**	----	----	**22-Sep-2017**	24-Sep-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH12, GW-D8	**22-Sep-2017**	**----**	----	----	**22-Sep-2017**	20-Oct-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	20-Oct-2017	✓	**28-Sep-2017**	20-Oct-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	20-Oct-2017	✓	**28-Sep-2017**	20-Oct-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
BH12,	GW-D8	**22-Sep-2017**	**----**	----	----	**22-Sep-2017**	24-Sep-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	29-Sep-2017	✓	**29-Sep-2017**	07-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	06-Oct-2017	✓	**28-Sep-2017**	06-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	29-Sep-2017	✓	**29-Sep-2017**	07-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	06-Oct-2017	✓	**28-Sep-2017**	06-Oct-2017	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**22-Sep-2017**	**28-Sep-2017**	06-Oct-2017	✓	**28-Sep-2017**	06-Oct-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1710339**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA - R8 Water Monitoring	Date Samples Received	: 19-Sep-2017
Site	: ----	Issue Date	: 27-Sep-2017
Sampler	: Tim Williamson	No. of samples received	: 8
Order number	: W81020-103	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	26	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**23-Sep-2017**	18-Mar-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**23-Sep-2017**	18-Mar-2018	✓	**23-Sep-2017**	18-Mar-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**22-Sep-2017**	18-Mar-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**22-Sep-2017**	18-Mar-2018	✓	**22-Sep-2017**	18-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**20-Sep-2017**	17-Oct-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**20-Sep-2017**	21-Sep-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**20-Sep-2017**	17-Oct-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**26-Sep-2017**	17-Oct-2017	✓	**27-Sep-2017**	17-Oct-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**26-Sep-2017**	17-Oct-2017	✓	**27-Sep-2017**	17-Oct-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**20-Sep-2017**	21-Sep-2017	✓
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**----**	----	----	**20-Sep-2017**	21-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**21-Sep-2017**	26-Sep-2017	✓	**22-Sep-2017**	31-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**26-Sep-2017**	03-Oct-2017	✓	**26-Sep-2017**	03-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**21-Sep-2017**	26-Sep-2017	✓	**22-Sep-2017**	31-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**26-Sep-2017**	03-Oct-2017	✓	**26-Sep-2017**	03-Oct-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1, A2, A2S, FS2, FS4A, RD1, RD1A, WQA02_190917	**19-Sep-2017**	**26-Sep-2017**	03-Oct-2017	✓	**26-Sep-2017**	03-Oct-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	26	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1711669**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 19-Oct-2017
Site	: ----	Issue Date	: 26-Oct-2017
Sampler	: Rachel Champion	No. of samples received	: 13
Order number	: W81020-103	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**25-Oct-2017**	16-Apr-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**25-Oct-2017**	17-Apr-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**25-Oct-2017**	16-Apr-2018	✓	**25-Oct-2017**	16-Apr-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**25-Oct-2017**	16-Apr-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**25-Oct-2017**	17-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG094B-T)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**25-Oct-2017**	16-Apr-2018	✓	**25-Oct-2017**	16-Apr-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**19-Oct-2017**	15-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**19-Oct-2017**	16-Nov-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**19-Oct-2017**	20-Oct-2017	✓
Clear Plastic Bottle - Natural (EK057G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**19-Oct-2017**	21-Oct-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**19-Oct-2017**	15-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**19-Oct-2017**	16-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**23-Oct-2017**	15-Nov-2017	✓	**23-Oct-2017**	15-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**23-Oct-2017**	16-Nov-2017	✓	**23-Oct-2017**	16-Nov-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**23-Oct-2017**	15-Nov-2017	✓	**23-Oct-2017**	15-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**23-Oct-2017**	16-Nov-2017	✓	**23-Oct-2017**	16-Nov-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**19-Oct-2017**	20-Oct-2017	✓
Clear Plastic Bottle - Natural (EK071G)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**----**	----	----	**19-Oct-2017**	21-Oct-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**----**	----	----	**24-Oct-2017**	08-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**24-Oct-2017**	25-Oct-2017	✓	**24-Oct-2017**	03-Dec-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**24-Oct-2017**	26-Oct-2017	✓	**24-Oct-2017**	03-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**23-Oct-2017**	01-Nov-2017	✓	**23-Oct-2017**	01-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**23-Oct-2017**	02-Nov-2017	✓	**23-Oct-2017**	02-Nov-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**24-Oct-2017**	25-Oct-2017	✓	**24-Oct-2017**	03-Dec-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**24-Oct-2017**	26-Oct-2017	✓	**24-Oct-2017**	03-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**23-Oct-2017**	01-Nov-2017	✓	**23-Oct-2017**	01-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**23-Oct-2017**	02-Nov-2017	✓	**23-Oct-2017**	02-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
A2, A2S, BLNS-B1, WQA02_171017	**18-Oct-2017**	**23-Oct-2017**	01-Nov-2017	✓	**23-Oct-2017**	01-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T4C, GW-T3E-A, T2F, GW-D5, T3B, BH10, GW-D3, GW-D7, WQA01_191017	**19-Oct-2017**	**23-Oct-2017**	02-Nov-2017	✓	**23-Oct-2017**	02-Nov-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1711878**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 24-Oct-2017
Site	: ----	Issue Date	: 31-Oct-2017
Sampler	: Tim Williamson	No. of samples received	: 15
Order number	: W81020-103	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**----**	----	----	**30-Oct-2017**	21-Apr-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**----**	----	----	**30-Oct-2017**	22-Apr-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**27-Oct-2017**	21-Apr-2018	✓	**27-Oct-2017**	21-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**----**	----	----	**30-Oct-2017**	21-Apr-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**----**	----	----	**30-Oct-2017**	22-Apr-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG094B-T)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**30-Oct-2017**	21-Apr-2018	✓	**30-Oct-2017**	21-Apr-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**----**	----	----	**24-Oct-2017**	20-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**----**	----	----	**24-Oct-2017**	21-Nov-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**----**	----	----	**24-Oct-2017**	25-Oct-2017	✓
Clear Plastic Bottle - Natural (EK057G)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**----**	----	----	**24-Oct-2017**	26-Oct-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**----**	----	----	**24-Oct-2017**	20-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**----**	----	----	**24-Oct-2017**	21-Nov-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**31-Oct-2017**	20-Nov-2017	✓	**31-Oct-2017**	20-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**31-Oct-2017**	21-Nov-2017	✓	**31-Oct-2017**	21-Nov-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**31-Oct-2017**	20-Nov-2017	✓	**31-Oct-2017**	20-Nov-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**31-Oct-2017**	21-Nov-2017	✓	**31-Oct-2017**	21-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**----**	----	----	**24-Oct-2017**	25-Oct-2017	✓
Clear Plastic Bottle - Natural (EK071G)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**----**	----	----	**24-Oct-2017**	26-Oct-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**----**	----	----	**30-Oct-2017**	13-Nov-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**27-Oct-2017**	30-Oct-2017	✓	**27-Oct-2017**	06-Dec-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**27-Oct-2017**	31-Oct-2017	✓	**27-Oct-2017**	06-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E, FS2, RD1, S1, A1N, NLWS-N2, FS4A, RD1A, A3	**23-Oct-2017**	**30-Oct-2017**	06-Nov-2017	✓	**30-Oct-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4, T3C, D2, T4B, D1,	**24-Oct-2017**	**30-Oct-2017**	07-Nov-2017	✓	**30-Oct-2017**	07-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**27-Oct-2017**	30-Oct-2017	✓	**27-Oct-2017**	06-Dec-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**27-Oct-2017**	31-Oct-2017	✓	**27-Oct-2017**	06-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**30-Oct-2017**	06-Nov-2017	✓	**30-Oct-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**30-Oct-2017**	07-Nov-2017	✓	**30-Oct-2017**	07-Nov-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, RD1A, S1, A3	**23-Oct-2017**	**30-Oct-2017**	06-Nov-2017	✓	**30-Oct-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D4, T4B, T3C, D1, D2	**24-Oct-2017**	**30-Oct-2017**	07-Nov-2017	✓	**30-Oct-2017**	07-Nov-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1712054**	Page	: 1 of 7
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Oct-2017
Site	: ----	Issue Date	: 06-Nov-2017
Sampler	: Rachel Champion	No. of samples received	: 2
Order number	: W81020-103	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1712029--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BH12, GW-D8	**26-Oct-2017**	**----**	----	----	**01-Nov-2017**	24-Apr-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
BH12, GW-D8	**26-Oct-2017**	**----**	----	----	**02-Nov-2017**	24-Apr-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH12, GW-D8	**26-Oct-2017**	**----**	----	----	**27-Oct-2017**	23-Nov-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH12, GW-D8	**26-Oct-2017**	**----**	----	----	**27-Oct-2017**	28-Oct-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH12, GW-D8	**26-Oct-2017**	**----**	----	----	**27-Oct-2017**	23-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
BH12,	GW-D8	**26-Oct-2017**	**03-Nov-2017**	23-Nov-2017	✓	**04-Nov-2017**	23-Nov-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BH12,	GW-D8	**26-Oct-2017**	**03-Nov-2017**	23-Nov-2017	✓	**04-Nov-2017**	23-Nov-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
BH12,	GW-D8	**26-Oct-2017**	**----**	----	----	**27-Oct-2017**	28-Oct-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
BH12,	GW-D8	**26-Oct-2017**	**31-Oct-2017**	02-Nov-2017	✓	**01-Nov-2017**	10-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**26-Oct-2017**	**02-Nov-2017**	09-Nov-2017	✓	**02-Nov-2017**	09-Nov-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
BH12,	GW-D8	**26-Oct-2017**	**31-Oct-2017**	02-Nov-2017	✓	**01-Nov-2017**	10-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**26-Oct-2017**	**02-Nov-2017**	09-Nov-2017	✓	**02-Nov-2017**	09-Nov-2017	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH12,	GW-D8	**26-Oct-2017**	**02-Nov-2017**	09-Nov-2017	✓	**02-Nov-2017**	09-Nov-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1712990**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 17-Nov-2017
Site	: ----	Issue Date	: 27-Nov-2017
Sampler	: Rachel Champion	No. of samples received	: 14
Order number	: W81020-103	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**23-Nov-2017**	16-May-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**23-Nov-2017**	16-May-2018	✓	**23-Nov-2017**	16-May-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**24-Nov-2017**	16-May-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG094B-T)							
WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**24-Nov-2017**	16-May-2018	✓	**24-Nov-2017**	16-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**17-Nov-2017**	15-Dec-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**17-Nov-2017**	19-Nov-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**17-Nov-2017**	15-Dec-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**21-Nov-2017**	15-Dec-2017	✓	**21-Nov-2017**	15-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**21-Nov-2017**	15-Dec-2017	✓	**21-Nov-2017**	15-Dec-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**17-Nov-2017**	19-Nov-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**----**	----	----	**21-Nov-2017**	08-Dec-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**22-Nov-2017**	24-Nov-2017	✓	**23-Nov-2017**	01-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S, WQA05_DB TBW 1132	**17-Nov-2017**	**22-Nov-2017**	01-Dec-2017	✓	**22-Nov-2017**	01-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S	**17-Nov-2017**	**22-Nov-2017**	24-Nov-2017	✓	**23-Nov-2017**	01-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S, WQA05_DB TBW 1132	**17-Nov-2017**	**22-Nov-2017**	01-Dec-2017	✓	**22-Nov-2017**	01-Dec-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, D2, T2F, GW-T3E-A, GW-D3, GW-D4, GW-D5, T3B, T4B, WQA02_151117, BLNS-B1, A2, A2S, WQA05_DB TBW 1132	**17-Nov-2017**	**22-Nov-2017**	01-Dec-2017	✓	**22-Nov-2017**	01-Dec-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	6	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1712847**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 15-Nov-2017
Site	: ----	Issue Date	: 22-Nov-2017
Sampler	: Rachel Champion	No. of samples received	: 9
