

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2005328	Page	: 1 of 15
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 25-May-2020
Site	: ----	Issue Date	: 03-Jun-2020
Sampler	: DS + SI	No. of samples received	: 31
Order number	: 61041.0831	No. of samples analysed	: 31

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 Northern 5, BORR_MW18, BORR_MW39, JT01, BH11.1, BORR_MW19, BORR_MW19b, FD02, Northern 3, FD03, BORR_MW24, BORR_MW25, BORR_MW20, BORR_MW15	----	----	----	28-May-2020	20-May-2020	8
Clear Plastic Bottle - Natural Southern 4, BORR_MW12, MR_MW05, BORR_MW13, North Creek 2, BH32.1, SW09, SW07, SW08, BORR_MW09, BORR_MW10	----	----	----	28-May-2020	21-May-2020	7
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural Northern 5, BORR_MW18, BORR_MW39, JT01, BH11.1, BORR_MW19, BORR_MW19b, FD02, Northern 3, FD03, BORR_MW24, BORR_MW25, BORR_MW20, BORR_MW15	----	----	----	25-May-2020	22-May-2020	3
Clear Plastic Bottle - Natural Southern 4, BORR_MW12, MR_MW05, BORR_MW13, North Creek 2, BH32.1, SW09, SW07, SW08, BORR_MW09, BORR_MW10	----	----	----	25-May-2020	23-May-2020	2



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) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	28-May-2020	20-May-2020	*
Clear Plastic Bottle - Natural (EA005-P) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	28-May-2020	21-May-2020	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	28-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Natural (EA010-P) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	28-May-2020	18-Jun-2020	✓



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	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	27-May-2020	27-May-2020	✓
Clear Plastic Bottle - Natural (EA015H) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	27-May-2020	28-May-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	28-May-2020	03-Jun-2020	✓
Clear Plastic Bottle - Natural (ED037-P) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	28-May-2020	04-Jun-2020	✓



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	
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	27-May-2020	03-Jun-2020	✓
Clear Plastic Bottle - Natural (ED038) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	27-May-2020	04-Jun-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	25-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Natural (ED041G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	25-May-2020	18-Jun-2020	✓



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	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	25-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Natural (ED045G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	25-May-2020	18-Jun-2020	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	26-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	26-May-2020	18-Jun-2020	✓



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) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	26-May-2020	16-Nov-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	26-May-2020	17-Nov-2020	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW25, BORR_MW15	BORR_MW18, JT01, BORR_MW19, FD02, FD03, RB03, BORR_MW20,	20-May-2020	26-May-2020	16-Nov-2020	✓	26-May-2020	16-Nov-2020	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10,	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09, RB04	21-May-2020	26-May-2020	17-Nov-2020	✓	26-May-2020	17-Nov-2020	✓



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) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20, BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	25-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10, BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09	21-May-2020	----	----	----	25-May-2020	18-Jun-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20, BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	25-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10, BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09	21-May-2020	----	----	----	25-May-2020	18-Jun-2020	✓



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) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	27-May-2020	17-Jun-2020	✓	27-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	27-May-2020	18-Jun-2020	✓	27-May-2020	18-Jun-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	27-May-2020	17-Jun-2020	✓	27-May-2020	17-Jun-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	27-May-2020	18-Jun-2020	✓	27-May-2020	18-Jun-2020	✓



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) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	25-May-2020	22-May-2020	*
Clear Plastic Bottle - Natural (EK071G) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	25-May-2020	23-May-2020	*
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) Northern 5, BORR_MW39, BH11.1, BORR_MW19b, Northern 3, BORR_MW24, BORR_MW20,	BORR_MW18, JT01, BORR_MW19, FD02, FD03, BORR_MW25, BORR_MW15	20-May-2020	----	----	----	27-May-2020	27-May-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) Southern 4, MR_MW05, North Creek 2, SW09, SW08, BORR_MW10	BORR_MW12, BORR_MW13, BH32.1, SW07, BORR_MW09,	21-May-2020	----	----	----	27-May-2020	28-May-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) FB03,	TBW421	20-May-2020	29-May-2020	03-Jun-2020	✓	29-May-2020	03-Jun-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW413,	FB04	21-May-2020	29-May-2020	04-Jun-2020	✓	29-May-2020	04-Jun-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) FB03,	TBW421	20-May-2020	29-May-2020	03-Jun-2020	✓	29-May-2020	03-Jun-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW413,	FB04	21-May-2020	29-May-2020	04-Jun-2020	✓	29-May-2020	04-Jun-2020	✓

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 Project : 6137041



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) FB03,	TBW421	20-May-2020	29-May-2020	03-Jun-2020	✓	29-May-2020	03-Jun-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW413,	FB04	21-May-2020	29-May-2020	04-Jun-2020	✓	29-May-2020	04-Jun-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	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
Major Cations - Dissolved	ED093F	4	34	11.76	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
pH by PC Titrator	EA005-P	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	36	11.11	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	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
Major Cations - Dissolved	ED093F	2	34	5.88	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
pH by PC Titrator	EA005-P	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	36	11.11	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	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
Major Cations - Dissolved	ED093F	2	34	5.88	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	36	5.56	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	29	6.90	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	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260D 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)
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.

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESdat set up; no spaces)
6137041

PO Number (to be invoiced)
61041.0831

Laboratory: *ALS laboratories*
Address: *26 Rigali way, Ulas*
Laboratory Contact: *Marnie Thompson*

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S - Soil / SL - Sludge / W - Water / A - Air	Container				groundwater suite	surface water suite	rinse	trip blank	field blank	Analyses	Remarks
					Type: B - Bottle / Jar / Y - Yield / Bag / G - Glass / P - Plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / Other	No								
Northern 5	1	20.5.20		W	B	-	5		X						
BORR_MW18	2							X							
BORR_MW39	3							X							
JT01	4								X						
BH11.1	5							X							
BORR_MW19	6							X							
BORR_MW196	7							X							
FDO2	8							X							
Northern 3	9								X						
FDO3	10								X						
BORR_MW24	11			↓	↓	↓	↓	X							
RB03	12			W	B	-	1			X					
FB03	13			W	B	-	1					X			
TBW421	14			W	B	-	1				X				
BORR_MW25	15			W	B	-	5	X							
BORR_MW20	16			W	B	-	5	X							
BORR_MW15	17							X							

Environmental Division
Perth
Work Order Reference
EP2005328



Telephone: +61-8-9406 1301

Sampled by: DS + SI

Date/Time: 2015-21/5

Relinquished by: DS + SI

Date/Time: 21/5/20

Received by: *NO*

Date/Time: 25-5-2020

Relinquished by:

Date/Time:

10:30

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESDat set up; no spaces)
6137041

PO Number (to be invoiced)
61041.0831

Laboratory: ACS Laboratories

Address: 20 Rigali Way

Laboratory Contact: Maime Thompson

Laboratory Quote No.

EP/489/19 v4

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts

Julia Roberts

Email Address (Results)

dominique.shott@ghd.com
vicki.davies@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time
---------------	---------------	------	------

Sample Matrix S-Soil/SL
Sludge/W-Water/A-Air

Container

Type B-Boyle/Bar/V Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No
--	--	----

Surface Water	Groundwater Suite	Rinse	Field blank	mp blank
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Analyses

Remarks

Southern 4	18	21/5/20		W	B	-	5	X											
TBW 413	19	21/5/20		W	B	-	1								X				
BORR_MW12	20	21/5/20		W	B	-	5		X										
MR_MW05	21	21/5/20		W	B	-	5		X										
BORR_MW13	22	21/5/20		W	B	-	5		X										
North Creek 2	23	21/5/20		W	B	-	5	X											ran out of Syringes - please filter at lab.
BH32.1	24	21/5/20		W	B	-	5		X										(North Creek 2)
SW09	25	21/5/20		W	B	-	5	X											
SW07	26	21/5/20		W	B	-	5	X											
SW08	27	21/5/20		W	B	-	5	X											
BORR_MW09	28	21/5/20		W	B	-	5			X									
BORR_MW10	29	21/5/20		W	B	-	5			X									
Southern 3	20	21/5/20		W	B	-	5	X											
RB04	30	21/5/20		W	B	-	1				X								
FB04	31	21/5/20		W	B	-	1					X							

Sampled by: DS + SI

Date/Time:

21/5/20

Relinquished by:

DS + SI

Date/Time:

21/5/20

Received by:

ND

Date/Time:

25-5-2020

Relinquished by:

Date/Time:

10:30

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Dominique Shuttleworth**

Report **720880-W**

Project name

Project ID **6137041**

Received Date **May 21, 2020**

Client Sample ID			FS01
Sample Matrix			Water
Eurofins Sample No.			P20-My30624
Date Sampled			May 18, 2020
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	18
Chloride	1	mg/L	250
Conductivity (at 25°C)	10	uS/cm	1300
pH (at 25°C)	0.1	pH Units	7.0
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Sulphate (as SO ₄)	5	mg/L	100
Sulphide (as S)	0.05	mg/L	0.10
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	880
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	79
Carbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	79
Heavy Metals			
Arsenic	0.001	mg/L	0.002
Arsenic (filtered)	0.001	mg/L	0.001
Cadmium	0.0002	mg/L	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	0.009
Chromium (filtered)	0.001	mg/L	< 0.001
Copper	0.001	mg/L	0.003
Copper (filtered)	0.001	mg/L	< 0.001
Lead	0.001	mg/L	0.002
Lead (filtered)	0.001	mg/L	< 0.001
Mercury	0.0001	mg/L	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel	0.001	mg/L	0.002
Nickel (filtered)	0.001	mg/L	< 0.001
Zinc	0.005	mg/L	0.006
Zinc (filtered)	0.005	mg/L	< 0.005
Eurofins mgt Suite B11C: Na/K/Ca/Mg			
Calcium	0.5	mg/L	29
Magnesium	0.5	mg/L	20
Potassium	0.5	mg/L	6.9
Sodium	0.5	mg/L	200

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Perth	May 21, 2020	14 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Perth	May 21, 2020	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Perth	May 21, 2020	0 Hours
Phosphorus reactive (as P) - Method: APHA 4500-P	Melbourne	May 22, 2020	2 Days
Sulphide (as S) - Method: APHA 4500-S C & D - Sulphide	Melbourne	May 22, 2020	7 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS	Perth	May 21, 2020	180 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS	Perth	May 21, 2020	28 Days
Eurofins mgt Suite B11C: Na/K/Ca/Mg - Method: LTM-MET-3010 Alkali Metals, S, Si and P by ICP-AES	Perth	May 21, 2020	180 Days
Eurofins mgt Suite B11E: Cl/SO ₄ /Alkalinity Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	May 22, 2020	28 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	May 22, 2020	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Perth	May 21, 2020	14 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	May 22, 2020	7 Days

Australia

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6 Monterey Road
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NATA # 1261
Site # 1254 & 14271

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NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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NATA # 1261
Site # 23736

New Zealand

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Penrose, Auckland 1061
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IANZ # 1327

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Order No.: 61041.0831
Report #: 720880
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: May 21, 2020 8:55 AM
Due: May 28, 2020
Priority: 5 Day
Contact Name: Dominique Shuttleworth