Order number	: W81020-103	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EP1712848--001	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	24	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**----**	----	----	**21-Nov-2017**	14-May-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**21-Nov-2017**	14-May-2018	✓	**21-Nov-2017**	14-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**----**	----	----	**22-Nov-2017**	14-May-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG094B-T)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**22-Nov-2017**	14-May-2018	✓	**22-Nov-2017**	14-May-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**----**	----	----	**15-Nov-2017**	13-Dec-2017	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**----**	----	----	**15-Nov-2017**	17-Nov-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**----**	----	----	**15-Nov-2017**	13-Dec-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**17-Nov-2017**	13-Dec-2017	✓	**17-Nov-2017**	13-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**17-Nov-2017**	13-Dec-2017	✓	**17-Nov-2017**	13-Dec-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**----**	----	----	**15-Nov-2017**	17-Nov-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**----**	----	----	**16-Nov-2017**	06-Dec-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**17-Nov-2017**	22-Nov-2017	✓	**20-Nov-2017**	27-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, FS2, FS4A, RD1, S1, A3	**15-Nov-2017**	**17-Nov-2017**	29-Nov-2017	✓	**17-Nov-2017**	29-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**17-Nov-2017**	22-Nov-2017	✓	**20-Nov-2017**	27-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**17-Nov-2017**	29-Nov-2017	✓	**17-Nov-2017**	29-Nov-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E, FS2, RD1, A3 / A1N, NLWS-N2, FS4A, S1,	**15-Nov-2017**	**17-Nov-2017**	29-Nov-2017	✓	**17-Nov-2017**	29-Nov-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	24	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1714429**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 20-Dec-2017
Site	: ----	Issue Date	: 29-Dec-2017
Sampler	: Rachel Champion	No. of samples received	: 16
Order number	: W81020-103	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**22-Dec-2017**	17-Jun-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**22-Dec-2017**	18-Jun-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG093B-F)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**22-Dec-2017**	17-Jun-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG093B-F)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**22-Dec-2017**	18-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**20-Dec-2017**	16-Jan-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**20-Dec-2017**	17-Jan-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**20-Dec-2017**	21-Dec-2017	✓
Clear Plastic Bottle - Natural (EK057G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**20-Dec-2017**	22-Dec-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**20-Dec-2017**	16-Jan-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**20-Dec-2017**	17-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**28-Dec-2017**	16-Jan-2018	✓	**28-Dec-2017**	16-Jan-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**28-Dec-2017**	17-Jan-2018	✓	**28-Dec-2017**	17-Jan-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**28-Dec-2017**	16-Jan-2018	✓	**28-Dec-2017**	16-Jan-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**28-Dec-2017**	17-Jan-2018	✓	**28-Dec-2017**	17-Jan-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**----**	----	----	**20-Dec-2017**	21-Dec-2017	✓
Clear Plastic Bottle - Natural (EK071G)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**----**	----	----	**20-Dec-2017**	22-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**21-Dec-2017**	26-Dec-2017	✓	**21-Dec-2017**	30-Jan-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**21-Dec-2017**	27-Dec-2017	✓	**21-Dec-2017**	30-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3, T4B-A, T4B-B	**19-Dec-2017**	**22-Dec-2017**	02-Jan-2018	✓	**22-Dec-2017**	02-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**22-Dec-2017**	03-Jan-2018	✓	**22-Dec-2017**	03-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3	**19-Dec-2017**	**21-Dec-2017**	26-Dec-2017	✓	**21-Dec-2017**	30-Jan-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**21-Dec-2017**	27-Dec-2017	✓	**21-Dec-2017**	30-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3, T4B-A, T4B-B	**19-Dec-2017**	**22-Dec-2017**	02-Jan-2018	✓	**22-Dec-2017**	02-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**22-Dec-2017**	03-Jan-2018	✓	**22-Dec-2017**	03-Jan-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-12, D1, T4B, D2, GW-D4, T4B, GW-D3, T4B-A, T4B-B	**19-Dec-2017**	**22-Dec-2017**	02-Jan-2018	✓	**22-Dec-2017**	02-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D5, T2F, T3C, BH10, T3B, GW-D8	**20-Dec-2017**	**22-Dec-2017**	03-Jan-2018	✓	**22-Dec-2017**	03-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	16	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	16	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1714152**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 14-Dec-2017
Site	: ----	Issue Date	: 22-Dec-2017
Sampler	: Rachel Champion	No. of samples received	: 9
Order number	: W81020-103	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	15	6.67	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
A1, A1N, A1E, NLWS-N2, FS2, A2S, BLNS-B1, A2, WQA02_131217	**13-Dec-2017**	**----**	----	----	**18-Dec-2017**	11-Jun-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
A1, A1N, A1E, NLWS-N2, FS2, A2S, BLNS-B1, A2, WQA02_131217	**13-Dec-2017**	**18-Dec-2017**	11-Jun-2018	✓	**18-Dec-2017**	11-Jun-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
A1, A1N, A1E, NLWS-N2, FS2, A2S, BLNS-B1, A2, WQA02_131217	**13-Dec-2017**	**----**	----	----	**20-Dec-2017**	11-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG094B-T)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**20-Dec-2017**	11-Jun-2018	✓	**20-Dec-2017**	11-Jun-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**----**	----	----	**14-Dec-2017**	10-Jan-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**----**	----	----	**14-Dec-2017**	15-Dec-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**----**	----	----	**14-Dec-2017**	10-Jan-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**20-Dec-2017**	10-Jan-2018	✓	**20-Dec-2017**	10-Jan-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217, A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**20-Dec-2017**	10-Jan-2018	✓	**20-Dec-2017**	10-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**----**	----	----	**14-Dec-2017**	15-Dec-2017	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**----**	----	----	**19-Dec-2017**	03-Jan-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**19-Dec-2017**	20-Dec-2017	✓	**20-Dec-2017**	28-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**19-Dec-2017**	27-Dec-2017	✓	**19-Dec-2017**	27-Dec-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**19-Dec-2017**	20-Dec-2017	✓	**20-Dec-2017**	28-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E, FS2, BLNS-B1, WQA02_131217 / A1N, NLWS-N2, A2S, A2,	**13-Dec-2017**	**19-Dec-2017**	27-Dec-2017	✓	**19-Dec-2017**	27-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, FS2, A2S, BLNS-B1, A2, WQA02_131217	**13-Dec-2017**	**19-Dec-2017**	27-Dec-2017	✓	**19-Dec-2017**	27-Dec-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	9	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	22	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1801308**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 16-Jan-2018
Site	: ----	Issue Date	: 25-Jan-2018
Sampler	: Rachel Champion	No. of samples received	: 6
Order number	: W81020-103	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EP1801306--004	Anonymous	**Total Kjeldahl Nitrogen as N**	----	65.0 %	70-130%	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
BH12	**15-Jan-2018**	**----**	----	----	**23-Jan-2018**	14-Jul-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**23-Jan-2018**	15-Jul-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
A1, A1N, A1E, NLWS-N2	**16-Jan-2018**	**23-Jan-2018**	15-Jul-2018	✓	**23-Jan-2018**	15-Jul-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
BH12	**15-Jan-2018**	**----**	----	----	**24-Jan-2018**	14-Jul-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**24-Jan-2018**	15-Jul-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG094B-T)							
A1, A1N, A1E, NLWS-N2	**16-Jan-2018**	**24-Jan-2018**	15-Jul-2018	✓	**24-Jan-2018**	15-Jul-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH12	**15-Jan-2018**	**----**	----	----	**19-Jan-2018**	12-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**19-Jan-2018**	13-Feb-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH12	**15-Jan-2018**	**----**	----	----	**17-Jan-2018**	17-Jan-2018	✓
Clear Plastic Bottle - Natural (EK057G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**17-Jan-2018**	18-Jan-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH12	**15-Jan-2018**	**----**	----	----	**19-Jan-2018**	12-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**19-Jan-2018**	13-Feb-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH12	**15-Jan-2018**	**22-Jan-2018**	12-Feb-2018	✓	**22-Jan-2018**	12-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**22-Jan-2018**	13-Feb-2018	✓	**22-Jan-2018**	13-Feb-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH12	**15-Jan-2018**	**22-Jan-2018**	12-Feb-2018	✓	**22-Jan-2018**	12-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**22-Jan-2018**	13-Feb-2018	✓	**22-Jan-2018**	13-Feb-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH12	**15-Jan-2018**	**----**	----	----	**17-Jan-2018**	17-Jan-2018	✓
Clear Plastic Bottle - Natural (EK071G)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**----**	----	----	**17-Jan-2018**	18-Jan-2018	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A1, A1N, A1E, NLWS-N2	**16-Jan-2018**	**----**	----	----	**19-Jan-2018**	06-Feb-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BH12	**15-Jan-2018**	**22-Jan-2018**	22-Jan-2018	✓	**23-Jan-2018**	03-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**18-Jan-2018**	23-Jan-2018	✓	**23-Jan-2018**	27-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH12	**15-Jan-2018**	**23-Jan-2018**	29-Jan-2018	✓	**23-Jan-2018**	29-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**23-Jan-2018**	30-Jan-2018	✓	**23-Jan-2018**	30-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BH12	**15-Jan-2018**	**22-Jan-2018**	22-Jan-2018	✓	**23-Jan-2018**	03-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**18-Jan-2018**	23-Jan-2018	✓	**23-Jan-2018**	27-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH12	**15-Jan-2018**	**23-Jan-2018**	29-Jan-2018	✓	**23-Jan-2018**	29-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**23-Jan-2018**	30-Jan-2018	✓	**23-Jan-2018**	30-Jan-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH12	**15-Jan-2018**	**23-Jan-2018**	29-Jan-2018	✓	**23-Jan-2018**	29-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2, GW-D8	**16-Jan-2018**	**23-Jan-2018**	30-Jan-2018	✓	**23-Jan-2018**	30-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1801446**	Page	: 1 of 10
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 16-Jan-2018
Site	: ----	Issue Date	: 24-Jan-2018
Sampler	: ----	No. of samples received	: 9
Order number	: W81020-103	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	EB1801928--001	Anonymous	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK071G: Reactive Phosphorus as P by discrete analyse	EM1801208--069	Anonymous	**Reactive Phosphorus as P**	14265-44-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	----	----	----	16-Jan-2018	13-Jan-2018	**3**
Clear Plastic Bottle - Natural						
D2	----	----	----	18-Jan-2018	13-Jan-2018	**5**
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural						
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	----	----	----	16-Jan-2018	13-Jan-2018	**3**
Clear Plastic Bottle - Natural						
D2	----	----	----	18-Jan-2018	13-Jan-2018	**5**
EP008: Chlorophyll a & Pheophytin a						
White Plastic Bottle - Unpreserved						
BLNS-B1, WQA02, A2S, A2	----	----	----	18-Jan-2018	13-Jan-2018	**5**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Total Kjeldahl Nitrogen as N By Discrete Analyser	3	33	9.09	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	31	3.23	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) - Continued					
TRH Volatiles/BTEX	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	1	31	3.23	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
D2	**11-Jan-2018**	**----**	----	----	**22-Jan-2018**	10-Jul-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**----**	----	----	**17-Jan-2018**	10-Jul-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**17-Jan-2018**	10-Jul-2018	✓	**17-Jan-2018**	10-Jul-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**----**	----	----	**24-Jan-2018**	10-Jul-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG094B-F)							
D2	**11-Jan-2018**	**----**	----	----	**24-Jan-2018**	10-Jul-2018	✓
EG094T: Total metals in Fresh water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG094B-T)							
BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**24-Jan-2018**	10-Jul-2018	✓	**24-Jan-2018**	10-Jul-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**----**	----	----	**17-Jan-2018**	08-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
D2	**11-Jan-2018**	**----**	----	----	**19-Jan-2018**	08-Feb-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**----**	----	----	**16-Jan-2018**	13-Jan-2018	×
Clear Plastic Bottle - Natural (EK057G)							
D2	**11-Jan-2018**	**----**	----	----	**18-Jan-2018**	13-Jan-2018	×
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**----**	----	----	**17-Jan-2018**	08-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
D2	**11-Jan-2018**	**----**	----	----	**19-Jan-2018**	08-Feb-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**18-Jan-2018**	08-Feb-2018	✓	**18-Jan-2018**	08-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
D2	**11-Jan-2018**	**19-Jan-2018**	08-Feb-2018	✓	**19-Jan-2018**	08-Feb-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**18-Jan-2018**	08-Feb-2018	✓	**18-Jan-2018**	08-Feb-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
D2	**11-Jan-2018**	**19-Jan-2018**	08-Feb-2018	✓	**19-Jan-2018**	08-Feb-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
D1, GW05, BLNS-B1, A2S, GW03, T4C, WQA02, A2	**11-Jan-2018**	**----**	----	----	**16-Jan-2018**	13-Jan-2018	×
Clear Plastic Bottle - Natural (EK071G)							
D2	**11-Jan-2018**	**----**	----	----	**18-Jan-2018**	13-Jan-2018	×
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
BLNS-B1, A2S, WQA02, A2	**11-Jan-2018**	**----**	----	----	**18-Jan-2018**	13-Jan-2018	×
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
D1, GW05, BLNS-B1, A2S, GW03, T4C, WQA02, A2	**11-Jan-2018**	**17-Jan-2018**	18-Jan-2018	✓	**18-Jan-2018**	26-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
D2	**11-Jan-2018**	**18-Jan-2018**	18-Jan-2018	✓	**22-Jan-2018**	27-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, GW05, BLNS-B1, A2S, GW03, T4C, WQA02, A2	**11-Jan-2018**	**17-Jan-2018**	25-Jan-2018	✓	**17-Jan-2018**	25-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D2	**11-Jan-2018**	**22-Jan-2018**	25-Jan-2018	✓	**22-Jan-2018**	25-Jan-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
D1, GW05, BLNS-B1, A2S, GW03, T4C, WQA02, A2	**11-Jan-2018**	**17-Jan-2018**	18-Jan-2018	✓	**18-Jan-2018**	26-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
D2	**11-Jan-2018**	**18-Jan-2018**	18-Jan-2018	✓	**22-Jan-2018**	27-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, GW05, BLNS-B1, A2S, GW03, T4C, WQA02, A2	**11-Jan-2018**	**17-Jan-2018**	25-Jan-2018	✓	**17-Jan-2018**	25-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D2	**11-Jan-2018**	**22-Jan-2018**	25-Jan-2018	✓	**22-Jan-2018**	25-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
D1, GW03, GW05, T4C, BLNS-B1, WQA02, A2S, A2	**11-Jan-2018**	**17-Jan-2018**	25-Jan-2018	✓	**17-Jan-2018**	25-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
D2	**11-Jan-2018**	**22-Jan-2018**	25-Jan-2018	✓	**22-Jan-2018**	25-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	33	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	31	**3.23**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	31	**3.23**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1801303**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Melbourne
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: Roe 8 Rehab	Date Samples Received	: 12-Jan-2018
Site	: ----	Issue Date	: 23-Jan-2018
Sampler	: ----	No. of samples received	: 7
Order number	: W81020-103	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK067G: Total Phosphorus as P by Discrete Analyser	EB1801523--002	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-F)							
T3B, T4B, T2F, GW-T3E-A, BH10, T3C, GW-D4,	**10-Jan-2018**	**----**	----	----	**17-Jan-2018**	09-Jul-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-F)							
T3B, T4B, T2F, GW-T3E-A, BH10, T3C, GW-D4,	**10-Jan-2018**	**----**	----	----	**22-Jan-2018**	09-Jul-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**----**	----	----	**15-Jan-2018**	07-Feb-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**----**	----	----	**12-Jan-2018**	12-Jan-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**----**	----	----	**16-Jan-2018**	07-Feb-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**17-Jan-2018**	07-Feb-2018	✓	**17-Jan-2018**	07-Feb-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**17-Jan-2018**	07-Feb-2018	✓	**17-Jan-2018**	07-Feb-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
T3B, BH10, T4B, T3C, T2F, GW-D4, GW-T3E-A	**10-Jan-2018**	**----**	----	----	**12-Jan-2018**	12-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T4B, T2F, GW-T3E-A — BH10, T3C, GW-D4,	**10-Jan-2018**	**17-Jan-2018**	17-Jan-2018	✓	**18-Jan-2018**	26-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T4B, T2F, GW-T3E-A — BH10, T3C, GW-D4,	**10-Jan-2018**	**15-Jan-2018**	24-Jan-2018	✓	**15-Jan-2018**	24-Jan-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T4B, T2F, GW-T3E-A — BH10, T3C, GW-D4,	**10-Jan-2018**	**17-Jan-2018**	17-Jan-2018	✓	**18-Jan-2018**	26-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T4B, T2F, GW-T3E-A — BH10, T3C, GW-D4,	**10-Jan-2018**	**15-Jan-2018**	24-Jan-2018	✓	**15-Jan-2018**	24-Jan-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T4B, T2F, GW-T3E-A — BH10, T3C, GW-D4,	**10-Jan-2018**	**15-Jan-2018**	24-Jan-2018	✓	**15-Jan-2018**	24-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1713111**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Tim Williamson	Telephone	: 08 9209 7655
Project	: MRIA - R8 Rehab	Date Samples Received	: 21-Nov-2017
Site	: ----	Issue Date	: 28-Nov-2017
Sampler	: Rachel Champion	No. of samples received	: 8
Order number	: W81020-103	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**24-Nov-2017**	19-May-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**24-Nov-2017**	20-May-2018	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**27-Nov-2017**	19-May-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**27-Nov-2017**	20-May-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**21-Nov-2017**	18-Dec-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**21-Nov-2017**	19-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**21-Nov-2017**	22-Nov-2017	✓
Clear Plastic Bottle - Natural (EK057G)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**21-Nov-2017**	23-Nov-2017	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**21-Nov-2017**	18-Dec-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**21-Nov-2017**	19-Dec-2017	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**24-Nov-2017**	18-Dec-2017	✓	**24-Nov-2017**	18-Dec-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	19-Dec-2017	✓	**24-Nov-2017**	19-Dec-2017	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**24-Nov-2017**	18-Dec-2017	✓	**24-Nov-2017**	18-Dec-2017	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	19-Dec-2017	✓	**24-Nov-2017**	19-Dec-2017	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**----**	----	----	**21-Nov-2017**	22-Nov-2017	✓
Clear Plastic Bottle - Natural (EK071G)							
T4C, BH12	**21-Nov-2017**	**----**	----	----	**21-Nov-2017**	23-Nov-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**24-Nov-2017**	27-Nov-2017	✓	**27-Nov-2017**	03-Jan-2018	✓
Amber Glass Bottle - Unpreserved (EP071) T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	28-Nov-2017	✓	**27-Nov-2017**	03-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH10, T3C, GW-D7, GW-D8, WQA01_201117, WQA06_DB TBW 1133	**20-Nov-2017**	**24-Nov-2017**	04-Dec-2017	✓	**24-Nov-2017**	04-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	05-Dec-2017	✓	**24-Nov-2017**	05-Dec-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) BH10, T3C, GW-D7, GW-D8, WQA01_201117	**20-Nov-2017**	**24-Nov-2017**	27-Nov-2017	✓	**27-Nov-2017**	03-Jan-2018	✓
Amber Glass Bottle - Unpreserved (EP071) T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	28-Nov-2017	✓	**27-Nov-2017**	03-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH10, T3C, GW-D7, GW-D8, WQA01_201117, WQA06_DB TBW 1133	**20-Nov-2017**	**24-Nov-2017**	04-Dec-2017	✓	**24-Nov-2017**	04-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	05-Dec-2017	✓	**24-Nov-2017**	05-Dec-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) BH10, T3C, GW-D7, GW-D8, WQA01_201117, WQA06_DB TBW 1133	**20-Nov-2017**	**24-Nov-2017**	04-Dec-2017	✓	**24-Nov-2017**	04-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) T4C, BH12	**21-Nov-2017**	**24-Nov-2017**	05-Dec-2017	✓	**24-Nov-2017**	05-Dec-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1802093**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 07-Feb-2018
Site	: ----	Issue Date	: 15-Feb-2018
Sampler	: Rachel Champion	No. of samples received	: 8
Order number	: W81020-103	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP008: Chlorophyll a & Pheophytin a						
White Plastic Bottle - Unpreserved						
A1, A1N, A1E, NLWS-N2	----	----	----	12-Feb-2018	09-Feb-2018	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**----**	----	----	**12-Feb-2018**	05-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**----**	----	----	**12-Feb-2018**	06-Aug-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**12-Feb-2018**	06-Aug-2018	✓	**12-Feb-2018**	06-Aug-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**----**	----	----	**12-Feb-2018**	05-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**----**	----	----	**12-Feb-2018**	06-Aug-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**12-Feb-2018**	06-Aug-2018	✓	**12-Feb-2018**	06-Aug-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**----**	----	----	**07-Feb-2018**	06-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**----**	----	----	**07-Feb-2018**	07-Mar-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**----**	----	----	**07-Feb-2018**	08-Feb-2018	✓
Clear Plastic Bottle - Natural (EK057G)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**----**	----	----	**07-Feb-2018**	09-Feb-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**----**	----	----	**07-Feb-2018**	06-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**----**	----	----	**07-Feb-2018**	07-Mar-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**09-Feb-2018**	06-Mar-2018	✓	**12-Feb-2018**	06-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**09-Feb-2018**	07-Mar-2018	✓	**12-Feb-2018**	07-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-T3E-A, T2F,	GW-D5, WQA01_060218	**06-Feb-2018**	**09-Feb-2018**	06-Mar-2018	✓	**12-Feb-2018**	06-Mar-2018 ✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A1, A1E,	A1N, NLWS-N2	**07-Feb-2018**	**09-Feb-2018**	07-Mar-2018	✓	**12-Feb-2018**	07-Mar-2018 ✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-T3E-A, T2F,	GW-D5, WQA01_060218	**06-Feb-2018**	**----**	----	----	**07-Feb-2018**	08-Feb-2018 ✓
Clear Plastic Bottle - Natural (EK071G)							
A1, A1E,	A1N, NLWS-N2	**07-Feb-2018**	**----**	----	----	**07-Feb-2018**	09-Feb-2018 ✓
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
A1, A1E,	A1N, NLWS-N2	**07-Feb-2018**	**----**	----	----	**12-Feb-2018**	09-Feb-2018 ×
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, T2F,	GW-D5, WQA01_060218	**06-Feb-2018**	**08-Feb-2018**	13-Feb-2018	✓	**09-Feb-2018**	20-Mar-2018 ✓
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1E,	A1N, NLWS-N2	**07-Feb-2018**	**08-Feb-2018**	14-Feb-2018	✓	**09-Feb-2018**	20-Mar-2018 ✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, T2F,	GW-D5, WQA01_060218	**06-Feb-2018**	**13-Feb-2018**	20-Feb-2018	✓	**14-Feb-2018**	20-Feb-2018 ✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1E,	A1N, NLWS-N2	**07-Feb-2018**	**13-Feb-2018**	21-Feb-2018	✓	**14-Feb-2018**	21-Feb-2018 ✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**08-Feb-2018**	13-Feb-2018	✓	**09-Feb-2018**	20-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**08-Feb-2018**	14-Feb-2018	✓	**09-Feb-2018**	20-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**13-Feb-2018**	20-Feb-2018	✓	**14-Feb-2018**	20-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**13-Feb-2018**	21-Feb-2018	✓	**14-Feb-2018**	21-Feb-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D5, T2F, WQA01_060218	**06-Feb-2018**	**13-Feb-2018**	20-Feb-2018	✓	**14-Feb-2018**	20-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A1, A1N, A1E, NLWS-N2	**07-Feb-2018**	**13-Feb-2018**	21-Feb-2018	✓	**14-Feb-2018**	21-Feb-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	10	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	17	**17.65**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	17	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1802224**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Feb-2018
Site	: ----	Issue Date	: 19-Feb-2018
Sampler	: Rachel Champion	No. of samples received	: 10
Order number	: W81020-103	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**14-Feb-2018**	07-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**14-Feb-2018**	08-Aug-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**14-Feb-2018**	07-Aug-2018	✓	**14-Feb-2018**	07-Aug-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_090218	**09-Feb-2018**	**14-Feb-2018**	08-Aug-2018	✓	**14-Feb-2018**	08-Aug-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**14-Feb-2018**	07-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**14-Feb-2018**	08-Aug-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-T)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**14-Feb-2018**	07-Aug-2018	✓	**14-Feb-2018**	07-Aug-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_090218	**09-Feb-2018**	**14-Feb-2018**	08-Aug-2018	✓	**14-Feb-2018**	08-Aug-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**09-Feb-2018**	08-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**09-Feb-2018**	09-Mar-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**09-Feb-2018**	10-Feb-2018	✓
Clear Plastic Bottle - Natural (EK057G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**09-Feb-2018**	11-Feb-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**09-Feb-2018**	08-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**09-Feb-2018**	09-Mar-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**13-Feb-2018**	08-Mar-2018	✓	**16-Feb-2018**	08-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**13-Feb-2018**	09-Mar-2018	✓	**16-Feb-2018**	09-Mar-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**13-Feb-2018**	08-Mar-2018	✓	**16-Feb-2018**	08-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**13-Feb-2018**	09-Mar-2018	✓	**16-Feb-2018**	09-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**09-Feb-2018**	10-Feb-2018	✓