Project Name:
Project ID: 6137041

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acidity (as CaCO3)	Conductivity (at 25°C)	pH (at 25°C)	Phosphorus reactive (as P)	Sulphide (as S)	Metals M8	Metals M8 filtered	Eurofins mgt Suite B11E: Cl/SO4/Alkalinity	Eurofins mgt Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271									X	X			X		X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736						X	X	X			X	X	X	X	X
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	FS01	May 18, 2020		Water	P20-My30624	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Acidity (as CaCO ₃)	mg/L	< 10			10	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO ₄)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.05			0.05	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Eurofins mgt Suite B11C: Na/K/Ca/Mg							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Acidity (as CaCO ₃)	%	99			70-130	Pass	
Chloride	%	110			70-130	Pass	
Conductivity (at 25°C)	%	102			70-130	Pass	
Phosphorus reactive (as P)	%	113			70-130	Pass	
Sulphate (as SO ₄)	%	101			70-130	Pass	
Sulphide (as S)	%	100			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	117			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO ₃)	%	104			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	110			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Arsenic (filtered)	%	97			80-120	Pass		
Cadmium	%	107			80-120	Pass		
Cadmium (filtered)	%	93			80-120	Pass		
Chromium	%	97			80-120	Pass		
Chromium (filtered)	%	86			80-120	Pass		
Copper	%	91			80-120	Pass		
Copper (filtered)	%	86			80-120	Pass		
Lead	%	101			80-120	Pass		
Lead (filtered)	%	93			80-120	Pass		
Mercury	%	111			70-130	Pass		
Mercury (filtered)	%	89			70-130	Pass		
Nickel	%	94			80-120	Pass		
Nickel (filtered)	%	84			80-120	Pass		
Zinc	%	97			80-120	Pass		
Zinc (filtered)	%	84			80-120	Pass		
LCS - % Recovery								
Eurofins mgt Suite B11C: Na/K/Ca/Mg								
Calcium	%	101			70-130	Pass		
Magnesium	%	105			70-130	Pass		
Potassium	%	104			70-130	Pass		
Sodium	%	110			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Chloride	M20-My33856	NCP	%	89		70-130	Pass	
Sulphate (as SO4)	S20-My34467	NCP	%	87		70-130	Pass	
Spike - % Recovery								
Alkalinity (speciated)								
				Result 1				
Total Alkalinity (as CaCO3)	P20-My31727	NCP	%	61		70-130	Fail	Q08
Spike - % Recovery								
Heavy Metals								
				Result 1				
Arsenic	P20-My30569	NCP	%	114		75-125	Pass	
Arsenic (filtered)	P20-My31726	NCP	%	115		70-130	Pass	
Cadmium	P20-My30569	NCP	%	101		75-125	Pass	
Cadmium (filtered)	P20-My31726	NCP	%	105		70-130	Pass	
Chromium	P20-My30569	NCP	%	93		75-125	Pass	
Chromium (filtered)	P20-My31726	NCP	%	98		70-130	Pass	
Copper	P20-My30569	NCP	%	82		75-125	Pass	
Copper (filtered)	P20-My31726	NCP	%	91		70-130	Pass	
Lead	P20-My30569	NCP	%	95		75-125	Pass	
Lead (filtered)	P20-My31726	NCP	%	101		70-130	Pass	
Mercury	P20-My30569	NCP	%	103		70-130	Pass	
Mercury (filtered)	P20-My31726	NCP	%	89		70-130	Pass	
Nickel	P20-My30569	NCP	%	84		75-125	Pass	
Nickel (filtered)	P20-My31726	NCP	%	90		70-130	Pass	
Zinc	P20-My30569	NCP	%	87		75-125	Pass	
Zinc (filtered)	P20-My31726	NCP	%	97		70-130	Pass	
Spike - % Recovery								
Eurofins mgt Suite B11C: Na/K/Ca/Mg								
				Result 1				
Calcium	P20-My30569	NCP	%	110		70-130	Pass	
Magnesium	P20-My30569	NCP	%	97		70-130	Pass	
Potassium	P20-My30569	NCP	%	95		70-130	Pass	
Sodium	P20-My33569	NCP	%	109		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Acidity (as CaCO ₃)	P20-My30568	NCP	mg/L	12	12	2.0	30%	Pass	
Chloride	P20-My31644	NCP	mg/L	80	88	10	30%	Pass	
Conductivity (at 25°C)	P20-My31726	NCP	uS/cm	790	760	4.0	30%	Pass	
pH (at 25°C)	P20-My31726	NCP	pH Units	5.9	5.9	<1	30%	Pass	
Sulphate (as SO ₄)	P20-My31644	NCP	mg/L	14	15	6.0	30%	Pass	
Sulphide (as S)	M20-My32337	NCP	mg/L	0.10	0.10	<1	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	P20-My31641	NCP	mg/L	540	520	4.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO ₃)	P20-My31726	NCP	mg/L	52	52	<1	30%	Pass	
Carbonate Alkalinity (as CaCO ₃)	P20-My31726	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO ₃)	P20-My31726	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO ₃)	P20-My31726	NCP	mg/L	52	52	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	P20-My30624	CP	mg/L	0.002	0.002	2.0	30%	Pass	
Arsenic (filtered)	P20-My30624	CP	mg/L	0.001	0.001	11	30%	Pass	
Cadmium	P20-My30624	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	P20-My30624	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	P20-My30624	CP	mg/L	0.009	0.009	<1	30%	Pass	
Chromium (filtered)	P20-My30624	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	P20-My30624	CP	mg/L	0.003	0.003	2.0	30%	Pass	
Copper (filtered)	P20-My30624	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	P20-My30624	CP	mg/L	0.002	0.002	<1	30%	Pass	
Lead (filtered)	P20-My30624	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	P20-My30624	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Mercury (filtered)	P20-My30624	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	P20-My30624	CP	mg/L	0.002	0.002	2.0	30%	Pass	
Nickel (filtered)	P20-My30624	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	P20-My30624	CP	mg/L	0.006	0.005	12	30%	Pass	
Zinc (filtered)	P20-My30624	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Eurofins mgt Suite B11C: Na/K/Ca/Mg				Result 1	Result 2	RPD			
Calcium	P20-My30624	CP	mg/L	29	29	1.0	30%	Pass	
Magnesium	P20-My30624	CP	mg/L	20	20	3.0	30%	Pass	
Potassium	P20-My30624	CP	mg/L	6.9	6.9	<1	30%	Pass	
Sodium	P20-My30624	CP	mg/L	200	200	2.0	30%	Pass	

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised By

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Rhys Thomas	Senior Analyst-Inorganic (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**Glenn Jackson
General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 1

Project ID (as per ESDat set up; no spaces)
6137041

PO Number (to be invoiced)
61041.0831

Laboratory: Eurofins Laboratory
Address: 91 Leach Highway
Laboratory Contact: Rob

Laboratory Quote No.

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts

Julia Roberts

Email Address (Results)

dominique.shuttleworth@ghd.com
vicki.davies@ghd.com

GHD Sample ID

Lab
Sample ID

Date

Time

FS01

18 5 20

Sample Matrix
S-Soil/ SL-
Sludge/ W-Water/ A-Air

W

Container

Type B-Bottle/Jar/W-
Vial/Bag/G-Glass/P-Plastic

B

Preservative

Unpreserved/ HCl/
H2SO4/HNO3/Other

-

No

5

Metals (B)
Total

X

Metals (B)
Dissolved

X

Cl, SO₄, alkalinity,
acidity, pH, EC,
TDS, Ca, mg, Na,
K, Reactive
phosphorus

~~X~~

Sulfide

X

Analyses

Remarks

HOLD

720880

*Please contact dom or
vicky davies if
you have
any queries*



Date/Time: 21/5/20 8:55
Chiller: _____
Temp: 8.6 °C / No
8.3
9.4
Correction: -1.4
Final Temp: 7.5 °C

Sampled by: DS/IO/SI

Date/Time: 18.5.20

Relinquished by: DS

Date/Time: 19.5.20

Received by: Rob Johnston Eurofins

Date/Time: 21/5/20 8:55

Relinquished by:

Date/Time:

CERTIFICATE OF ANALYSIS

Work Order : EP2006304 Client : GHD PTY LTD Contact : Julia Roberts Address : 999 HAY STREET PERTH WA, AUSTRALIA 6000 Telephone : ---- Project : 6137041 Order number : 61370410831 C-O-C number : ---- Sampler : DS/BS/SI Site : ---- Quote number : EP/489/19 V4 No. of samples received : 27 No. of samples analysed : 23	Page : 1 of 12 Laboratory : Environmental Division Perth Contact : Rebecca Shaw Address : 26 Rigali Way Wangara WA Australia 6065 Telephone : +61-8-9406 1301 Date Samples Received : 18-Jun-2020 13:40 Date Analysis Commenced : 18-Jun-2020 Issue Date : 26-Jun-2020 17:17
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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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- ED041G: LOR raised for sulphate on sample EP2006304-018 due to possible sample matrix interference.
- EK061G/EK067G (TKN/TP): LOR for sample EP2006304-009 raised due to possible sample matrix interference.
- EG020T: Results for aluminium for samples EP2006304-010, 011 have been confirmed by re-digestion and re-analysis.
- TDS by method EA-015 may bias high for sample #4 and 9 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper. Result has been confirmed by re-preparation and re-analysis.
- Ionic Balance out of acceptable limits for sample #14 due to analytes not quantified in this report. Major anions (ED041/45G) and major cations (ED093F) have been confirmed by re-preparation and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Ionic balances were calculated using: major anions - chloride, alkalinity, sulfate and NOx; and major cations - calcium, magnesium, potassium and sodium for #9.
- 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	BH32.1	North Creek 2	SW09	BORR_MW13	SW07
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-001	EP2006304-002	EP2006304-003	EP2006304-004	EP2006304-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.04	7.01	7.35	7.23	7.06	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1180	821	680	847	843	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	696	471	417	660	481	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	21	16	102	264	17	
Total Alkalinity as CaCO3	----	1	mg/L	21	16	102	264	17	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	21	7	13	18	6	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	33	10	78	37	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	355	228	147	56	241	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	5	7	23	47	8	
Magnesium	7439-95-4	1	mg/L	24	18	11	19	18	
Sodium	7440-23-5	1	mg/L	183	122	85	124	126	
Potassium	7440-09-7	1	mg/L	7	6	9	2	6	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.02	<0.01	0.13	0.04	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	0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	0.017	0.002	
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	0.061	0.050	0.012	0.006	0.057	
Nickel	7440-02-0	0.001	mg/L	0.002	0.002	<0.001	0.008	0.002	
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	0.014	0.012	0.008	0.044	0.012	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	2.26	0.10	0.18	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH32.1	North Creek 2	SW09	BORR_MW13	SW07
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-001	EP2006304-002	EP2006304-003	EP2006304-004	EP2006304-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	2.93	0.25	2.86	5.87	0.14	
Iron	7439-89-6	0.05	mg/L	12.0	2.36	6.58	2.43	1.31	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.07	<0.01	0.01	0.04	0.04	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.07	<0.01	<0.01	0.04	0.04	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.10	<0.01	7.62	0.10	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	1.7	1.4	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.2	0.2	1.7	9.0	0.3	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.17	0.02	0.16	0.06	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	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.0	7.44	6.39	8.48	7.91	
∅ Total Cations	----	0.01	meq/L	10.4	7.29	5.98	9.35	7.51	
∅ Ionic Balance	----	0.01	%	3.05	1.00	3.33	4.91	2.55	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW08	BORR_MW15	Northern 5	BORR_MW18	BORR_MW19b
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-006	EP2006304-007	EP2006304-008	EP2006304-009	EP2006304-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.09	6.47	7.68	5.10	6.38	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	854	194	623	356	2260	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	492	122	336	262	1380	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	17	16	101	<1	41	
Total Alkalinity as CaCO3	----	1	mg/L	17	16	101	<1	41	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	7	10	8	15	23	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	9	24	20	40	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	245	41	108	52	693	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	8	5	23	13	16	
Magnesium	7439-95-4	1	mg/L	18	4	11	5	50	
Sodium	7440-23-5	1	mg/L	125	19	83	32	341	
Potassium	7440-09-7	1	mg/L	6	6	6	18	4	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.02	0.09	0.04	0.47	<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	0.0003	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.001	<0.001	<0.001	0.007	0.001	
Copper	7440-50-8	0.001	mg/L	0.017	0.019	0.014	0.015	<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	0.056	0.006	0.068	0.291	0.119	
Nickel	7440-02-0	0.001	mg/L	0.007	0.011	0.005	0.008	0.002	
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	0.046	0.079	0.040	0.056	0.015	
Iron	7439-89-6	0.05	mg/L	0.20	0.76	0.22	<0.05	5.36	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW08	BORR_MW15	Northern 5	BORR_MW18	BORR_MW19b
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-006	EP2006304-007	EP2006304-008	EP2006304-009	EP2006304-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.14	1.43	0.37	0.91	3.30	
Iron	7439-89-6	0.05	mg/L	1.48	10.1	1.26	0.10	7.43	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.92	0.21	<0.01	<0.01	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.03	0.92	0.20	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.10	0.27	0.46	13.9	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	1.2	0.6	1.6	<0.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.3	1.5	1.1	15.5	<0.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	1.58	<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	<0.01	1.32	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	2.88	----	
∅ Total Anions	----	0.01	meq/L	8.02	1.66	5.56	----	21.2	
∅ Total Cations	----	0.01	meq/L	7.47	1.56	5.82	2.91	19.8	
∅ Ionic Balance	----	0.01	%	----	----	----	0.64	----	
∅ Ionic Balance	----	0.01	%	3.55	3.26	2.22	----	3.29	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FD01	BORR_MW20	BORR_MW04	BORR_MW05	RB01
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-011	EP2006304-012	EP2006304-013	EP2006304-014	EP2006304-015	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.36	6.26	7.28	7.11	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	2260	5530	3630	1050	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1410	3800	2190	614	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	39	256	156	----	
Total Alkalinity as CaCO3	----	1	mg/L	42	39	256	156	----	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	23	17	16	12	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	40	90	199	115	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	691	1700	914	232	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	17	45	159	23	----	
Magnesium	7439-95-4	1	mg/L	50	130	56	16	----	
Sodium	7440-23-5	1	mg/L	342	856	520	161	----	
Potassium	7440-09-7	1	mg/L	4	5	5	8	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.02	0.01	0.09	----	
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	----	
Cobalt	7440-48-4	0.001	mg/L	0.001	0.015	0.001	<0.001	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.015	0.013	0.006	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Manganese	7439-96-5	0.001	mg/L	0.120	0.202	0.142	0.009	----	
Nickel	7440-02-0	0.001	mg/L	0.002	0.015	0.007	0.002	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	0.017	0.071	0.052	0.017	----	
Iron	7439-89-6	0.05	mg/L	5.44	1.91	5.98	1.20	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FD01	BORR_MW20	BORR_MW04	BORR_MW05	RB01
Client sampling date / time				15-Jun-2020 00:00	15-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	15-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-011	EP2006304-012	EP2006304-013	EP2006304-014	EP2006304-015	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	4.70	2.22	1.10	1.85	----	
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	
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	<0.001	
Lead	7439-92-1	0.001	mg/L	----	----	----	----	<0.001	
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	<0.005	
Iron	7439-89-6	0.05	mg/L	8.20	6.12	10.1	1.72	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.03	0.19	0.07	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	<0.01	0.03	0.19	0.07	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	1.02	<0.01	<0.01	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.2	0.2	0.9	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	1.2	0.2	0.9	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.03	0.02	0.06	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	0.02	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	21.2	50.6	35.0	12.0	----	
∅ Total Cations	----	0.01	meq/L	19.9	50.3	35.3	9.67	----	
∅ Ionic Balance	----	0.01	%	2.97	0.30	0.35	11.0	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW06	BORR_MW08a	BORR_MW09	BORR_MW10	MR_MW05
Client sampling date / time				16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-017	EP2006304-018	EP2006304-019	EP2006304-020	EP2006304-021	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.20	6.52	6.68	6.51	6.41	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	702	566	257	585	23200	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	499	385	154	366	14200	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	74	55	14	28	74	
Total Alkalinity as CaCO3	----	1	mg/L	74	55	14	28	74	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	12	18	7	16	26	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	74	<10	20	67	1140	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	159	135	51	105	7330	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	31	20	13	14	179	
Magnesium	7439-95-4	1	mg/L	12	12	2	17	658	
Sodium	7440-23-5	1	mg/L	81	70	26	66	3840	
Potassium	7440-09-7	1	mg/L	14	9	7	6	42	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.28	0.29	0.02	0.11	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	<0.001	0.002	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.001	<0.001	<0.001	<0.001	0.007	
Copper	7440-50-8	0.001	mg/L	0.018	0.014	0.024	0.023	0.027	
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	0.096	0.062	0.004	0.016	0.155	
Nickel	7440-02-0	0.001	mg/L	0.008	0.007	0.006	0.006	0.010	
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	0.047	0.046	0.053	0.046	0.072	
Iron	7439-89-6	0.05	mg/L	4.53	0.83	<0.05	4.25	0.94	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW06	BORR_MW08a	BORR_MW09	BORR_MW10	MR_MW05
Client sampling date / time				16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006304-017	EP2006304-018	EP2006304-019	EP2006304-020	EP2006304-021	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	2.11	4.11	0.31	0.30	6.30	
Iron	7439-89-6	0.05	mg/L	9.16	1.13	0.10	5.10	18.9	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.28	0.34	0.05	0.36	0.07	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.28	0.34	0.05	0.36	0.07	
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	1.4	1.9	<0.1	0.8	0.4	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.4	1.9	<0.1	0.8	0.4	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.07	0.85	0.02	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	0.72	<0.01	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.2	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	7.50	4.91	2.13	4.92	232	
∅ Total Cations	----	0.01	meq/L	6.42	5.26	2.12	5.12	231	
∅ Ionic Balance	----	0.01	%	7.82	3.48	0.27	2.05	0.17	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		BORR_MW11	MW46	RB02	----	----
Client sampling date / time		16-Jun-2020 00:00		16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2006304-022	EP2006304-023	EP2006304-025	-----	-----
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.87	3.53	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	12600	547	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	7520	296	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	656	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	656	<1	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	12	35	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	476	156	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3180	35	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	72	50	----	----	----
Magnesium	7439-95-4	1	mg/L	218	9	----	----	----
Sodium	7440-23-5	1	mg/L	2400	16	----	----	----
Potassium	7440-09-7	1	mg/L	19	3	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.20	0.06	----	----	----
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	0.002	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.006	----	----	----
Copper	7440-50-8	0.001	mg/L	0.030	0.033	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.017	0.065	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.013	0.012	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.070	0.064	----	----	----
Iron	7439-89-6	0.05	mg/L	0.49	15.8	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW11	MW46	RB02	----	----
Client sampling date / time				16-Jun-2020 00:00	16-Jun-2020 00:00	16-Jun-2020 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2006304-022	EP2006304-023	EP2006304-025	-----	-----	
				Result	Result	Result	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	3.45	11.2	----	----	----	
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	----	----	
Nickel	7440-02-0	0.001	mg/L	----	----	<0.001	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	<0.001	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	<0.005	----	----	
Iron	7439-89-6	0.05	mg/L	6.06	52.6	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.16	----	----	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	<0.01	0.16	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.17	0.03	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.8	0.4	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	3.0	0.4	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.13	0.05	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	<0.01	----	----	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	113	4.24	----	----	----	
∅ Total Cations	----	0.01	meq/L	126	4.01	----	----	----	
∅ Ionic Balance	----	0.01	%	5.73	2.75	----	----	----	

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2006304	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 18-Jun-2020
Site	: ----	Issue Date	: 26-Jun-2020
Sampler	: DS/BS/SI	No. of samples received	: 27
Order number	: 61370410831	No. of samples analysed	: 23

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	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01,	North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	----	----	----	23-Jun-2020	15-Jun-2020	8
Clear Plastic Bottle - Natural							
BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46	BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	----	----	----	23-Jun-2020	16-Jun-2020	7
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01,	North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	----	----	----	18-Jun-2020	17-Jun-2020	1

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



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) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	23-Jun-2020	15-Jun-2020	*
Clear Plastic Bottle - Natural (EA005-P) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	23-Jun-2020	16-Jun-2020	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	23-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	23-Jun-2020	14-Jul-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	22-Jun-2020	22-Jun-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	23-Jun-2020	23-Jun-2020	✓



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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	23-Jun-2020	29-Jun-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	23-Jun-2020	30-Jun-2020	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	23-Jun-2020	29-Jun-2020	✓
Clear Plastic Bottle - Natural (ED038) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	23-Jun-2020	30-Jun-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	18-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Natural (ED041G) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	18-Jun-2020	14-Jul-2020	✓



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
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	18-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Natural (ED045G) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	18-Jun-2020	14-Jul-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	19-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	19-Jun-2020	14-Jul-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	19-Jun-2020	12-Dec-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	19-Jun-2020	13-Dec-2020	✓



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
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, RB01 North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20,	15-Jun-2020	22-Jun-2020	12-Dec-2020	✓	22-Jun-2020	12-Dec-2020	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46, BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11, RB02	16-Jun-2020	22-Jun-2020	13-Dec-2020	✓	22-Jun-2020	13-Dec-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	---	---	---	18-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	---	---	---	18-Jun-2020	14-Jul-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	---	---	---	18-Jun-2020	13-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	---	---	---	18-Jun-2020	14-Jul-2020	✓



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)								
BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	24-Jun-2020	13-Jul-2020	✓	24-Jun-2020	13-Jul-2020	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	24-Jun-2020	14-Jul-2020	✓	24-Jun-2020	14-Jul-2020	✓	
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	24-Jun-2020	13-Jul-2020	✓	24-Jun-2020	13-Jul-2020	✓	
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	24-Jun-2020	14-Jul-2020	✓	24-Jun-2020	14-Jul-2020	✓	
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)								
BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01, North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	18-Jun-2020	17-Jun-2020	*	
Clear Plastic Bottle - Natural (EK071G)								
BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46 BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	18-Jun-2020	18-Jun-2020	✓	



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	
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BH32.1, SW09, SW07, BORR_MW15, BORR_MW18, FD01,	North Creek 2, BORR_MW13, SW08, Northern 5, BORR_MW19b, BORR_MW20	15-Jun-2020	----	----	----	22-Jun-2020	22-Jun-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR_MW04, BORR_MW06, BORR_MW09, MR_MW05, MW46	BORR_MW05, BORR_MW08a, BORR_MW10, BORR_MW11,	16-Jun-2020	----	----	----	22-Jun-2020	23-Jun-2020	✓



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	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	54	11.11	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	21	19.05	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	21	19.05	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	54	11.11	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	21	9.52	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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Chloride by Discrete Analyser	ED045G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	54	5.56	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	21	9.52	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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
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)

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESdat set up, no spaces)

PO Number (to be invoiced)

Laboratory: ALS Laboratories

6137041083

61370410831

Address: 26 Rigali Way, Wangara

Laboratory Contact: Toni Mc Pake

Laboratory Quote No.

Turnaround Time
Standard

EP1489/19 v4

Job Manager (Invoice) & GHD accounts

Email Address (Results)

Julia Roberts.

vicki.davies@ghd.com
dominique.shuttleworth@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix (S-Soil/S-L- Sludge/W-Water/A-Air)	Container				Analyses											HOLD	Remarks						
					Type (B-Bottle/J-Jar/V- Vial/Bag/G-Glass/P-Plastic)	Preservative (Unpreserved/HCl/ H2SO4/HNO3/Other)	No																				
<u>BH3201</u>	<u>1</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>North Creek 2</u>	<u>2</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>																				<u>forgot syringe please filter metals at lab where applicable</u>
<u>SW09</u>	<u>3</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>																				<u>(BH321 SW09, North Creek 2)</u>
<u>BORR-MW13</u>	<u>4</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>SW07</u>	<u>5</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>																				
<u>SW08</u>	<u>6</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>																				
<u>BORR-MW15</u>	<u>7</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>Northern 5</u>	<u>8</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>BORR-MW18</u>	<u>9</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>BORR-MW19b</u>	<u>10</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>F001</u>	<u>11</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>F001</u>	<u>-</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>BORR-MW20</u>	<u>12</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>BORR-MW04</u>	<u>13</u>	<u>16.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>BORR-MW05</u>	<u>14</u>	<u>16.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>5</u>	<u>X</u>																			
<u>RBO1</u>	<u>15</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>1</u>																				
<u>FBO1</u>	<u>16</u>	<u>15.6.20</u>		<u>W</u>	<u>B</u>	<u>-</u>	<u>1</u>																				

Environmental Division
Perth
Work Order Reference
EP2006304



Telephone : + 61-8-9406 1301

Sampled by: PS/BS/SI Date/Time: 15.6.2020 Relinquished by: OS + SI Date/Time: 16/6/20
 Received by: SP Date/Time: 18.6.2020 Relinquished by: _____ Date/Time: _____

#1340

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESdat set up; no spaces)
6137041

PO Number (to be invoiced)
8-0034
61370410831

Laboratory: ALS Laboratories
Address: 26 Rigali Way Wangara
Laboratory Contact: Terille Peakes

Laboratory Quote No.
ALS EP/489/19 v4

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Vicki Davies

Email Address (Results)
vicki.davies@ghd.com
amy.hestehauge@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil / L- Sludge / W-Water / A-Air	Container				Groundwater suite	Surface water suite	Rinsate	Field blank	Trip blank	Analyses								HOLD	Remarks						
					Type B-bottle / Jar / V- Vial / Bag / G-glass / P-plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / other	No																						
BORR_MW06	17	16.6.20		W	B	-	5	X																					
BORR_MW08a	18	16.6.20		W	B	-	5	X																					
BORR_MW09	19	16.6.20		W	B	-	5	X																					
BORR_MW10	20	16.6.20		W	B	-	5	X																					
MR_MW05	21	16.6.20		W	B	-	5	X																					
BORR_MW11	22	16.6.20		W	B	-	5	X																					
MW46	23	16.6.20		W	B	-	5	X																					
FB02	24	16.6.20		W	B	-	5	*				X																	
RB02	25	16.6.20		W	B	-	5				X																		
TBW 500	26	16.6.20		W	B	-	1						X																
TBW 501	27	16.6.20		W	B	-	1						X																