Clear Plastic Bottle - Natural (EK071G)							
BH12, GW-D3, GW-D4	**09-Feb-2018**	**----**	----	----	**09-Feb-2018**	11-Feb-2018	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
A2, A2S, BLNS-B1, WQA02_080218	**08-Feb-2018**	**----**	----	----	**12-Feb-2018**	01-Mar-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**13-Feb-2018**	15-Feb-2018	✓	**15-Feb-2018**	25-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH12, GW-D3, GW-D4, WQA03_090218	**09-Feb-2018**	**13-Feb-2018**	16-Feb-2018	✓	**15-Feb-2018**	25-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**15-Feb-2018**	22-Feb-2018	✓	**17-Feb-2018**	22-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH12, GW-D3, GW-D4, WQA04_DB TBW 999, WQA03_090218	**09-Feb-2018**	**15-Feb-2018**	23-Feb-2018	✓	**17-Feb-2018**	23-Feb-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**13-Feb-2018**	15-Feb-2018	✓	**15-Feb-2018**	25-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH12, GW-D3, GW-D4, WQA03_090218	**09-Feb-2018**	**13-Feb-2018**	16-Feb-2018	✓	**15-Feb-2018**	25-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**15-Feb-2018**	22-Feb-2018	✓	**17-Feb-2018**	22-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH12, GW-D3, GW-D4, WQA04_DB TBW 999, WQA03_090218	**09-Feb-2018**	**15-Feb-2018**	23-Feb-2018	✓	**17-Feb-2018**	23-Feb-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) A2, A2S, BLNS-B1, WQA02_080218, WQA03_080218	**08-Feb-2018**	**15-Feb-2018**	22-Feb-2018	✓	**17-Feb-2018**	22-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH12, GW-D3, GW-D4, WQA04_DB TBW 999, WQA03_090218	**09-Feb-2018**	**15-Feb-2018**	23-Feb-2018	✓	**17-Feb-2018**	23-Feb-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	4	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1802359**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9209 7655
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Feb-2018
Site	: ----	Issue Date	: 20-Feb-2018
Sampler	: Rachel Champion	No. of samples received	: 10
Order number	: W81020-103	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Total Kjeldahl Nitrogen as N By Discrete Analyser	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-D8	**12-Feb-2018**	**----**	----	----	**16-Feb-2018**	11-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**16-Feb-2018**	12-Aug-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_130218	**13-Feb-2018**	**16-Feb-2018**	12-Aug-2018	✓	**16-Feb-2018**	12-Aug-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-D8	**12-Feb-2018**	**----**	----	----	**16-Feb-2018**	11-Aug-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**16-Feb-2018**	12-Aug-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_130218	**13-Feb-2018**	**16-Feb-2018**	12-Aug-2018	✓	**16-Feb-2018**	12-Aug-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D8	**12-Feb-2018**	**----**	----	----	**13-Feb-2018**	12-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**13-Feb-2018**	13-Mar-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D8	**12-Feb-2018**	**----**	----	----	**13-Feb-2018**	14-Feb-2018	✓
Clear Plastic Bottle - Natural (EK057G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**13-Feb-2018**	15-Feb-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D8	**12-Feb-2018**	**----**	----	----	**13-Feb-2018**	12-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**13-Feb-2018**	13-Mar-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D8	**12-Feb-2018**	**16-Feb-2018**	12-Mar-2018	✓	**19-Feb-2018**	12-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**16-Feb-2018**	13-Mar-2018	✓	**19-Feb-2018**	13-Mar-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D8	**12-Feb-2018**	**16-Feb-2018**	12-Mar-2018	✓	**19-Feb-2018**	12-Mar-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**16-Feb-2018**	13-Mar-2018	✓	**19-Feb-2018**	13-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D8	**12-Feb-2018**	**----**	----	----	**13-Feb-2018**	14-Feb-2018	✓
Clear Plastic Bottle - Natural (EK071G)							
T3B, T3C, T4B, T4C, D1, D2, BH10	**13-Feb-2018**	**----**	----	----	**13-Feb-2018**	15-Feb-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D8	**12-Feb-2018**	**16-Feb-2018**	19-Feb-2018	✓	**19-Feb-2018**	28-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T3C, T4B, T4C, D1, D2, WQA03_130218, BH10	**13-Feb-2018**	**16-Feb-2018**	20-Feb-2018	✓	**19-Feb-2018**	28-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D8	**12-Feb-2018**	**19-Feb-2018**	26-Feb-2018	✓	**19-Feb-2018**	26-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, T4B, T4C, D1, D2, WQA05_DB TBW 998, WQA03_130218, BH10	**13-Feb-2018**	**19-Feb-2018**	27-Feb-2018	✓	**19-Feb-2018**	27-Feb-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D8	**12-Feb-2018**	**16-Feb-2018**	19-Feb-2018	✓	**19-Feb-2018**	28-Mar-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T3C, T4B, T4C, D1, D2, WQA03_130218, BH10	**13-Feb-2018**	**16-Feb-2018**	20-Feb-2018	✓	**19-Feb-2018**	28-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D8	**12-Feb-2018**	**19-Feb-2018**	26-Feb-2018	✓	**19-Feb-2018**	26-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, T4B, T4C, D1, D2, WQA05_DB TBW 998, WQA03_130218, BH10	**13-Feb-2018**	**19-Feb-2018**	27-Feb-2018	✓	**19-Feb-2018**	27-Feb-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D8	**12-Feb-2018**	**19-Feb-2018**	26-Feb-2018	✓	**19-Feb-2018**	26-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, T4B, T4C, D1, D2, WQA05_DB TBW 998, WQA03_130218, BH10	**13-Feb-2018**	**19-Feb-2018**	27-Feb-2018	✓	**19-Feb-2018**	27-Feb-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1804348**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 04-Apr-2018
Site	: ----	Issue Date	: 13-Apr-2018
Sampler	: Rachel Champion	No. of samples received	: 14
Order number	: W81020-103	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**10-Apr-2018**	01-Oct-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**10-Apr-2018**	01-Oct-2018	✓	**10-Apr-2018**	01-Oct-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**09-Apr-2018**	01-Oct-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	01-Oct-2018	✓	**09-Apr-2018**	01-Oct-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**12-Apr-2018**	02-May-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**04-Apr-2018**	06-Apr-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**12-Apr-2018**	02-May-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**11-Apr-2018**	02-May-2018	✓	**11-Apr-2018**	02-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**11-Apr-2018**	02-May-2018	✓	**11-Apr-2018**	02-May-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**04-Apr-2018**	06-Apr-2018	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**----**	----	----	**09-Apr-2018**	25-Apr-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_040418	**04-Apr-2018**	**09-Apr-2018**	11-Apr-2018	✓	**09-Apr-2018**	11-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	11-Apr-2018	✓	**10-Apr-2018**	19-May-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
WQA03_040418	**04-Apr-2018**	**10-Apr-2018**	11-Apr-2018	✓	**10-Apr-2018**	20-May-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA05_DB TBW 404, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	18-Apr-2018	✓	**09-Apr-2018**	18-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_040418	**04-Apr-2018**	**09-Apr-2018**	11-Apr-2018	✓	**09-Apr-2018**	11-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	11-Apr-2018	✓	**10-Apr-2018**	19-May-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
WQA03_040418	**04-Apr-2018**	**10-Apr-2018**	11-Apr-2018	✓	**10-Apr-2018**	20-May-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA05_DB TBW 404, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	18-Apr-2018	✓	**09-Apr-2018**	18-Apr-2018	✓
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_040418	**04-Apr-2018**	**09-Apr-2018**	11-Apr-2018	✓	**09-Apr-2018**	11-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, T2F, GW-D5, GW-D8, BH12, D1, D2, WQA05_DB TBW 404, WQA01_040418, BLNS-B1, A2, A2S, WAQ02_040418	**04-Apr-2018**	**09-Apr-2018**	18-Apr-2018	✓	**09-Apr-2018**	18-Apr-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	9	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1803361**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 09-Mar-2018
Site	: ----	Issue Date	: 16-Mar-2018
Sampler	: Rachel Champion	No. of samples received	: 10
Order number	: W81020-103	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP008: Chlorophyll a & Pheophytin a						
White Plastic Bottle - Unpreserved						
NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	----	----	----	12-Mar-2018	11-Mar-2018	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**14-Mar-2018**	05-Sep-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
NLWS-N2, A2S, BLNS-B1, A2, WQA03_090318, WQA02_090318	**09-Mar-2018**	**14-Mar-2018**	05-Sep-2018	✓	**14-Mar-2018**	05-Sep-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**14-Mar-2018**	05-Sep-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
NLWS-N2, A2S, BLNS-B1, A2, WQA03_090318, WQA02_090318	**09-Mar-2018**	**14-Mar-2018**	05-Sep-2018	✓	**14-Mar-2018**	05-Sep-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**09-Mar-2018**	06-Apr-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**09-Mar-2018**	11-Mar-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**09-Mar-2018**	06-Apr-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**15-Mar-2018**	06-Apr-2018	✓	**15-Mar-2018**	06-Apr-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**15-Mar-2018**	06-Apr-2018	✓	**15-Mar-2018**	06-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**09-Mar-2018**	11-Mar-2018	✓
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
NLWS-N2, A2S, BLNS-B1, A2, WQA02_090318	**09-Mar-2018**	**----**	----	----	**12-Mar-2018**	11-Mar-2018	×
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1	**09-Mar-2018**	**13-Mar-2018**	16-Mar-2018	✓	**14-Mar-2018**	22-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
A2, WQA03_090318, WQA02_090318	**09-Mar-2018**	**14-Mar-2018**	16-Mar-2018	✓	**14-Mar-2018**	23-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA05_TBW119, WQA03_090318, WQA02_090318	**09-Mar-2018**	**12-Mar-2018**	23-Mar-2018	✓	**12-Mar-2018**	23-Mar-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1	**09-Mar-2018**	**13-Mar-2018**	16-Mar-2018	✓	**14-Mar-2018**	22-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
A2, WQA03_090318, WQA02_090318	**09-Mar-2018**	**14-Mar-2018**	16-Mar-2018	✓	**14-Mar-2018**	23-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA05_TBW119, WQA03_090318, WQA02_090318	**09-Mar-2018**	**12-Mar-2018**	23-Mar-2018	✓	**12-Mar-2018**	23-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B, T3C, BH10, NLWS-N2, A2S, BLNS-B1, A2, WQA05_TBW119, WQA03_090318, WQA02_090318	**09-Mar-2018**	**12-Mar-2018**	23-Mar-2018	✓	**12-Mar-2018**	23-Mar-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	5	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1803480**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 13-Mar-2018
Site	: ----	Issue Date	: 20-Mar-2018
Sampler	: Rachel Champion	No. of samples received	: 4
Order number	: W181020-103	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1803480--001	GW-D4	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-D4	**12-Mar-2018**	**----**	----	----	**16-Mar-2018**	08-Sep-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**16-Mar-2018**	09-Sep-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-D4	**12-Mar-2018**	**----**	----	----	**16-Mar-2018**	08-Sep-2018	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**16-Mar-2018**	09-Sep-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D4	**12-Mar-2018**	**----**	----	----	**13-Mar-2018**	09-Apr-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**13-Mar-2018**	10-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) GW-D4	**12-Mar-2018**	**----**	----	----	**13-Mar-2018**	14-Mar-2018	✓
Clear Plastic Bottle - Natural (EK057G) GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**13-Mar-2018**	15-Mar-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) GW-D4	**12-Mar-2018**	**----**	----	----	**13-Mar-2018**	09-Apr-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**13-Mar-2018**	10-Apr-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) GW-D4	**12-Mar-2018**	**16-Mar-2018**	09-Apr-2018	✓	**16-Mar-2018**	09-Apr-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) GW-D8, BH12	**13-Mar-2018**	**16-Mar-2018**	10-Apr-2018	✓	**16-Mar-2018**	10-Apr-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) GW-D4	**12-Mar-2018**	**16-Mar-2018**	09-Apr-2018	✓	**16-Mar-2018**	09-Apr-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) GW-D8, BH12	**13-Mar-2018**	**16-Mar-2018**	10-Apr-2018	✓	**16-Mar-2018**	10-Apr-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) GW-D4	**12-Mar-2018**	**----**	----	----	**13-Mar-2018**	14-Mar-2018	✓
Clear Plastic Bottle - Natural (EK071G) GW-D8, BH12	**13-Mar-2018**	**----**	----	----	**13-Mar-2018**	15-Mar-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) GW-D4	**12-Mar-2018**	**15-Mar-2018**	19-Mar-2018	✓	**16-Mar-2018**	24-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071) GW-D8, BH12	**13-Mar-2018**	**15-Mar-2018**	20-Mar-2018	✓	**16-Mar-2018**	24-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW-D4	**12-Mar-2018**	**14-Mar-2018**	26-Mar-2018	✓	**14-Mar-2018**	26-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW-D8, BH12, WQA04_TBW118	**13-Mar-2018**	**14-Mar-2018**	27-Mar-2018	✓	**14-Mar-2018**	27-Mar-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) GW-D4	**12-Mar-2018**	**15-Mar-2018**	19-Mar-2018	✓	**16-Mar-2018**	24-Apr-2018	✓
Amber Glass Bottle - Unpreserved (EP071) GW-D8, BH12	**13-Mar-2018**	**15-Mar-2018**	20-Mar-2018	✓	**16-Mar-2018**	24-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW-D4	**12-Mar-2018**	**14-Mar-2018**	26-Mar-2018	✓	**14-Mar-2018**	26-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW-D8, BH12, WQA04_TBW118	**13-Mar-2018**	**14-Mar-2018**	27-Mar-2018	✓	**14-Mar-2018**	27-Mar-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) GW-D4	**12-Mar-2018**	**14-Mar-2018**	26-Mar-2018	✓	**14-Mar-2018**	26-Mar-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW-D8, BH12, WQA04_TBW118	**13-Mar-2018**	**14-Mar-2018**	27-Mar-2018	✓	**14-Mar-2018**	27-Mar-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1803299**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 08-Mar-2018
Site	: ----	Issue Date	: 16-Mar-2018
Sampler	: Rachel Champion	No. of samples received	: 11
Order number	: W81020-103	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG020T: Total Metals by ICP-MS	ES1807288--001	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	17	5.88	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**13-Mar-2018**	04-Sep-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_080318	**08-Mar-2018**	**12-Mar-2018**	04-Sep-2018	✓	**12-Mar-2018**	04-Sep-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**12-Mar-2018**	04-Sep-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_080318	**08-Mar-2018**	**12-Mar-2018**	04-Sep-2018	✓	**12-Mar-2018**	04-Sep-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**08-Mar-2018**	05-Apr-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**08-Mar-2018**	10-Mar-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**08-Mar-2018**	05-Apr-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**15-Mar-2018**	05-Apr-2018	✓	**15-Mar-2018**	05-Apr-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**15-Mar-2018**	05-Apr-2018	✓	**15-Mar-2018**	05-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA01_080318, T2F	**08-Mar-2018**	**----**	----	----	**08-Mar-2018**	10-Mar-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA03_080318, WQA01_080318, T2F	**08-Mar-2018**	**12-Mar-2018**	15-Mar-2018	✓	**12-Mar-2018**	21-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA04_TBW 117, WQA03_080318, WQA01_080318, T2F	**08-Mar-2018**	**09-Mar-2018**	22-Mar-2018	✓	**09-Mar-2018**	22-Mar-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA03_080318, WQA01_080318, T2F	**08-Mar-2018**	**12-Mar-2018**	15-Mar-2018	✓	**12-Mar-2018**	21-Apr-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA04_TBW 117, WQA03_080318, WQA01_080318, T2F	**08-Mar-2018**	**09-Mar-2018**	22-Mar-2018	✓	**09-Mar-2018**	22-Mar-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-T3E-A, GW-D3, GW-D5, T4B, T4C, D1, D2, WQA04_TBW 117, WQA03_080318, WQA01_080318, T2F	**08-Mar-2018**	**09-Mar-2018**	22-Mar-2018	✓	**09-Mar-2018**	22-Mar-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1804292**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 03-Apr-2018
Site	: ----	Issue Date	: 11-Apr-2018
Sampler	: Rachel Champion	No. of samples received	: 9
Order number	: W81020-103	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**09-Apr-2018**	30-Sep-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_030418	**03-Apr-2018**	**09-Apr-2018**	30-Sep-2018	✓	**09-Apr-2018**	30-Sep-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**06-Apr-2018**	30-Sep-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_030418	**03-Apr-2018**	**06-Apr-2018**	30-Sep-2018	✓	**06-Apr-2018**	30-Sep-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**11-Apr-2018**	01-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**03-Apr-2018**	05-Apr-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**11-Apr-2018**	01-May-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**11-Apr-2018**	01-May-2018	✓	**11-Apr-2018**	01-May-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**11-Apr-2018**	01-May-2018	✓	**11-Apr-2018**	01-May-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B	**03-Apr-2018**	**----**	----	----	**03-Apr-2018**	05-Apr-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B, WQA03_030418	**03-Apr-2018**	**05-Apr-2018**	10-Apr-2018	✓	**09-Apr-2018**	15-May-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B, WQA03_030418, WQA04_DB TBW 246	**03-Apr-2018**	**09-Apr-2018**	17-Apr-2018	✓	**09-Apr-2018**	17-Apr-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B, WQA03_030418	**03-Apr-2018**	**05-Apr-2018**	10-Apr-2018	✓	**09-Apr-2018**	15-May-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B, WQA03_030418, WQA04_DB TBW 246	**03-Apr-2018**	**09-Apr-2018**	17-Apr-2018	✓	**09-Apr-2018**	17-Apr-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3, GW-D4, BH10, T3B, T3C, T4C, T4B, WQA03_030418, WQA04_DB TBW 246	**03-Apr-2018**	**09-Apr-2018**	17-Apr-2018	✓	**09-Apr-2018**	17-Apr-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1805453**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 02-May-2018
Site	: ----	Issue Date	: 10-May-2018
Sampler	: Danielle Sullivan	No. of samples received	: 11
Order number	: W81020-103	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP080/071: Total Petroleum Hydrocarbons	EP1805422--002	Anonymous	**C6 - C9 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EP1805422--002	Anonymous	**C6 - C10 Fraction**	C6_C10	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080: BTEXN	EP1805422--002	Anonymous	**Benzene**	71-43-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080: BTEXN	EP1805422--002	Anonymous	**Toluene**	108-88-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	28	3.57	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	1	28	3.57	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**08-May-2018**	29-Oct-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_020518, A2_020518, A2S_020518, WQA01_020518	**02-May-2018**	**07-May-2018**	29-Oct-2018	✓	**07-May-2018**	29-Oct-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA02_020518	**02-May-2018**	**07-May-2018**	29-Oct-2018	✓	**07-May-2018**	29-Oct-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**07-May-2018**	29-Oct-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
BLNS-B1_020518, A2_020518, A2S_020518, WQA01_020518	**02-May-2018**	**07-May-2018**	29-Oct-2018	✓	**07-May-2018**	29-Oct-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-T)							
WQA02_020518	**02-May-2018**	**07-May-2018**	29-Oct-2018	✓	**07-May-2018**	29-Oct-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**02-May-2018**	30-May-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**02-May-2018**	04-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**02-May-2018**	30-May-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**09-May-2018**	30-May-2018	✓	**09-May-2018**	30-May-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**09-May-2018**	30-May-2018	✓	**09-May-2018**	30-May-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**----**	----	----	**02-May-2018**	04-May-2018	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
BLNS-B1_020518, A2_020518, A2S_020518, WQA01_020518	**02-May-2018**	**----**	----	----	**07-May-2018**	23-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP080)							
WQA02_020518	**02-May-2018**	**07-May-2018**	09-May-2018	✓	**07-May-2018**	09-May-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518	**02-May-2018**	**07-May-2018**	09-May-2018	✓	**08-May-2018**	16-Jun-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, WQA02_020518, D2_020518, D1_020518	**02-May-2018**	**08-May-2018**	09-May-2018	✓	**08-May-2018**	17-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**09-May-2018**	16-May-2018	✓	**09-May-2018**	16-May-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP080)							
WQA02_020518	**02-May-2018**	**07-May-2018**	09-May-2018	✓	**07-May-2018**	09-May-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518	**02-May-2018**	**07-May-2018**	09-May-2018	✓	**08-May-2018**	16-Jun-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, WQA02_020518, D2_020518, D1_020518	**02-May-2018**	**08-May-2018**	09-May-2018	✓	**08-May-2018**	17-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**09-May-2018**	16-May-2018	✓	**09-May-2018**	16-May-2018	✓
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080)							
WQA02_020518	**02-May-2018**	**07-May-2018**	09-May-2018	✓	**07-May-2018**	09-May-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_020518, A2_020518, A2S_020518, BH12_020518, GW-D3_020518, GW-D4_020518, GW-D8_020518, WQA01_020518, D2_020518, D1_020518	**02-May-2018**	**09-May-2018**	16-May-2018	✓	**09-May-2018**	16-May-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	5	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	28	**3.57**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	28	**3.57**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1805524**	Page	: 1 of 11
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 03-May-2018
Site	: ----	Issue Date	: 14-May-2018
Sampler	: Danielle Sullivan	No. of samples received	: 10
Order number	: W81020-103	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP1805520--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP1805520--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural KA_030518	----	----	----	08-May-2018	03-May-2018	**5**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) KA_030518	**03-May-2018**	**----**	----	----	**08-May-2018**	03-May-2018	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) KA_030518	**03-May-2018**	**----**	----	----	**08-May-2018**	31-May-2018	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) KA_030518	**03-May-2018**	**----**	----	----	**09-May-2018**	10-May-2018	✓
EA041: Colour (True)							
Clear Plastic Bottle - Natural (EA041) KA_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	05-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA075: Redox Potential							
Clear Plastic Bottle - Natural (EA075)							
KA_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	03-May-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
KA_030518	**03-May-2018**	**----**	----	----	**08-May-2018**	17-May-2018	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038)							
KA_030518	**03-May-2018**	**----**	----	----	**08-May-2018**	17-May-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
KA_030518	**03-May-2018**	**----**	----	----	**11-May-2018**	31-May-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
KA_030518	**03-May-2018**	**----**	----	----	**11-May-2018**	31-May-2018	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
KA_030518	**03-May-2018**	**----**	----	----	**09-May-2018**	10-May-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**09-May-2018**	30-Oct-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_030518	**03-May-2018**	**09-May-2018**	30-Oct-2018	✓	**09-May-2018**	30-Oct-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**09-May-2018**	30-Oct-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_030518	**03-May-2018**	**09-May-2018**	30-Oct-2018	✓	**09-May-2018**	30-Oct-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	31-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	05-May-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	31-May-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**10-May-2018**	31-May-2018	✓	**10-May-2018**	31-May-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**10-May-2018**	31-May-2018	✓	**10-May-2018**	31-May-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
T3B_030518, T4B_030518, T3C_030518, T4C_030518, GW-D5_030518, GW-T3E-A_030518, WQA01_030518, BH10_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	05-May-2018	✓
EP025: Oxygen - Dissolved (DO)							
Clear Plastic Bottle - Natural (EP025)							
KA_030518	**03-May-2018**	**----**	----	----	**03-May-2018**	03-May-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
T3B_030518, T3C_030518, GW-D5_030518, WQA01_030518, BH10_030518, T4B_030518, T4C_030518, GW-T3E-A_030518, WQA03_030518,	**03-May-2018**	**09-May-2018**	10-May-2018	✓	**10-May-2018**	18-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_030518, T3C_030518, GW-D5_030518, WQA01_030518, BH10_030518, T4B_030518, T4C_030518, GW-T3E-A_030518, WQA03_030518,	**03-May-2018**	**10-May-2018**	17-May-2018	✓	**10-May-2018**	17-May-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
T3B_030518, T3C_030518, GW-D5_030518, WQA01_030518, BH10_030518, T4B_030518, T4C_030518, GW-T3E-A_030518, WQA03_030518,	**03-May-2018**	**09-May-2018**	10-May-2018	✓	**10-May-2018**	18-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_030518, T3C_030518, GW-D5_030518, WQA01_030518, BH10_030518, T4B_030518, T4C_030518, GW-T3E-A_030518, WQA03_030518,	**03-May-2018**	**10-May-2018**	17-May-2018	✓	**10-May-2018**	17-May-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
T3B_030518, T3C_030518, GW-D5_030518, WQA01_030518, BH10_030518, T4B_030518, T4C_030518, GW-T3E-A_030518, WQA03_030518,	**03-May-2018**	**10-May-2018**	17-May-2018	✓	**10-May-2018**	17-May-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Colour (True)	EA041	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oxygen - Dissolved	EP025	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Redox Potential	EA075	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Colour (True)	EA041	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Colour (True)	EA041	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Colour (True)	EA041	WATER	In house: Referenced to APHA 2120 B. This method is compliant with NEPM (2013) Schedule B(3)
Redox Potential	EA075	WATER	In house: Ion selective electrode