Sampled by: DS/51

Date/Time: 16/6

Relinquished by: DS+51

Date/Time: 16.6.20

Received by:

Date/Time:

Relinquished by:

Date/Time:

CERTIFICATE OF ANALYSIS

Work Order : **EP2006334**
Client : **GHD PTY LTD**
Contact : **MS VICKI DAVIES**
Address : **999 HAY STREET**
PERTH WA, AUSTRALIA 6000

Telephone : **----**
Project : **6137041**
Order number : **61370410831**
C-O-C number : **----**
Sampler : **DS + SI**
Site : **----**
Quote number : **EP/489/19 V4**
No. of samples received : **26**
No. of samples analysed : **26**

Page : 1 of 13
Laboratory : Environmental Division Perth
Contact : Rebecca Shaw
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 19-Jun-2020 13:20
Date Analysis Commenced : 19-Jun-2020
Issue Date : 26-Jun-2020 16:15



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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
∅ = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED041G (Turbidimetric Sulfate): LOR raised for samples #5, #6 and #8 due to possible sample matrix interference.
- EK055G (Ammonia): LOR for sample EP2006334-015 raised due to possible sample matrix interference.
- 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.
- TDS by method EA-015 may bias high for sample #3 and #9 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	BH11.1	JT01	BORR_MW39	BORR_MW25	BORR_MW32
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-001	EP2006334-002	EP2006334-003	EP2006334-004	EP2006334-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.44	7.12	5.86	6.20	6.30	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	2850	4080	372	3660	267	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1780	2450	500	2250	198	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	70	46	13	58	33	
Total Alkalinity as CaCO3	----	1	mg/L	70	46	13	58	33	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	37	16	28	63	22	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	91	131	70	83	<10	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	729	1120	47	1040	66	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	22	46	<1	29	3	
Magnesium	7439-95-4	1	mg/L	79	100	<1	66	8	
Sodium	7440-23-5	1	mg/L	446	659	78	647	44	
Potassium	7440-09-7	1	mg/L	18	21	<1	4	4	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.04	0.02	0.09	0.04	0.82	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.003	<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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	0.001	0.038	<0.001	
Copper	7440-50-8	0.001	mg/L	0.009	0.018	<0.001	0.019	0.022	
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	0.479	0.181	0.040	0.458	0.006	
Nickel	7440-02-0	0.001	mg/L	0.018	0.007	0.002	0.024	0.006	
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	0.178	0.067	0.012	0.066	0.060	
Iron	7439-89-6	0.05	mg/L	26.4	0.11	<0.05	6.96	0.55	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11.1	JT01	BORR_MW39	BORR_MW25	BORR_MW32
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-001	EP2006334-002	EP2006334-003	EP2006334-004	EP2006334-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.05	0.37	4.75	2.62	1.79	
Iron	7439-89-6	0.05	mg/L	27.1	2.44	5.84	9.83	0.74	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.22	0.10	0.01	0.01	0.51	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.22	0.10	<0.01	<0.01	0.51	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.11	0.03	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.1	0.2	1.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.5	0.6	0.1	0.2	1.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.13	0.02	0.10	0.04	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	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	23.8	35.2	3.04	32.2	2.52	
∅ Total Cations	----	0.01	meq/L	27.4	39.7	3.39	35.1	2.82	
∅ Ionic Balance	----	0.01	%	7.02	5.98	5.44	4.31	5.67	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW31	BORR_MW29	MT01	FD02	FD03
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-006	EP2006334-007	EP2006334-008	EP2006334-009	EP2006334-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	5.93	6.20	6.78	5.80	7.54	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	261	841	282	377	2090	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	210	550	203	466	1330	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	15	32	21	12	82	
Total Alkalinity as CaCO3	----	1	mg/L	15	32	21	12	82	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	28	23	10	24	7	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	165	<10	71	37	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	70	134	67	48	595	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	3	24	7	<1	39	
Magnesium	7439-95-4	1	mg/L	7	28	6	<1	67	
Sodium	7440-23-5	1	mg/L	42	100	51	78	263	
Potassium	7440-09-7	1	mg/L	5	8	9	<1	13	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.97	0.40	0.34	0.05	0.05	
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	0.003	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.012	0.006	0.024	<0.001	0.002	
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	0.022	0.007	0.048	0.127	
Nickel	7440-02-0	0.001	mg/L	0.006	0.007	0.005	0.006	0.006	
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	0.036	0.067	0.099	0.018	<0.005	
Iron	7439-89-6	0.05	mg/L	1.47	0.70	0.76	<0.05	0.62	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW31	BORR_MW29	MT01	FD02	FD03
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-006	EP2006334-007	EP2006334-008	EP2006334-009	EP2006334-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.86	1.41	0.40	5.02	2.42	
Iron	7439-89-6	0.05	mg/L	2.52	1.11	0.96	5.95	3.54	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.95	0.70	<0.01	<0.01	0.24	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.95	0.70	<0.01	<0.01	0.24	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	0.04	0.20	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.0	1.6	3.1	0.2	1.9	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	2.0	1.6	3.1	0.2	2.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.05	0.02	0.44	0.12	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	0.19	0.02	0.02	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	0.4	1.8	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.27	7.85	2.31	3.07	19.2	
∅ Total Cations	----	0.01	meq/L	2.68	8.06	3.29	3.39	19.2	
∅ Ionic Balance	----	0.01	%	8.20	1.27	----	4.96	0.10	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW24	Northern 3	SW06	BORR_MW37	BH9.2
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-011	EP2006334-012	EP2006334-013	EP2006334-014	EP2006334-015	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	5.01	6.78	7.55	5.84	3.53	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1820	16100	2120	3570	7930	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1380	10700	1360	2160	5310	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	24	85	27	<1	
Total Alkalinity as CaCO3	----	1	mg/L	2	24	85	27	<1	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	38	5	4	34	309	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	651	36	63	88	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	534	4630	591	996	2460	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	148	41	18	67	
Magnesium	7439-95-4	1	mg/L	11	359	71	76	277	
Sodium	7440-23-5	1	mg/L	348	2790	279	599	1020	
Potassium	7440-09-7	1	mg/L	<1	94	13	2	<1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.43	0.14	0.02	0.03	27.6	
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	0.0002	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	0.010	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.008	0.005	<0.001	0.046	0.033	
Copper	7440-50-8	0.001	mg/L	0.020	0.021	0.002	0.032	0.039	
Lead	7439-92-1	0.001	mg/L	0.001	<0.001	<0.001	0.001	0.024	
Manganese	7439-96-5	0.001	mg/L	0.006	0.208	0.132	0.211	0.020	
Nickel	7440-02-0	0.001	mg/L	0.020	0.008	0.001	0.025	0.020	
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	0.065	0.060	0.005	0.793	0.072	
Iron	7439-89-6	0.05	mg/L	0.75	0.43	0.58	7.76	58.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW24	Northern 3	SW06	BORR_MW37	BH9.2
Client sampling date / time				17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-011	EP2006334-012	EP2006334-013	EP2006334-014	EP2006334-015	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	36.2	0.33	2.58	3.02	29.2	
Iron	7439-89-6	0.05	mg/L	40.6	0.87	3.10	10.1	60.8	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.30	0.04	<0.05	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.06	0.06	0.29	0.04	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	<0.01	0.20	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.4	1.9	0.1	0.3	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.2	1.4	2.1	0.1	0.3	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.35	0.11	0.28	0.03	<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	0.06	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.9	145	19.1	29.9	71.2	
∅ Total Cations	----	0.01	meq/L	16.0	161	20.4	33.2	70.5	
∅ Ionic Balance	----	0.01	%	0.53	5.26	3.14	5.24	0.50	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW12	Southern 4	BORR_MW22	BORR_MW22b	North Creek 4
Client sampling date / time				18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-016	EP2006334-017	EP2006334-018	EP2006334-019	EP2006334-020	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.84	8.10	6.86	6.50	7.23	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	583	12300	505	1830	1600	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	364	8020	318	1090	1010	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	36	287	17	11	40	
Total Alkalinity as CaCO3	----	1	mg/L	36	287	17	11	40	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	8	<1	7	8	7	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	38	180	47	144	44	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	123	3620	66	459	444	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	5	127	10	9	32	
Magnesium	7439-95-4	1	mg/L	12	301	12	22	43	
Sodium	7440-23-5	1	mg/L	83	2120	69	286	216	
Potassium	7440-09-7	1	mg/L	6	49	2	<1	9	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.22	0.02	0.07	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.003	<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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	<0.001	0.017	0.002	
Copper	7440-50-8	0.001	mg/L	0.024	0.012	0.030	0.022	0.042	
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	0.006	0.045	0.004	0.025	0.082	
Nickel	7440-02-0	0.001	mg/L	0.006	0.008	0.007	0.024	0.012	
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	0.053	0.091	0.055	0.091	0.091	
Iron	7439-89-6	0.05	mg/L	1.56	0.11	0.14	0.23	0.29	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR_MW12	Southern 4	BORR_MW22	BORR_MW22b	North Creek 4
Client sampling date / time				18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	18-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-016	EP2006334-017	EP2006334-018	EP2006334-019	EP2006334-020	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.93	0.89	2.09	1.93	3.09	
Iron	7439-89-6	0.05	mg/L	5.78	0.58	1.51	2.98	3.65	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.13	0.92	<0.01	0.02	0.01	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.13	0.86	<0.01	0.02	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.31	<0.01	9.72	6.91	0.25	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	8.4	1.6	1.2	1.7	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.9	8.4	11.3	8.1	2.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.03	0.49	0.15	0.06	0.31	
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	0.08	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	3.87	----	----	
∅ Total Anions	----	0.01	meq/L	4.98	112	----	16.2	14.2	
∅ Total Cations	----	0.01	meq/L	5.00	124	4.54	14.7	14.8	
∅ Ionic Balance	----	0.01	%	----	----	7.90	----	----	
∅ Ionic Balance	----	0.01	%	0.21	5.50	----	4.75	1.80	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB03	RB04	TBW499	TBW497	FB03
Client sampling date / time				17-Jun-2020 00:00	18-Jun-2020 00:00	17-Jun-2020 00:00	18-Jun-2020 00:00	17-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2006334-021	EP2006334-022	EP2006334-023	EP2006334-024	EP2006334-025	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
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	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	----	<20	<20	<20	
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	
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	%	----	----	96.9	102	95.7	
Toluene-D8	2037-26-5	2	%	----	----	92.0	93.8	93.4	
4-Bromofluorobenzene	460-00-4	2	%	----	----	102	105	106	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	FB04	----	----	----	----
Client sampling date / time			18-Jun-2020 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	EP2006334-026	-----	-----	-----	-----
				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	%	94.2	----	----	----	----
Toluene-D8	2037-26-5	2	%	94.1	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	98.8	----	----	----	----



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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2006334	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MS VICKI DAVIES	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 19-Jun-2020
Site	: ----	Issue Date	: 26-Jun-2020
Sampler	: DS + SI	No. of samples received	: 26
Order number	: 61370410831	No. of samples analysed	: 26

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							
EG020F: Dissolved Metals by ICP-MS	EP2006318--003	Anonymous	Cadmium	7440-43-9	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	EP2006318--003	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	EP2006318--003	Anonymous	Zinc	7440-66-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	----	----	----	24-Jun-2020	17-Jun-2020	7
Clear Plastic Bottle - Natural							
BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	----	----	----	24-Jun-2020	18-Jun-2020	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.