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Oxygen - Dissolved	EP025	WATER	In house: Referenced to APHA 4500-O G. Dissolved Oxygen Probe. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1806724**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MRIA - R8 Rehab	Date Samples Received	: 31-May-2018
Site	: ----	Issue Date	: 11-Jun-2018
Sampler	: ----	No. of samples received	: 5
Order number	: W81020-103	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**07-Jun-2018**	27-Nov-2018	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18, WQA03_31_05_18	**31-May-2018**	**07-Jun-2018**	27-Nov-2018	✓	**07-Jun-2018**	27-Nov-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**07-Jun-2018**	27-Nov-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093B-T)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18, WQA03_31_05_18	**31-May-2018**	**07-Jun-2018**	27-Nov-2018	✓	**07-Jun-2018**	27-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	28-Jun-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	02-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	28-Jun-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**07-Jun-2018**	28-Jun-2018	✓	**07-Jun-2018**	28-Jun-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**07-Jun-2018**	28-Jun-2018	✓	**07-Jun-2018**	28-Jun-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	02-Jun-2018	✓
EP008: Chlorophyll a & Pheophytin a							
Glass Fibre Filter Paper (Chlorophyll) (EP008)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**----**	----	----	**07-Jun-2018**	21-Jun-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_31_05_18	**31-May-2018**	**05-Jun-2018**	07-Jun-2018	✓	**05-Jun-2018**	07-Jun-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18, WQA03_31_05_18	**31-May-2018**	**06-Jun-2018**	07-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**05-Jun-2018**	14-Jun-2018	✓	**05-Jun-2018**	14-Jun-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_31_05_18	**31-May-2018**	**05-Jun-2018**	07-Jun-2018	✓	**05-Jun-2018**	07-Jun-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18, WQA03_31_05_18	**31-May-2018**	**06-Jun-2018**	07-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**05-Jun-2018**	14-Jun-2018	✓	**05-Jun-2018**	14-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_31_05_18	**31-May-2018**	**05-Jun-2018**	07-Jun-2018	✓	**05-Jun-2018**	07-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BLNS-B1_31_05_18, A2_31_05_18, A2S_31_05_18, WQA02_31_05_18	**31-May-2018**	**05-Jun-2018**	14-Jun-2018	✓	**05-Jun-2018**	14-Jun-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1806777**	Page	: 1 of 6
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Klinton Breese	Telephone	: 08 9406 1328
Project	: MDC	Date Samples Received	: 01-Jun-2018
Site	: ----	Issue Date	: 08-Jun-2018
Sampler	: LF	No. of samples received	: 1
Order number	: W81020-103	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
PB-East	----	----	----	07-Jun-2018	01-Jun-2018	**6**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	01-Jun-2018	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	29-Jun-2018	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	08-Jun-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	15-Jun-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	29-Jun-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	29-Jun-2018	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
PB-East	**01-Jun-2018**	**----**	----	----	**06-Jun-2018**	08-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	28-Nov-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
PB-East	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	28-Nov-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	6	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1806776**	Page	: 1 of 9
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 01-Jun-2018
Site	: ----	Issue Date	: 12-Jun-2018
Sampler	: Tim Williamson	No. of samples received	: 13
Order number	: W81020-103	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**----**	----	----	**07-Jun-2018**	28-Nov-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_01_06_18	**01-Jun-2018**	**08-Jun-2018**	28-Nov-2018	✓	**08-Jun-2018**	28-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**----**	----	----	**01-Jun-2018**	29-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**----**	----	----	**01-Jun-2018**	03-Jun-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**----**	----	----	**01-Jun-2018**	29-Jun-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**08-Jun-2018**	29-Jun-2018	✓	**08-Jun-2018**	29-Jun-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**08-Jun-2018**	29-Jun-2018	✓	**08-Jun-2018**	29-Jun-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**----**	----	----	**01-Jun-2018**	03-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, WQA03_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**06-Jun-2018**	08-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_01_06_18	**01-Jun-2018**	**08-Jun-2018**	08-Jun-2018	✓	**08-Jun-2018**	08-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**08-Jun-2018**	15-Jun-2018	✓	**08-Jun-2018**	15-Jun-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, WQA03_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**06-Jun-2018**	08-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_01_06_18	**01-Jun-2018**	**08-Jun-2018**	08-Jun-2018	✓	**08-Jun-2018**	08-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**08-Jun-2018**	15-Jun-2018	✓	**08-Jun-2018**	15-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080)							
WQA03_01_06_18	**01-Jun-2018**	**08-Jun-2018**	08-Jun-2018	✓	**08-Jun-2018**	08-Jun-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_01_06_18, GW-D4_01_06_18, GW-D5_01_06_18, GW-D8_01_06_18, T3B_01_06_18, T3C_01_06_18, BH10_01_06_18, BH12_01_06_18, GW-T3E-A_01_06_18, WQA01_01_06_18, D1_01_06_18, D2_01_06_18	**01-Jun-2018**	**08-Jun-2018**	15-Jun-2018	✓	**08-Jun-2018**	15-Jun-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1807736**	Page	: 1 of 8
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 27-Jun-2018
Site	: ----	Issue Date	: 04-Jul-2018
Sampler	: D. Sullivan	No. of samples received	: 12
Order number	: W81020-103	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EP1807691--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D5_27_06_18, T3B_27_06_18, T4B_27_06_18, T4C_27_06_18, D2_27_06_18, D1_27_06_18, GW-T3E-A_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**04-Jul-2018**	24-Dec-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_27_06_18	**27-Jun-2018**	**04-Jul-2018**	24-Dec-2018	✓	**04-Jul-2018**	24-Dec-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG093B-F)							
GW-D5_27_06_18, T3B_27_06_18, T4B_27_06_18, T4C_27_06_18, D2_27_06_18, D1_27_06_18, GW-T3E-A_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**04-Jul-2018**	24-Dec-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-T)							
WQA03_27_06_18	**27-Jun-2018**	**04-Jul-2018**	24-Dec-2018	✓	**04-Jul-2018**	24-Dec-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**27-Jun-2018**	25-Jul-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**27-Jun-2018**	29-Jun-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**27-Jun-2018**	25-Jul-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**04-Jul-2018**	25-Jul-2018	✓	**04-Jul-2018**	25-Jul-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**04-Jul-2018**	25-Jul-2018	✓	**04-Jul-2018**	25-Jul-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18	**27-Jun-2018**	**----**	----	----	**27-Jun-2018**	29-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, WQA03_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18,	**27-Jun-2018**	**29-Jun-2018**	04-Jul-2018	✓	**02-Jul-2018**	08-Aug-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, WQA03_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18,	**27-Jun-2018**	**29-Jun-2018**	11-Jul-2018	✓	**29-Jun-2018**	11-Jul-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, WQA03_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18,	**27-Jun-2018**	**29-Jun-2018**	04-Jul-2018	✓	**02-Jul-2018**	08-Aug-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, WQA03_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18,	**27-Jun-2018**	**29-Jun-2018**	11-Jul-2018	✓	**29-Jun-2018**	11-Jul-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D5_27_06_18, T4B_27_06_18, D2_27_06_18, GW-T3E-A_27_06_18, WQA03_27_06_18, T3B_27_06_18, T4C_27_06_18, D1_27_06_18, WQA01_27_06_18,	**27-Jun-2018**	**29-Jun-2018**	11-Jul-2018	✓	**29-Jun-2018**	11-Jul-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	15	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	15	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1807774**	Page	: 1 of 9
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Telephone	: 08 9406 1328
Project	: MRIA (Roe 8 Rehab)	Date Samples Received	: 28-Jun-2018
Site	: ----	Issue Date	: 05-Jul-2018
Sampler	: D Sullivan	No. of samples received	: 10
Order number	: W81020-103	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EP1807761--002	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	EP1807761--002	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP008: Chlorophyll a & Pheophytin a						
White Plastic Bottle - Unpreserved						
BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	----	----	----	02-Jul-2018	30-Jun-2018	**2**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Chlorophyll a and Pheophytin a	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	15	6.67	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**04-Jul-2018**	25-Dec-2018	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
WQA03_28_06_18	**28-Jun-2018**	**03-Jul-2018**	25-Dec-2018	✓	**03-Jul-2018**	25-Dec-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**04-Jul-2018**	25-Dec-2018	✓	**04-Jul-2018**	25-Dec-2018	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG093B-F)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**04-Jul-2018**	25-Dec-2018	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG093B-T)							
BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**04-Jul-2018**	25-Dec-2018	✓	**04-Jul-2018**	25-Dec-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**28-Jun-2018**	26-Jul-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**28-Jun-2018**	30-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**28-Jun-2018**	26-Jul-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**04-Jul-2018**	26-Jul-2018	✓	**04-Jul-2018**	26-Jul-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**04-Jul-2018**	26-Jul-2018	✓	**04-Jul-2018**	26-Jul-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**28-Jun-2018**	30-Jun-2018	✓
EP008: Chlorophyll a & Pheophytin a							
White Plastic Bottle - Unpreserved (EP008)							
BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18	**28-Jun-2018**	**----**	----	----	**02-Jul-2018**	30-Jun-2018	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18, WQA03_28_06_18	**28-Jun-2018**	**02-Jul-2018**	05-Jul-2018	✓	**02-Jul-2018**	11-Aug-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18, WQA03_28_06_18	**28-Jun-2018**	**03-Jul-2018**	12-Jul-2018	✓	**03-Jul-2018**	12-Jul-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18, WQA03_28_06_18	**28-Jun-2018**	**02-Jul-2018**	05-Jul-2018	✓	**02-Jul-2018**	11-Aug-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18, WQA03_28_06_18	**28-Jun-2018**	**03-Jul-2018**	12-Jul-2018	✓	**03-Jul-2018**	12-Jul-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW-D3_28_06_18, GW-D4_28_06_18, GW-D8_28_06_18, BH10_28_06_18, BH12_28_06_18, BLNS-B1_28_06_18, A2_28_06_18, A2S_28_06_18, WQA02_28_06_18, WQA03_28_06_18	**28-Jun-2018**	**03-Jul-2018**	12-Jul-2018	✓	**03-Jul-2018**	12-Jul-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	0	4	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chlorophyll a and Pheophytin a	EP008	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020 Samples are 0.45µm filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Chlorophyll a and Pheophytin a	EP008	WATER	In house: Referenced to APHA 10200 H. The pigments are extracted into aqueous acetone. The optical density of the extract before and after acidification at both 664 nm and 665 nm is determined spectrometrically.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP1806725**	Page	: 1 of 7
Amendment	: **1**		
Client	: **MRIA**	Laboratory	: Environmental Division Perth
Contact	: Chris McGraghan	Telephone	: 08 9406 1328
Project	: 60478410	Date Samples Received	: 31-May-2018
Site	: ----	Issue Date	: 13-Jun-2018
Sampler	: Tim Williamson	No. of samples received	: 2
Order number	: W81020-103	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**----**	----	----	**07-Jun-2018**	27-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	28-Jun-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	02-Jun-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	28-Jun-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**07-Jun-2018**	28-Jun-2018	✓	**07-Jun-2018**	28-Jun-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**07-Jun-2018**	28-Jun-2018	✓	**07-Jun-2018**	28-Jun-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**----**	----	----	**31-May-2018**	02-Jun-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**06-Jun-2018**	07-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**06-Jun-2018**	14-Jun-2018	✓	**06-Jun-2018**	14-Jun-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**06-Jun-2018**	07-Jun-2018	✓	**07-Jun-2018**	16-Jul-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**06-Jun-2018**	14-Jun-2018	✓	**06-Jun-2018**	14-Jun-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
T4B_31_05_18, T4C_31_05_18	**31-May-2018**	**06-Jun-2018**	14-Jun-2018	✓	**06-Jun-2018**	14-Jun-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Appendix D: Calibration Records