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) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2	17-Jun-2020	----	----	----	24-Jun-2020	17-Jun-2020	✘
Clear Plastic Bottle - Natural (EA005-P) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4	18-Jun-2020	----	----	----	24-Jun-2020	18-Jun-2020	✘
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2	17-Jun-2020	----	----	----	24-Jun-2020	15-Jul-2020	✔
Clear Plastic Bottle - Natural (EA010-P) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4	18-Jun-2020	----	----	----	24-Jun-2020	16-Jul-2020	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2	17-Jun-2020	----	----	----	23-Jun-2020	24-Jun-2020	✔
Clear Plastic Bottle - Natural (EA015H) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4	18-Jun-2020	----	----	----	23-Jun-2020	25-Jun-2020	✔



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	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	24-Jun-2020	01-Jul-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	24-Jun-2020	02-Jul-2020	✓
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	25-Jun-2020	01-Jul-2020	✓
Clear Plastic Bottle - Natural (ED038) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	25-Jun-2020	02-Jul-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	19-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Natural (ED041G) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	19-Jun-2020	16-Jul-2020	✓



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	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	19-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Natural (ED045G) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	19-Jun-2020	16-Jul-2020	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	22-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	22-Jun-2020	16-Jul-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	22-Jun-2020	14-Dec-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	22-Jun-2020	15-Dec-2020	✓



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
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2, RB03	17-Jun-2020	22-Jun-2020	14-Dec-2020	✓	22-Jun-2020	14-Dec-2020	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4, RB04	18-Jun-2020	22-Jun-2020	15-Dec-2020	✓	22-Jun-2020	15-Dec-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2	17-Jun-2020	----	----	----	19-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4	18-Jun-2020	----	----	----	19-Jun-2020	16-Jul-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH11.1, JT01, BORR_MW39, BORR_MW25, BORR_MW32, BORR_MW31, BORR_MW29, MT01, FD02, FD03, BORR_MW24, Northern 3, SW06, BORR_MW37, BH9.2	17-Jun-2020	----	----	----	19-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR_MW12, Southern 4, BORR_MW22, BORR_MW22b, North Creek 4	18-Jun-2020	----	----	----	19-Jun-2020	16-Jul-2020	✓



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) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	26-Jun-2020	15-Jul-2020	✓	26-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	26-Jun-2020	16-Jul-2020	✓	26-Jun-2020	16-Jul-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	26-Jun-2020	15-Jul-2020	✓	26-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	26-Jun-2020	16-Jul-2020	✓	26-Jun-2020	16-Jul-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	19-Jun-2020	19-Jun-2020	✓
Clear Plastic Bottle - Natural (EK071G) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	19-Jun-2020	20-Jun-2020	✓



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	
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BH11.1, BORR_MW39, BORR_MW32, BORR_MW29, FD02, BORR_MW24, SW06, BH9.2	JT01, BORR_MW25, BORR_MW31, MT01, FD03, Northern 3, BORR_MW37,	17-Jun-2020	----	----	----	22-Jun-2020	24-Jun-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR_MW12, BORR_MW22, North Creek 4	Southern 4, BORR_MW22b,	18-Jun-2020	----	----	----	22-Jun-2020	25-Jun-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) TBW499,	FB03	17-Jun-2020	24-Jun-2020	01-Jul-2020	✓	24-Jun-2020	01-Jul-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW497,	FB04	18-Jun-2020	24-Jun-2020	02-Jul-2020	✓	24-Jun-2020	02-Jul-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) TBW499,	FB03	17-Jun-2020	24-Jun-2020	01-Jul-2020	✓	24-Jun-2020	01-Jul-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW497,	FB04	18-Jun-2020	24-Jun-2020	02-Jul-2020	✓	24-Jun-2020	02-Jul-2020	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) TBW499,	FB03	17-Jun-2020	24-Jun-2020	01-Jul-2020	✓	24-Jun-2020	01-Jul-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW497,	FB04	18-Jun-2020	24-Jun-2020	02-Jul-2020	✓	24-Jun-2020	02-Jul-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	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	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	5	38	13.16	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	28	10.71	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
pH by PC Titrator	EA005-P	4	40	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	32	12.50	10.53	✓	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	34	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 Volatiles/BTEX	EP080	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	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	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	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
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	32	12.50	10.53	✓	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	34	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 Volatiles/BTEX	EP080	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	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	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	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
Sulfide as S2-	EK085	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	32	6.25	5.26	✓	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	34	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 Volatiles/BTEX	EP080	1	5	20.00	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	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	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 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	34	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 Volatiles/BTEX	EP080	1	5	20.00	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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260D 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)
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.

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street PO Box 3106
Perth WA 6000 Perth WA 6832

Reception Ph: 08 6222 8222

Project ID <i>(as per ESDat set up; no spaces)</i> 6137041	PO Number (to be invoiced) 9 0824 61370410831	Laboratory: <u>ALS laboratories</u> Address: <u>26 Rigali way, Wangara WA</u> Laboratory Contact: <u>Terulle Peakes</u>
--	--	--

Laboratory Quote No. ALS EP/489/19 v4	Turnaround Time Standard	Sample Matrix
---	------------------------------------	----------------------

Job Manager (Invoice) & GHD accounts Vicki Davies	Email Address (Results) vicki.davies@ghd.com amy.hestehaug@ghd.com	Analyses
---	---	-----------------

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix <small>S-Soil/Sl- Sludge/ W-Water/ A-Air</small>	Container <small>Type B-Bottle/L-LagV- Via/Bag/G-Glass/P-Plastic</small>	Preservative <small>Unpreserved/HCl/ H2SO4/HNO3/Other</small>	No	HOLD	Remarks
BH11.1	1	17.6.20		W					
JTO1	2	17.6.20							
BORR_MW39	3	17.6.20							
BORR_MW25	4	17.6.20							
BORR_MW32	5	17.6.20							
BORR_MW31	6	17.6.20							
BORR_MW29	7	17.6.20							
MT01	8	17.6.20							
FD02	9	17.6.20							
FD03	10	17.6.20							
BORR_MW24	11	17.6.20							
Northern 3	12	17.6.20							
SN06	13	17.6.20							
BORR_MW37	14	17.6.20							
BH9.2	15	17.6.20							
BORR_MW12	16	18.6.20							
Southern 4	17	18.6.20							

Environmental Division
Perth
Work Order Reference
EP2006334



Telephone : + 61-8-9406 1301

Sampled by: DS + SI	Date/Time: 17/6 - 18/6	Relinquished by: DS + SI
Received by: NP	Date/Time: 19/6/2020	Relinquished by:
		Date/Time: 18/6/20

1320

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESdat set up; no spaces)
6137041

PO Number (to be invoiced)
8-0031
61370410831

Laboratory: ALS laboratories
Address: 26 Rigali Way, Wangara WA
Laboratory Contact: Jenille Peakes

Laboratory Quote No.
ALS EP/489/19 v4

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Vicki Davies

Email Address (Results)
vicki.davies@ghd.com
amy.hestehauge@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil / SL- Sludge / W-Water / A-Air	Container				ground water suite	surface water suite	rinsate	field blank	mp blank	Analyses										HOLD	Remarks	
					Type B-Bottle / Jar / V- Via / Bag / G-Glass / P-Plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / Other	No																			
BORR_MW22	18	18.6.20		W	B	-	5	X																		
BORR_MW22b	19	18.6.20		W	B	-	5	X																		
North Creek 4	20	18.6.20		W	B	-	5		X																	
RB03	21	17.6.20		W	B	-	1			X																
RB04	22	18.6.20		W	B	-	1			X																
TBW499	23	17.6.20		W	B	-	1						X													
TBW497	24	18.6.20		W	B	-	1						X													
FB03	25	17.6.20		W	B	-	1			X	X															
FB04	26	18.6.20		W	B	-	1				X															

Sampled by: DS + SI Date/Time: 17-18 June Relinquished by: DS + SI Date/Time: 18/6/20

Received by: NM Date/Time: 17/6/2020 Relinquished by: Date/Time:

1320

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Vicki Davies

Report 726271-W

Project name

Project ID 6137041

Received Date Jun 17, 2020

Client Sample ID			FS01
Sample Matrix			Water
Eurofins Sample No.			M20-Jn29288
Date Sampled			Jun 15, 2020
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	65
Ammonia (as N)	0.01	mg/L	0.04
Ammonium Ion (as N)	0.01	mg/L	0.04
Chloride	1	mg/L	670
Conductivity (at 25°C)	10	uS/cm	2300
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
pH (at 25°C)	0.1	pH Units	6.5
Phosphate total (as P)	0.01	mg/L	0.01
Phosphorus reactive (as P)	0.01	mg/L	< 0.01
Sulphate (as SO ₄)	5	mg/L	37
Sulphide (as S)	0.05	mg/L	0.10
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1400
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2
Total Nitrogen (as N)	0.2	mg/L	< 0.2
Alkalinity (speciated)			
Total Alkalinity (as CaCO ₃)	20	mg/L	62
Heavy Metals			
Aluminium	0.05	mg/L	1.1
Aluminium (filtered)	0.05	mg/L	< 0.05
Arsenic	0.001	mg/L	0.002
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium	0.0002	mg/L	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	0.004
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	0.002
Cobalt (filtered)	0.001	mg/L	0.001
Copper	0.001	mg/L	0.005
Copper (filtered)	0.001	mg/L	0.004
Iron	0.05	mg/L	8.1
Iron (filtered)	0.05	mg/L	5.5
Lead	0.001	mg/L	0.002
Lead (filtered)	0.001	mg/L	< 0.001
Manganese	0.005	mg/L	0.13
Manganese (filtered)	0.005	mg/L	0.13

Client Sample ID			FS01
Sample Matrix			Water
Eurofins Sample No.			M20-Jn29288
Date Sampled			Jun 15, 2020
Test/Reference	LOR	Unit	
Heavy Metals			
Nickel	0.001	mg/L	0.003
Nickel (filtered)	0.001	mg/L	0.007
Selenium	0.001	mg/L	< 0.001
Selenium (filtered)	0.001	mg/L	< 0.001
Zinc	0.005	mg/L	0.016
Zinc (filtered)	0.005	mg/L	0.049
Alkali Metals			
Calcium	0.5	mg/L	17
Magnesium	0.5	mg/L	51
Potassium	0.5	mg/L	4.1
Sodium	0.5	mg/L	360

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Jun 18, 2020	14 Days
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Jun 18, 2020	28 Days
Ammonium Ion (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Jun 18, 2020	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Jun 18, 2020	28 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Jun 18, 2020	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Jun 18, 2020	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Jun 18, 2020	0 Hours
Phosphate total (as P) - Method: APHA 4500-P E. Phosphorus	Melbourne	Jun 18, 2020	28 Days
Phosphorus reactive (as P) - Method: APHA 4500-P	Melbourne	Jun 18, 2020	2 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Jun 18, 2020	28 Days
Sulphide (as S) - Method: APHA 4500-S C & D - Sulphide	Melbourne	Jun 18, 2020	7 Days
Total Kjeldahl Nitrogen (as N) - Method: LTM-INO-4310 TKN in Waters & Soils by FIA	Melbourne	Jun 18, 2020	7 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Jun 18, 2020	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Jun 18, 2020	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Jun 18, 2020	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Jun 18, 2020	180 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Jun 18, 2020	7 Days

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
 Perth
 WA 6004

Order No.: 61370410831
Report #: 726271
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jun 17, 2020 11:30 AM
Due: Jun 24, 2020
Priority: 5 Day
Contact Name: Vicki Davies

Project Name:
Project ID: 6137041

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acidity (as CaCO ₃)	Aluminium	Aluminium (filtered)	Ammonia (as N)	Ammonium Ion (as N)	Arsenic	Arsenic (filtered)	Cadmium	Chloride	Chromium (filtered)	Cobalt	Cobalt (filtered)	Conductivity (at 25°C)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Nickel	Nickel (filtered)	Nitrate & Nitrite (as N)	pH (at 25°C)	Phosphate total (as P)	Phosphorus reactive (as P)	Selenium	Selenium (filtered)	Sulphate (as SO ₄)	Sulphide (as S)	Total Alkalinity (as CaCO ₃)	Total Kjeldahl Nitrogen (as N)	Total Nitrogen (as N)	Zinc	Zinc (filtered)	Alkali Metals	Total Dissolved Solids Dried at 180°C ± 2°C									
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
Sydney Laboratory - NATA Site # 18217																																																				
Brisbane Laboratory - NATA Site # 20794																																																				
Perth Laboratory - NATA Site # 23736																																																				
External Laboratory																																																				
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																															
1	FS01	Jun 15, 2020		Water	M20-Jn29288	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Test Counts						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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary
General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Phosphorus reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.05			0.05	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	99			70-130	Pass	
Chloride	%	103			70-130	Pass	
Conductivity (at 25°C)	%	109			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Nitrate & Nitrite (as N)	%	101			70-130	Pass		
Phosphate total (as P)	%	99			70-130	Pass		
Phosphorus reactive (as P)	%	94			70-130	Pass		
Sulphate (as SO ₄)	%	98			70-130	Pass		
Sulphide (as S)	%	90			70-130	Pass		
Total Dissolved Solids Dried at 180°C ± 2°C	%	125			70-130	Pass		
Total Kjeldahl Nitrogen (as N)	%	78			70-130	Pass		
Total Nitrogen (as N)	%	102			70-130	Pass		
LCS - % Recovery								
Alkalinity (speciated)								
Total Alkalinity (as CaCO ₃)	%	122			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Aluminium	%	102			80-120	Pass		
Arsenic	%	96			80-120	Pass		
Cadmium	%	93			80-120	Pass		
Chromium	%	93			80-120	Pass		
Cobalt	%	97			80-120	Pass		
Copper	%	96			80-120	Pass		
Iron	%	98			80-120	Pass		
Lead	%	97			80-120	Pass		
Manganese	%	99			80-120	Pass		
Nickel	%	95			80-120	Pass		
Selenium	%	97			80-120	Pass		
Zinc	%	96			80-120	Pass		
LCS - % Recovery								
Alkali Metals								
Calcium	%	102			70-130	Pass		
Magnesium	%	92			70-130	Pass		
Potassium	%	92			70-130	Pass		
Sodium	%	105			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M20-Jn29092	NCP	%	97		70-130	Pass	
Chloride	B20-Jn27468	NCP	%	101		70-130	Pass	
Nitrate & Nitrite (as N)	B20-Jn27359	NCP	%	100		70-130	Pass	
Phosphate total (as P)	B20-Jn27463	NCP	%	92		70-130	Pass	
Sulphate (as SO ₄)	B20-Jn27468	NCP	%	98		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	P20-Jn27818	NCP	%	74		70-130	Pass	
Spike - % Recovery								
Alkalinity (speciated)								
Total Alkalinity (as CaCO ₃)	M20-Ap10941	NCP	%	103		70-130	Pass	
Spike - % Recovery								
Heavy Metals								
				Result 1				
Aluminium	M20-Jn29269	NCP	%	95		75-125	Pass	
Aluminium (filtered)	P20-Jn27748	NCP	%	100		75-125	Pass	
Arsenic	M20-Jn29269	NCP	%	89		75-125	Pass	
Arsenic (filtered)	P20-Jn27748	NCP	%	92		70-130	Pass	
Cadmium	M20-Jn29269	NCP	%	76		75-125	Pass	
Cadmium (filtered)	P20-Jn27748	NCP	%	92		70-130	Pass	
Chromium	M20-Jn29269	NCP	%	81		75-125	Pass	
Chromium (filtered)	P20-Jn27748	NCP	%	94		70-130	Pass	
Cobalt	M20-Jn29269	NCP	%	86		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cobalt (filtered)	P20-Jn27748	NCP	%	93			75-125	Pass	
Copper	M20-Jn29269	NCP	%	77			75-125	Pass	
Copper (filtered)	P20-Jn27748	NCP	%	91			70-130	Pass	
Iron	M20-Jn27781	NCP	%	72			75-125	Fail	Q08
Iron (filtered)	P20-Jn27748	NCP	%	84			70-130	Pass	
Lead	M20-Jn29269	NCP	%	81			75-125	Pass	
Lead (filtered)	P20-Jn27748	NCP	%	92			70-130	Pass	
Manganese	M20-Jn29269	NCP	%	11			75-125	Fail	Q08
Manganese (filtered)	P20-Jn27748	NCP	%	82			70-130	Pass	
Nickel	M20-Jn29269	NCP	%	82			75-125	Pass	
Nickel (filtered)	P20-Jn27748	NCP	%	91			70-130	Pass	
Selenium	M20-Jn29269	NCP	%	85			75-125	Pass	
Selenium (filtered)	P20-Jn27748	NCP	%	69			70-130	Fail	Q08
Zinc	M20-Jn29269	NCP	%	59			75-125	Fail	Q08
Zinc (filtered)	P20-Jn27748	NCP	%	89			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M20-Jn30231	NCP	%	109			70-130	Pass	
Magnesium	M20-Jn30231	NCP	%	107			70-130	Pass	
Sodium	M20-Jn30231	NCP	%	105			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M20-Jn29092	NCP	mg/L	0.75	0.74	2.0	30%	Pass	
Ammonium Ion (as N)	M20-Jn29092	NCP	mg/L	0.80	0.78	2.0	30%	Pass	
Chloride	B20-Jn25447	NCP	mg/L	120	120	3.0	30%	Pass	
Conductivity (at 25°C)	B20-Jn27356	NCP	uS/cm	6700	7800	15	30%	Pass	
Nitrate & Nitrite (as N)	B20-Jn27359	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
pH (at 25°C)	B20-Jn27356	NCP	pH Units	7.6	7.6	pass	30%	Pass	
Phosphate total (as P)	M20-Jn27791	NCP	mg/L	0.08	0.08	<1	30%	Pass	
Sulphate (as SO4)	B20-Jn25447	NCP	mg/L	12	12	2.0	30%	Pass	
Sulphide (as S)	M20-Jn29288	CP	mg/L	0.10	0.10	<1	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M20-Jn24395	NCP	mg/L	4600	4300	6.0	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M20-Jn29288	CP	mg/L	< 0.2	0.7	190	30%	Fail	Q15
Total Nitrogen (as N)	M20-Jn24404	NCP	mg/L	0.5	0.7	27	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Total Alkalinity (as CaCO3)	B20-Jn27356	NCP	mg/L	1100	1400	20	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M20-Jn29269	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	P20-Jn27748	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	M20-Jn29269	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Arsenic (filtered)	P20-Jn27748	NCP	mg/L	0.001	< 0.001	8.0	30%	Pass	
Cadmium	M20-Jn29269	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	P20-Jn27748	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M20-Jn29269	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chromium (filtered)	P20-Jn27748	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	M20-Jn29269	NCP	mg/L	0.009	0.009	<1	30%	Pass	
Cobalt (filtered)	P20-Jn27748	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M20-Jn29269	NCP	mg/L	0.039	0.039	1.0	30%	Pass	
Copper (filtered)	P20-Jn27748	NCP	mg/L	0.006	0.006	2.0	30%	Pass	
Iron	M20-Jn29269	NCP	mg/L	12	12	<1	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Iron (filtered)	P20-Jn27748	NCP	mg/L	1.0	0.98	2.0	30%	Pass
Lead	M20-Jn29269	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead (filtered)	P20-Jn27748	NCP	mg/L	0.004	0.004	3.0	30%	Pass
Manganese	M20-Jn29269	NCP	mg/L	0.83	0.83	<1	30%	Pass
Manganese (filtered)	P20-Jn27748	NCP	mg/L	0.095	0.094	1.0	30%	Pass
Nickel	M20-Jn29269	NCP	mg/L	0.016	0.016	3.0	30%	Pass
Nickel (filtered)	P20-Jn27748	NCP	mg/L	0.002	0.002	4.0	30%	Pass
Selenium	M20-Jn29269	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Selenium (filtered)	P20-Jn27748	NCP	mg/L	0.009	0.008	5.0	30%	Pass
Zinc	M20-Jn29269	NCP	mg/L	0.20	0.20	1.0	30%	Pass
Zinc (filtered)	P20-Jn27748	NCP	mg/L	0.046	0.046	1.0	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	M20-Jn30231	NCP	mg/L	24	23	6.0	30%	Pass
Magnesium	M20-Jn30231	NCP	mg/L	130	120	9.0	30%	Pass
Potassium	M20-Jn31161	NCP	mg/L	1.5	1.5	<1	30%	Pass
Sodium	M20-Jn30231	NCP	mg/L	1100	1000	11	30%	Pass

Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
Ammonia (as N)	1	1	1	1	1
Ammonium Ion (as N)	1	1	0	1	0
Chloride	1	1	1	1	1
Conductivity (at 25°C)	1	1	NA	1	1
Nitrate & Nitrite (as N)	1	1	1	1	1
pH (at 25°C)	1	1	NA	NA	NA
Phosphate total (as P)	1	1	1	1	1
Phosphorus reactive (as P)	1	0	0	1	1
Sulphate (as SO ₄)	1	1	1	1	1
Sulphide (as S)	1	1	NA	1	1
Total Dissolved Solids Dried at 180°C ± 2°C	1	1	NA	1	1
Total Kjeldahl Nitrogen (as N)	1	1	1	1	1
Total Nitrogen (as N)	1	1	0	1	1
Alkalinity (speciated)	1	1	1	1	1
Heavy Metals	1	1	1	1	1
Alkali Metals	1	1	1	1	1

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**Glenn Jackson
General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Project ID (as per ESDat set up; no spaces) **6137041**
 Laboratory Quote No. **ALS EP/489/19 v4**
 Job Manager (Invoice) & GHD accounts **Wicki Davies**
 Wicki Davies **Julia Roberts**
 Email Address (Results) **wicki.davies@ghd.com**
 amy.hestehauger@ghd.com

PO Number (to be invoiced) **88934**
 Turnaround Time **Standard**
 Laboratory: **EVROHNS**
 Address: **1/91 Leach Highway, Westdale**
 Laboratory Contact: **Bob**

GHD
 Level 10, 999 Hay Street
 Perth WA 6000
 PO Box 3106
 Perth WA 6832
 Reception Ph: 08 6222 8222

Page 1 of 1

Sampled by: **DS + S1**
 Received by: **Catryn Gibson**

Date/Time: **15.6.20**
 Date/Time: **17/6/20 11:30**

Relinquished by: **DS + S1**
 Relinquished by: **1818A000**

Date/Time: **15.6.20**
 Date/Time: **16.6.20**

Date/Time: **17/6/20 11:30**
 Date/Time: **17/6/20 11:30**

Chilled: **13.3**
 Temp: **11.5**
 Correction: **10.5°C**

Final Temp: **10.5°C**

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix			Container			Analyses			Remarks
				S-Soil/ SL-Sludge/ W-Water/ A-Air	Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	Cl, SO4, alkalinity, acidity, pH, EC, TDS, Ca, mg, Na, K	Reactive Phosphorus	Dissolved Metals (As, Cd, Co, Cu, Pb, Fe, Mn, Al, Cr, Ni, Se, Zn)	Total Metals (12)	Total N, Total P, Ammonia, Ammonium or NTKN, NOx	
F501		15.6.20		W	B	-	U	X	X	X	X	X	HOLD

1818A000
 726271

CERTIFICATE OF ANALYSIS

Work Order : **EP2007638**
Client : **GHD PTY LTD**
Contact : Julia Roberts
Address : 999 HAY STREET
 PERTH WA, AUSTRALIA 6000

Telephone : ----
Project : 6137041
Order number : 6137041.0831
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EP/489/19 V4_V2
No. of samples received : 16
No. of samples analysed : 16

Page : 1 of 14
Laboratory : Environmental Division Perth
Contact : Rebecca Shaw
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 22-Jul-2020 12:20
Date Analysis Commenced : 22-Jul-2020
Issue Date : 03-Aug-2020 14:57