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

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www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: YSIProDSS-1P

Serial Number: 15G100712 (Display)

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	✓	
YSI 4 port Sonde	✓	
- YSI pH / ORP probe	✓	
- YSI-Turbidity Probe	✓	
- YSI Cond/Temp Probe	✓	
- YSI ODO Sensor	✓	
Flow Cell	✓	
Probe Guard & weight	✓	
Storage/Calibration Sleeve (with Gasket)	✓	
Charger & PC Cable	✓	
Instruction Manual & Field Sheets	✓	
Battery Charged 100%	✓	

SENSOR CALIBRATION DETAILS

		Calibration Undertaken		Accuracy	Pass	Fail
Temperature		Factory Calibrated		±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation		±2%	✓	
		Pressure Compensation		1008.9 hPa	✓	
Conductivity	✓	1288mS/cm		±0.5%	✓	
	✓	Check linearity at 1.4mS/cm		±0.5%	✓	
Salinity		Auto Calibrated		±1%	✓	
pH	✓	pH 7.00		± 0.2	✓	
	✓	pH 4.00		± 0.2	✓	
ORP	✓	244 mV at 18	°C	±20mV	✓	
Turbidity		0, 124 NTU / FNU Sonde – 15H101896				

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Paul Goodgame

ECO Environmental Equipment Specialist

Date: 22.06.2017

ECO Environmental

Environmental monitoring
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Rentals and sales.

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214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: YSIProDSS-1P

Serial Number: 15G100712 (Display)

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	✓	
YSI 4 port Sonde	✓	
- YSI pH / ORP probe	✓	
- YSI-Turbidity Probe	✓	
- YSI Cond/Temp Probe	✓	
- YSI ODO Sensor	✓	
Flow Cell	✓	
Probe Guard & weight	✓	
Storage/Calibration Sleeve (with Gasket)	✓	
Charger & PC Cable	✓	
Instruction Manual & Field Sheets	✓	
Battery Charged 100%	✓	

SENSOR CALIBRATION DETAILS

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		Factory Calibrated	±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation	±2%	✓	
		Pressure Compensation 1020 hPa		✓	
Conductivity	✓	1288mS/cm	±0.5%	✓	
	✓	Check linearity at 1.4mS/cm	±0.5%	✓	
Salinity		Auto Calibrated	±1%	✓	
pH	✓	pH 7.00	± 0.2	✓	
	✓	pH 4.00	± 0.2	✓	
ORP	✓	244 mV at 18 °C	±20mV	✓	
Turbidity		0, 124 NTU / FNU Sonde – 15H101896			

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Mitch Lawson

ECO Environmental Equipment Specialist

Date: 17.07.2017

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Buidling Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	M. O'Rourke	**Fieldwork Staff Name:**	TW, LF

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	ECO Environmental
Make and Model:	YSI Pro DSS
Serial Number:	15G103303

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Parameter	Acidity		Conductivity	Dissolved Oxygen	
Date and Time:					
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Parameter	Acidity		Conductivity	~~Dissolved Oxygen~~ ORP	
Date and Time:					
Units	pH	pH	µS/cm	~~ppm~~ mV	ppm
Calibration Standard Concentration:	7.04 @ 15°C	4.0 @ 15°C	1413 @ 15°C	251 @ 15°C	
Bump Test Reading:	7.11	4.10	1142	246.7	
Bump Test Temperature:	15.9	15.6	15.6	15.4	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

26/7/17
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Buidling Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	M. O'Rourke	**Fieldwork Staff Name:**	TW, LF

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	ECO
Make and Model:	YSI Pro DSS
Serial Number:	15G103303

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	12/7/17. @ 7:00AM.				
Parameter	Acidity		Conductivity	~~Dissolved Oxygen~~	
Units	pH 4	pH 7	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.	7	1413	251 mV	
Calibration Reading:	4.07.	7.03	1407.	253 mV	
Calibration Temperature:	15.7	15.7	15.7	15.7	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature **Date**

Distribution: Project Central File

ECO Environmental

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& sampling equipment
Rentals and sales.

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www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: YSIProDSS-1P

Serial Number: 15G100712 (Display)

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	✓	
YSI 4 port Sonde	✓	
- YSI pH / ORP probe	✓	
- YSI-Turbidity Probe	✓	
- YSI Cond/Temp Probe	✓	
- YSI ODO Sensor	✓	
Flow Cell	✓	
Probe Guard & weight	✓	
Storage/Calibration Sleeve (with Gasket)	✓	
Charger & PC Cable	✓	
Instruction Manual & Field Sheets	✓	
Battery Charged 100%	✓	

SENSOR CALIBRATION DETAILS

		Calibration Undertaken		Accuracy	Pass	Fail
Temperature		Factory Calibrated		±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation		±2%	✓	
		Pressure Compensation		1031 hPa	✓	
Conductivity	✓	1288mS/cm		±0.5%	✓	
	✓	Check linearity at 1.4mS/cm		±0.5%	✓	
Salinity		Auto Calibrated		±1%	✓	
pH	✓	pH 7.00		± 0.2	✓	
	✓	pH 4.00		± 0.2	✓	
ORP	✓	251 mV at 15	°C	±20mV	✓	
Turbidity		0, 124 NTU / FNU				
		Sonde – 15H101896				

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Mitch Lawson

ECO Environmental Equipment Specialist

Date: 29.06.2017

ECO Environmental

Environmental monitoring
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214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: YSIProDSS-1P

Serial Number: 15G100712 (Display)

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	✓	
YSI 4 port Sonde	✓	
- YSI pH / ORP probe	✓	
- YSI-Turbidity Probe	✓	
- YSI Cond/Temp Probe	✓	
- YSI ODO Sensor	✓	
Flow Cell	✓	
Probe Guard & weight	✓	
Storage/Calibration Sleeve (with Gasket)	✓	
Charger & PC Cable	✓	
Instruction Manual & Field Sheets	✓	
Battery Charged 100%	✓	

SENSOR CALIBRATION DETAILS

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		Factory Calibrated	±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation	±2%	✓	
		Pressure Compensation	1022.3 hPa	✓	
Conductivity	✓	1288mS/cm	±0.5%	✓	
	✓	Check linearity at 1.4mS/cm	±0.5%	✓	
Salinity		Auto Calibrated	±1%	✓	
pH	✓	pH 7.00	± 0.2	✓	
	✓	pH 4.00	± 0.2	✓	
ORP	✓	249 mV at 16 °C	±20mV	✓	
Turbidity		0, 124 NTU / FNU Sonde – 15H101896			

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Kane Jackson

ECO Environmental Equipment Specialist

Date: 04.08.2017

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Buidling Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	M. O'Rourke	**Fieldwork Staff Name:**	TW, LF

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	9/8/17 9:55am				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	~~25C~~ µS/cm	~~ppm~~ mV	ppm
Calibration Standard Concentration:	4.0 @ 15°C	7.0 @ 15°C	1413 @ 25	262 @ 10°C	
Bump Test Reading:	4.07	7.07	1407	264.2	
Bump Test Temperature:	11.1°C	11°	11.1°C	11.1°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature _____ Date _____

Distribution: Project Central File

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature **Date**

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	25/08/17				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 15°C	7.04 @ 15°C	12880 @ 25°C	251 @ 15°C	
Bump Test Reading:	4.04	7.02	12805 (SPC)	247.9	
Bump Test Temperature:	17.6°C	17.6°C	17.7	17.6	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

25/8/17
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	YSI PRO DSS
Serial Number:	17H10 1156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	6 September 2017				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	~~ppm~~ mV	ppm
Calibration Standard Concentration:	4.0 @ 15°C	7.04 @ 15°C	12880 25°C	251 @ 15°C	262 @ 10°C
Bump Test Reading:	4.02	7.03	SPC 12930	261	
Bump Test Temperature:	11.7°C	11.8°C	12.2°C	11.6°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature _____ Date _____

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	RC

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	YSI PRO DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 20°C	7.02 @ 20°C	12880 @25	240 @ 20°C	
Bump Test Reading:	~~4.00~~ 4.01	7.03	12871 SPC	238.5	
Bump Test Temperature:	19.3°C	18.2°C	18.4°C	18.7°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

26/9/17
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.00 @ 20°C	7.02 @ 20°C	10882 @ 17°C	240 @ 20°C	
Calibration Reading:	4.00	7.02	10887	240.5	
Calibration Temperature:	17.8°C	17.9°C	17.7°C	17.8°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	2/11/17				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 20°C	7.02 @ 20°C	10882 @ 17°C	240 @ 20°C	
Bump Test Reading:	4.00	7.02	10887	240.5	
Bump Test Temperature:	17.8°C	17.9°C	17.7°C	17.8°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 2/11/2017

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	15/11/17 7:15am				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 15°C	7.04 @ 15°C	10480 @ 15°C	251 @ 15°C	
Bump Test Reading:	4.02	7.03	10697	246.4	
Bump Test Temperature:	16.6°C	16.3°C	16.3	16.2.	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature **Date**

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	RC

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	21/12/2017				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	mV
Units	pH	pH	µS/cm	~~ppm~~ mV	ppm
Calibration Standard Concentration:	4.01@25°	7.00@25°C	12880	229@25°C	
Calibration Reading:	4.03	7.01	13181	228.8	
Calibration Temperature:	25.1°C	24.8°C	26.3°C	26.7°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 21/12/2017

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	13/12/17				
Parameter	Acidity		Conductivity	~~ORP~~ ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ppm	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Calibration Reading:	4.02	7.01	13092	227.9	
Calibration Temperature:	24.9°C	24.8°C	25.4°C	25.6°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

13/01/17
Date

Distribution: Project Central File

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI PRO DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	10/01/18				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Bump Test Reading:	4.01	7.02	13157	228.9	
Bump Test Temperature:	24.6°C	25.1°C	25.6°C	24.9°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

10/01/2018
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	1/12/2017				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880	229 @ 25°C	
Bump Test Reading:	4.02	7.01	13014	228.6	
Bump Test Temperature:	24.8°C	24.7°C	24.8°C	25.1°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 1/12/17

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	4/10/2017				
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	4/10/2017				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 20°C	7.02 @ 20°C	11670 @ 20°C	240 @ 20°C	
Bump Test Reading:	3.99	7.01	11673	239.4	
Bump Test Temperature:	19.7°C	20.0°C	20.4°C	20.3°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 4/10/2017

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	18/10/2017				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.0 @ 20°C	7.02 @ 20°C	11670 @ 20°C	240 @ 20°C	
Bump Test Reading:	3.98	7.03	11675.4	243	
Bump Test Temperature:	17.8°C	17.7°C	17.5°C	17.6°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature	Date
	18/10/2017

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	RC

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	24/01/2018				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Bump Test Reading:	4.01	7.02	12985	228.7	
Bump Test Temperature:	25.2	25.1	24.8	25.1	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature	Date: 24/01/18

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	RC

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	6/2/2018				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Bump Test Reading:	4.00	7.01	13068	228.7	
Bump Test Temperature:	24.8°C	25.1°C	25.3°C	24.9°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

6/02/2018
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	22/2/18				
Parameter	Acidity		Conductivity	ORP	~~Dissolved Oxygen~~
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Calibration Reading:	4.01	7.00	12307	228.5	
Calibration Temperature:	24.9°C	25.1°C	24.8°C	24.7°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 22/2/18

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI Pro DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	8/3/2018				
Parameter	Acidity		Conductivity	ORP	~~Dissolved Oxygen~~
Units	pH	pH	µS/cm	~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Calibration Reading:	4.00	7.01	12987	227.9	
Calibration Temperature:	24.9°C	25.1°C	24.8°C	24.3°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature	Date
	8/3/2018

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI PRO DSS
Serial Number:	17H 101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Calibration Reading:					
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	22/3/2018				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.01 @ 25°C	7.00 @ 25°C	12880 @ 25°C	229 @ 25°C	
Bump Test Reading:	3.99	7.02	12631	231	
Bump Test Temperature:	23.1°C	23.1°C	22.8°C	23.2°C	

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

22/3/18
Date

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	RC

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI PRO DSS
Serial Number:	17H101158

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	3/4/18				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.00 @ 20°C	7.02 @ 20°C	11670 @ 20°C	240 @ 20°C	
Calibration Reading:	4.00	7.02	11603	237.5	
Calibration Temperature:	19.7°C	19.9°C	20.3°C	19.8°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — Date: 3/4/18

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	YSI
Make and Model:	YSI PRO DSS
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	18/4/18				
Parameter	Acidity		Conductivity	ORP ~~Dissolved Oxygen~~	
Units	pH	pH	µS/cm	mV ~~ppm~~	ppm
Calibration Standard Concentration:	4.00 @ 20°C	7.02 @ 20°C	11670 @ 20°C	240 @ 20°C	
Calibration Reading:	4.00	7.02	11631	235.7	
Calibration Temperature:	19.8°C	20.0°C	19.9°C	19.8°C	

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

18/4/18.
Date

Distribution: Project Central File

Water Quality Meter Calibration Record

Project Name:	Roe 8 Environmental Monitoring	**Project:**	MRIA DCT
Project Location:	Bibra Lake	**Client:**	Main Roads
PM Name:	Linda Kirchner	**Fieldwork Staff Name:**	DS & SD

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	Pro DSS YSI
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	7:24am 27/06/18				
Parameter	Acidity		Conductivity	Redox ~~Dissolved Oxygen~~ (mV)	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:	20°C@7.02	20°C@4.01	25°C@58.0	~~25°C@240~~	20°C@240
Calibration Reading:	14.9°C@7.01	15.1°C@3.59	15°C@44406		15°C@236.4
Calibration Temperature:					

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature — **Date** 27/06/18

Distribution: Project Central File

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	**Project Number:**	60478410
Project Location:	Beeliar Wetlands	**Client:**	Main Roads
PM Name:	Chris McGraghan	**Fieldwork Staff Name:**	Shannon DeMelo & D. Sullivan

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	Pro DSS Professional Series YSI
Serial Number:	17H101156

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	16 May 2018 7:00 am				
Parameter	Acidity		Conductivity	(ORP) ~~Dissolved Oxygen~~	Redox (mV)
Units	pH	pH	µS/cm	~~ppm~~	~~ppm~~
Calibration Standard Concentration:	4 at 15°C	7 @ 25°C	~~12.88~~ @25°C		229 mV @ 25°C
Calibration Reading:	3.89	7.11	9717		247.0
Calibration Temperature:	12.3°C	12.8°C	13°C		12.7°C

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

- None
- EC, pH, Redox calibrated.

Approval and Distribution

☑ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature

16 May 2018
Date

Distribution: Project Central File

ANZ

AECOM

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	Building Roe 8	Project Number:	60478410
Project Location:	Beeliar Wetlands	Client:	Main Roads
PM Name:	Chris McGraghan	Fieldwork Staff Name:	Shannon De Melo & Dann Sullivan

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	
Make and Model:	
Serial Number:	

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:					
Parameter	Acidity		Conductivity	~~Dissolved Oxygen~~ Redox (mV)	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:			58.0 @ 25°C		
Calibration Reading:			43018		
Calibration Temperature:			11.6°C		

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:					
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:					
Bump Test Reading:					
Bump Test Temperature:					

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

Approval and Distribution

☐ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

Fieldwork Staff Signature _____ Date _____

Distribution: Project Central File