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
ShukHui Li	Client Services - Technical Manager	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- Glyphosate and AMPA conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP234: Poor matrix spike recovery for particular compounds due to matrix interferences.
- EP080: Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG020: It is recognised that total iron is less than dissolved for sample EP2007638-011. However, the difference is within experimental variation of the methods.
- TDS by method EA-015 may bias high for sample #1, 9, 10 and 13 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	BORR MW13	BORR MW15	BORR MW17	WRM NORTH 3	WFD01
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-001	EP2007638-002	EP2007638-003	EP2007638-004	EP2007638-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.23	6.43	7.04	7.37	7.36	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	696	171	163	582	536	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	594	118	122	412	365	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	246	12	28	49	48	
Total Alkalinity as CaCO3	----	1	mg/L	246	12	28	49	48	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	22	13	8	8	8	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	10	12	37	34	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	51	39	26	153	134	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	17	6	10	16	16	
Magnesium	7439-95-4	1	mg/L	13	4	7	16	16	
Sodium	7440-23-5	1	mg/L	132	19	12	87	87	
Potassium	7440-09-7	1	mg/L	3	4	3	8	8	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.03	0.20	0.09	0.11	0.10	
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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.029	0.036	0.056	0.002	0.002	
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	0.010	0.004	0.002	0.007	0.004	
Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.004	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	0.020	0.024	0.025	0.009	0.006	
Iron	7439-89-6	0.05	mg/L	0.34	0.90	0.21	0.82	0.76	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW13	BORR MW15	BORR MW17	WRM NORTH 3	WFD01
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-001	EP2007638-002	EP2007638-003	EP2007638-004	EP2007638-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	6.99	1.05	0.40	1.98	1.84	
Iron	7439-89-6	0.05	mg/L	4.04	8.02	1.62	1.47	1.52	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.52	<0.01	<0.01	<0.01	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.06	0.52	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	2.57	0.80	2.62	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.2	0.6	2.0	1.8	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	4.5	2.0	3.2	2.0	1.8	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.16	0.07	0.06	0.51	0.50	
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	0.47	0.40	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	7.60	1.55	1.54	6.06	5.45	
∅ Total Cations	----	0.01	meq/L	7.74	1.56	1.67	6.10	6.10	
∅ Ionic Balance	----	0.01	%	0.87	0.30	4.08	0.32	5.69	
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	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW13	BORR MW15	BORR MW17	WRM NORTH 3	WFD01
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-001	EP2007638-002	EP2007638-003	EP2007638-004	EP2007638-005	
				Result	Result	Result	Result	Result	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>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	
EP204: Glyphosate and AMPA									
Glyphosate	1071-83-6	10	µg/L	----	----	----	<10	<10	
EP234A: OP Pesticides									
Azinphos-ethyl	2642-71-9	0.02	µg/L	----	----	----	<0.02	<0.02	
Azinphos-methyl	86-50-0	0.02	µg/L	----	----	----	<0.02	<0.02	
Bromophos-ethyl	4824-78-6	0.10	µg/L	----	----	----	<0.10	<0.10	
Carbofenthiion	786-19-6	0.02	µg/L	----	----	----	<0.02	<0.02	
Chlorfenvinphos	470-90-6	0.02	µg/L	----	----	----	<0.02	<0.02	
Chlorpyrifos	2921-88-2	0.02	µg/L	----	----	----	<0.02	<0.02	
Chlorpyrifos-methyl	5598-13-0	0.2	µg/L	----	----	----	<0.2	<0.2	
Coumaphos	56-72-4	0.01	µg/L	----	----	----	<0.01	<0.01	
Demeton-O & Demeton-S	298-03-3/126-75-0	0.02	µg/L	----	----	----	<0.02	<0.02	
Demeton-S-methyl	919-86-8	0.02	µg/L	----	----	----	<0.02	<0.02	
Demeton-O	298-03-3	0.02	µg/L	----	----	----	<0.02	<0.02	
Demeton-S	126-75-0	0.02	µg/L	----	----	----	<0.02	<0.02	
Diazinon	333-41-5	0.01	µg/L	----	----	----	<0.01	<0.01	
Dichlorvos	62-73-7	0.20	µg/L	----	----	----	<0.20	<0.20	
Dimethoate	60-51-5	0.02	µg/L	----	----	----	<0.02	<0.02	
Disulfoton	298-04-4	0.05	µg/L	----	----	----	<0.05	<0.05	
Ethion	563-12-2	0.02	µg/L	----	----	----	<0.02	<0.02	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW13	BORR MW15	BORR MW17	WRM NORTH 3	WFD01
Client sampling date / time					20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007638-001	EP2007638-002	EP2007638-003	EP2007638-004	EP2007638-005	
				Result	Result	Result	Result	Result	
EP234A: OP Pesticides - Continued									
EPN	2104-64-5	0.05	µg/L	----	----	----	<0.05	<0.05	
Ethoprophos	13194-48-4	0.01	µg/L	----	----	----	<0.01	<0.01	
Fenamiphos	22224-92-6	0.01	µg/L	----	----	----	<0.01	<0.01	
Fenchlorphos (Rannel)	299-84-3	10	µg/L	----	----	----	<10	<10	
Fenitrothion	122-14-5	2	µg/L	----	----	----	<2	<2	
Fensulfothion	115-90-2	0.01	µg/L	----	----	----	<0.01	<0.01	
Fenthion	55-38-9	0.05	µg/L	----	----	----	<0.05	<0.05	
Malathion	121-75-5	0.02	µg/L	----	----	----	<0.02	<0.02	
Mevinphos	7786-34-7	0.02	µg/L	----	----	----	<0.02	<0.02	
Monocrotophos	6923-22-4	0.02	µg/L	----	----	----	<0.02	<0.02	
Omethoate	1113-02-6	0.01	µg/L	----	----	----	<0.01	<0.01	
Parathion	56-38-2	0.2	µg/L	----	----	----	<0.2	<0.2	
Parathion-methyl	298-00-0	0.5	µg/L	----	----	----	<0.5	<0.5	
Phorate	298-02-2	0.1	µg/L	----	----	----	<0.1	<0.1	
Pirimiphos-ethyl	23505-41-1	0.01	µg/L	----	----	----	<0.01	<0.01	
Pirimiphos-methyl	29232-93-7	0.01	µg/L	----	----	----	<0.01	<0.01	
Profenofos	41198-08-7	0.01	µg/L	----	----	----	<0.01	<0.01	
Prothiofos	34643-46-4	0.1	µg/L	----	----	----	<0.1	<0.1	
Sulfotep	3689-24-5	0.005	µg/L	----	----	----	<0.005	<0.005	
Sulprofos	35400-43-2	0.05	µg/L	----	----	----	<0.05	<0.05	
Terbufos	13071-79-9	0.01	µg/L	----	----	----	<0.01	<0.01	
Temephos	3383-96-8	0.02	µg/L	----	----	----	<0.02	<0.02	
Tetrachlorvinphos	22248-79-9	0.01	µg/L	----	----	----	<0.01	<0.01	
Triazophos	24017-47-8	0.005	µg/L	----	----	----	<0.005	<0.005	
Trichlorfon	52-68-6	0.02	µg/L	----	----	----	<0.02	<0.02	
Trichloronate	327-98-0	0.5	µg/L	----	----	----	<0.5	<0.5	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	102	109	110	109	106	
Toluene-D8	2037-26-5	2	%	96.7	97.0	95.6	97.2	97.5	
4-Bromofluorobenzene	460-00-4	2	%	102	102	102	102	102	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB01	FB01	TB01 (TBW21)	BORR MW27	BORR MW28
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-006	EP2007638-007	EP2007638-008	EP2007638-009	EP2007638-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	----	----	----	5.90	6.95	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	91	566	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	422	516	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	6	140	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	6	140	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	----	----	----	19	36	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	<1	52	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	----	24	97	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	----	3	38	
Magnesium	7439-95-4	1	mg/L	----	----	----	2	17	
Sodium	7440-23-5	1	mg/L	----	----	----	15	74	
Potassium	7440-09-7	1	mg/L	----	----	----	1	5	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	----	4.87	0.94	
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	----	----	----	0.003	0.001	
Cobalt	7440-48-4	0.001	mg/L	----	----	----	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	----	----	----	0.006	<0.001	
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	----	----	----	0.006	0.006	
Nickel	7440-02-0	0.001	mg/L	----	----	----	0.002	<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	----	----	----	1.49	1.60	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB01	FB01	TB01 (TBW21)	BORR MW27	BORR MW28
Client sampling date / time					20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007638-006	EP2007638-007	EP2007638-008	EP2007638-009	EP2007638-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	----	38.4	2.72	
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	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	----	----	----	8.62	1.71	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.08	0.38	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	----	----	----	0.08	0.38	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	0.17	0.02	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	1.8	3.5	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	2.0	3.5	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.25	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	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	----	----	----	<0.1	0.3	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	0.80	6.62	
∅ Total Cations	----	0.01	meq/L	----	----	----	0.99	6.64	
∅ Ionic Balance	----	0.01	%	----	----	----	----	0.20	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	<20	<20	<20	<20	
C10 - C14 Fraction	----	50	µg/L	----	----	----	<50	<50	
C15 - C28 Fraction	----	100	µg/L	----	----	----	<100	<100	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB01	FB01	TB01 (TBW21)	BORR MW27	BORR MW28
Client sampling date / time					20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007638-006	EP2007638-007	EP2007638-008	EP2007638-009	EP2007638-010	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons - Continued									
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	<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	
>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	<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	110	106	108	
Toluene-D8	2037-26-5	2	%	----	97.1	97.5	97.4	97.6	
4-Bromofluorobenzene	460-00-4	2	%	----	102	102	102	103	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW29	BORR MW32	BORR MW33	BORR MW34	WFD02
Client sampling date / time				21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-011	EP2007638-012	EP2007638-013	EP2007638-014	EP2007638-015	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.05	6.23	6.02	6.17	6.33	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	857	374	385	3180	378	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	664	254	410	2110	257	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	22	27	10	40	26	
Total Alkalinity as CaCO3	----	1	mg/L	22	27	10	40	26	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	24	24	15	35	22	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	186	13	15	240	13	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	174	100	106	852	101	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	24	2	10	58	3	
Magnesium	7439-95-4	1	mg/L	31	8	7	78	8	
Sodium	7440-23-5	1	mg/L	106	65	54	451	63	
Potassium	7440-09-7	1	mg/L	8	2	4	14	2	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.44	0.80	0.43	0.11	0.86	
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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.016	0.001	0.096	0.048	0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.002	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.016	0.002	0.008	0.060	0.002	
Nickel	7440-02-0	0.001	mg/L	0.005	<0.001	0.012	0.006	<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	0.042	<0.005	0.051	0.041	<0.005	
Iron	7439-89-6	0.05	mg/L	0.72	0.40	0.96	12.3	0.40	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW29	BORR MW32	BORR MW33	BORR MW34	WFD02
Client sampling date / time				21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-011	EP2007638-012	EP2007638-013	EP2007638-014	EP2007638-015	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.54	1.95	10.3	0.90	1.84	
Iron	7439-89-6	0.05	mg/L	0.67	0.93	5.92	17.6	0.92	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.69	0.38	0.59	1.16	0.37	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.69	0.38	0.59	1.16	0.37	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.54	0.07	0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	0.8	1.2	2.3	0.9	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.4	0.8	1.7	2.4	0.9	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.02	0.01	0.04	0.02	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	<0.01	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	1.9	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	9.22	3.63	3.50	29.8	3.64	
∅ Total Cations	----	0.01	meq/L	8.56	3.64	3.53	29.3	3.60	
∅ Ionic Balance	----	0.01	%	3.69	0.08	0.34	0.91	0.55	
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	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW29	BORR MW32	BORR MW33	BORR MW34	WFD02
Client sampling date / time				21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007638-011	EP2007638-012	EP2007638-013	EP2007638-014	EP2007638-015	
				Result	Result	Result	Result	Result	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>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	%	104	110	107	111	111	
Toluene-D8	2037-26-5	2	%	96.4	96.6	97.1	95.9	97.5	
4-Bromofluorobenzene	460-00-4	2	%	102	102	100	101	101	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			FB02	----	----	----	----
Client sampling date / time		21-Jul-2020 00:00			----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2007638-016	-----	-----	-----	-----	-----
				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	%	107	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	95.9	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	99.2	----	----	----	----	----



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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007638	Page	: 1 of 13
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 22-Jul-2020
Site	: ----	Issue Date	: 03-Aug-2020
Sampler	: ----	No. of samples received	: 16
Order number	: 6137041.0831	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.
- 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							
EP234A: OP Pesticides	EP2007618--001	Anonymous	Azinphos-ethyl	2642-71-9	23.5 %	70.0-130%	Recovery less than lower data quality objective
EP234A: OP Pesticides	EP2007618--001	Anonymous	Parathion	56-38-2	56.8 %	70.0-130%	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3, WFD01	----	----	----	28-Jul-2020	20-Jul-2020	8
Clear Plastic Bottle - Natural							
BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	----	----	----	28-Jul-2020	21-Jul-2020	7

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



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) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	28-Jul-2020	20-Jul-2020	*
Clear Plastic Bottle - Natural (EA005-P) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	28-Jul-2020	21-Jul-2020	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	28-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	28-Jul-2020	18-Aug-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	24-Jul-2020	27-Jul-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR MW27,	BORR MW28	21-Jul-2020	----	----	----	24-Jul-2020	28-Jul-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR MW29, BORR MW33, WFD02	BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	28-Jul-2020	28-Jul-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	28-Jul-2020	03-Aug-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	28-Jul-2020	04-Aug-2020	✓



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	
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	24-Jul-2020	03-Aug-2020	✓
Clear Plastic Bottle - Natural (ED038) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	24-Jul-2020	04-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Natural (ED041G) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	22-Jul-2020	18-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Natural (ED045G) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	22-Jul-2020	18-Aug-2020	✓
ED093F: Dissolved Major Cations								
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (ED093F) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	27-Jul-2020	17-Aug-2020	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (ED093F) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	27-Jul-2020	18-Aug-2020	✓



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) BORR MW13, BORR MW17, WFD01 BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	27-Jul-2020	16-Jan-2021	✓
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F) BORR MW27, BORR MW29, BORR MW33, WFD02 BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	27-Jul-2020	17-Jan-2021	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) BORR MW13, BORR MW17, WFD01, BORR MW15, WRM NORTH 3, RB01	20-Jul-2020	23-Jul-2020	16-Jan-2021	✓	23-Jul-2020	16-Jan-2021	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) BORR MW27, BORR MW29, BORR MW33, WFD02 BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	23-Jul-2020	17-Jan-2021	✓	23-Jul-2020	17-Jan-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW13, BORR MW17, WFD01 BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW27, BORR MW29, BORR MW33, WFD02 BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	22-Jul-2020	18-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW13, BORR MW17, WFD01 BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW27, BORR MW29, BORR MW33, WFD02 BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	22-Jul-2020	18-Aug-2020	✓



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) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	30-Jul-2020	17-Aug-2020	✓	30-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	30-Jul-2020	18-Aug-2020	✓	30-Jul-2020	18-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	30-Jul-2020	17-Aug-2020	✓	30-Jul-2020	17-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	30-Jul-2020	18-Aug-2020	✓	30-Jul-2020	18-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	22-Jul-2020	22-Jul-2020	✓
Clear Plastic Bottle - Natural (EK071G) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	22-Jul-2020	23-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW13, BORR MW17, WFD01	BORR MW15, WRM NORTH 3,	20-Jul-2020	----	----	----	24-Jul-2020	27-Jul-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	----	----	----	24-Jul-2020	28-Jul-2020	✓



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) BORR MW13, BORR MW17,	BORR MW15, WRM NORTH 3	20-Jul-2020	23-Jul-2020	27-Jul-2020	✓	28-Jul-2020	01-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) WFD01		20-Jul-2020	24-Jul-2020	27-Jul-2020	✓	28-Jul-2020	02-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	24-Jul-2020	28-Jul-2020	✓	28-Jul-2020	02-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW13, BORR MW17, WFD01, TB01 (TBW21)	BORR MW15, WRM NORTH 3, FB01,	20-Jul-2020	27-Jul-2020	03-Aug-2020	✓	27-Jul-2020	03-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW27, BORR MW29, BORR MW33, WFD02,	BORR MW28, BORR MW32, BORR MW34, FB02	21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) BORR MW13, BORR MW17,	BORR MW15, WRM NORTH 3	20-Jul-2020	23-Jul-2020	27-Jul-2020	✓	28-Jul-2020	01-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) WFD01		20-Jul-2020	24-Jul-2020	27-Jul-2020	✓	28-Jul-2020	02-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW27, BORR MW29, BORR MW33, WFD02	BORR MW28, BORR MW32, BORR MW34,	21-Jul-2020	24-Jul-2020	28-Jul-2020	✓	28-Jul-2020	02-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW13, BORR MW17, WFD01, TB01 (TBW21)	BORR MW15, WRM NORTH 3, FB01,	20-Jul-2020	27-Jul-2020	03-Aug-2020	✓	27-Jul-2020	03-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW27, BORR MW29, BORR MW33, WFD02,	BORR MW28, BORR MW32, BORR MW34, FB02	21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓



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) BORR MW13, BORR MW17, WFD01, TB01 (TBW21)	BORR MW15, WRM NORTH 3, FB01,	20-Jul-2020	27-Jul-2020	03-Aug-2020	✓	27-Jul-2020	03-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW27, BORR MW29, BORR MW33, WFD02,	BORR MW28, BORR MW32, BORR MW34, FB02	21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓
EP204: Glyphosate and AMPA								
Amber Bottle Unpreserved for Specialist Organics (EP204) WRM NORTH 3,	WFD01	20-Jul-2020	----	----	----	28-Jul-2020	03-Aug-2020	✓
EP234A: OP Pesticides								
Amber Bottle Unpreserved for Specialist Organics (EP234-1) WRM NORTH 3,	WFD01	20-Jul-2020	----	----	----	27-Jul-2020	27-Jul-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	20	10.00	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	4	34	11.76	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	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Glyphosate and AMPA	EP204	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	17	11.76	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	2	5	40.00	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	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	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	18	11.11	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)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	20	10.00	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	4	34	11.76	10.00	✓	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	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Glyphosate and AMPA	EP204	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	5	20.00	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
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	18	5.56	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)							
Alkalinity by PC Titrator	ED037-P	1	20	5.00	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	2	34	5.88	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	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Glyphosate and AMPA	EP204	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	5.26	5.26	✓	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	18	5.56	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
Chloride by Discrete Analyser	ED045G	2	34	5.88	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
Glyphosate and AMPA	EP204	1	5	20.00	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	5.41	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	18	5.56	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
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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
TRH - Semivolatle 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 - 8260D 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)
Glyphosate and AMPA	EP204	WATER	In house: Pre-column derivatisation LCMS (ES in negative mode). Water samples are derivatised with 9-fluorenyl methoxycarbonyl chloroformate (FMOCl) in alkaline condition. The derivatives of glyphosate and AMPA are separated by a C8 column and determined by MS.
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	WATER	In house: LC-MSMS, direct injection. A sample is filtered and injected directly onto the LC-MSMS. Analysis is by LC/MSMS, ESI Positive Mode.



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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 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.

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESDat set up; no spaces)
6137041

PO Number (to be invoiced)
6137041.0831

Laboratory: Eurofins | mgt
Address: 2/91 Leach Hwy, Kewdale WA 6105
Laboratory Contact: Robert Johnston (08 9251 9605)

Laboratory Quote No.

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Julia Roberts

Email Address (Results)
vicki.davies@ghd.com
pooranie.yoganathan@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix & Soil/SL <small>Sludge/W-Water/ A-Air</small>	Container			Analyses													Remarks							
					Type <small>B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic</small>	Preservative <small>Unpreserved/HCl/H2SO4/HNO3/Other</small>	No	As per normal suite <small>(groundwater)</small>	As per normal suite <small>(surface water)</small>						Rinsate Blank	Field Blank	Trip Blank						HOLD					
BORR MW13	1	20.7.20					8	X																				
BORR MW15	2	"					8	X																				
BORR MW17	3	"					8	X																				
WRM NORTH 3	4	"					10		X																			
WFD01	5	"					9		X																			
RBO1	6	"					1									X												
FBO1	7	"					2										X											
TBO1 (TBW21)	8	"					1											X										
BORR MW27	9	21.7.20					8	X																				
BORR MW28	10	"					8	X																				
BORR MW29	11	"					8	X																				
BORR MW32	12	"					10	X																				
BORR MW33	13	"					8	X																				
BORR MW34	14	"					8	X																				

Environmental Division
Perth
Work Order Reference
EP2007638

Telephone: +61-8-9406 1301

Sampled by: _____
Received by: **M**

Date/Time: _____
Date/Time: **22/7/2020**

Relinquished by: _____
Relinquished by: _____

Date/Time: _____
Date/Time: _____

1220

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESdat set up, no spaces) 6137041	PO Number (to be invoiced) 6137041.0831	Laboratory: ALS Environmental
Laboratory Quote No. EP/489/19 V5		Address: 26 Rigali Way, Wangara WA 6065
Turnaround Time Standard		Laboratory Contact: Lauren Ockwell (08 9406 1301)

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/S- Sludge/W-Water/A-Air	Container			Analyses										HOLD	Remarks								
					Type B-Bottle/I-Iar/V- Via/Bag/G-Glassy/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No	As per normal suite (groundwater)	As per normal suite (surface water)	Rinsate Blank	Field Blank	Trip Blank															
WF002	15	21.7.20		W			8	X																			
FB02	16	11		W			2																				

Sampled by:	Date/Time:	Relinquished by:	Date/Time:
Received by: <u>MD</u>	Date/Time: <u>22/7/2020</u>	Relinquished by:	Date/Time:

1020

CERTIFICATE OF ANALYSIS

Work Order : **EP2007640**
Client : **GHD PTY LTD**
Contact : Julia Roberts
Address : 999 HAY STREET
 PERTH WA, AUSTRALIA 6000

Telephone : ----
Project : 6137041
Order number : 6137041.0831
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EP/489/19 V4_V2
No. of samples received : 14
No. of samples analysed : 14

Page : 1 of 10
Laboratory : Environmental Division Perth
Contact : Rebecca Shaw
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 22-Jul-2020 12:20
Date Analysis Commenced : 22-Jul-2020
Issue Date : 29-Jul-2020 21:58



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- EP080: Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP080: Poor matrix spike recovery for QC sample due to suspected matrix effects and interferences.
- EK061G/EK067G (TKN/TP): LOR for sample EP2007640-001 raised due to possible sample matrix interference.
- TDS by method EA-015 may bias high for sample #7, 8, 9 and 11 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Ionic balances were calculated using: major anions - chloride, alkalinity, sulfate and NOx; and major cations - calcium, magnesium, potassium and sodium for #1.
- 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	BORR MW18	BH32.1	NORTH CREEK 2	NORTHERN 5	SW07
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007640-001	EP2007640-002	EP2007640-003	EP2007640-004	EP2007640-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	5.13	6.02	7.43	7.72	7.57	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	299	1240	547	663	562	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	210	688	316	376	318	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	21	36	112	37	
Total Alkalinity as CaCO3	----	1	mg/L	<1	21	36	112	37	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	14	18	5	7	4	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	31	26	39	26	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	51	375	138	122	142	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	13	5	8	36	8	
Magnesium	7439-95-4	1	mg/L	5	24	11	12	11	
Sodium	7440-23-5	1	mg/L	30	186	79	78	81	
Potassium	7440-09-7	1	mg/L	9	7	3	6	3	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.12	0.02	0.08	0.07	0.14	
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	
Cobalt	7440-48-4	0.001	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.002	0.013	0.002	0.006	0.041	
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	0.214	0.062	0.028	0.093	0.014	
Nickel	7440-02-0	0.001	mg/L	0.005	0.002	<0.001	0.002	0.002	
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	0.007	0.018	<0.005	0.007	0.015	
Iron	7439-89-6	0.05	mg/L	<0.05	6.45	0.54	0.30	0.36	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW18	BH32.1	NORTH CREEK 2	NORTHERN 5	SW07
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007640-001	EP2007640-002	EP2007640-003	EP2007640-004	EP2007640-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.28	3.48	1.38	0.84	1.38	
Iron	7439-89-6	0.05	mg/L	0.20	9.72	1.42	1.43	1.50	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.07	0.01	0.48	0.01	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	<0.01	0.07	<0.01	0.47	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	11.5	<0.01	1.18	2.10	1.21	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.8	0.2	0.6	1.5	0.5	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	13.3	0.2	1.8	3.6	1.7	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	<0.05	0.12	0.02	0.52	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	<0.01	0.30	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.53	----	----	----	----	
∅ Total Anions	----	0.01	meq/L	----	11.6	5.15	6.49	5.29	
∅ Total Cations	----	0.01	meq/L	2.60	10.5	4.82	6.33	4.90	
∅ Ionic Balance	----	0.01	%	1.27	----	----	----	----	
∅ Ionic Balance	----	0.01	%	----	5.19	3.37	1.26	3.74	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW08	SW09	BORR MW31	BH9.2	BORR MW37
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007640-006	EP2007640-007	EP2007640-008	EP2007640-009	EP2007640-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.57	7.26	6.02	7.31	5.80	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	566	406	270	789	3460	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	329	313	216	660	2060	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	37	79	15	81	23	
Total Alkalinity as CaCO3	----	1	mg/L	37	79	15	81	23	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	4	14	27	8	29	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	26	<1	<1	41	75	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	143	82	65	186	1010	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	8	19	3	42	14	
Magnesium	7439-95-4	1	mg/L	11	9	5	23	68	
Sodium	7440-23-5	1	mg/L	82	50	39	72	553	
Potassium	7440-09-7	1	mg/L	3	8	4	2	2	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.17	0.27	1.34	0.01	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	0.002	0.002	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	<0.001	<0.001	0.043	
Copper	7440-50-8	0.001	mg/L	0.002	0.044	0.065	0.109	0.002	
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	0.014	0.210	0.009	0.004	0.172	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.005	0.008	0.010	0.015	
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	0.040	0.049	0.054	0.013	
Iron	7439-89-6	0.05	mg/L	0.39	6.76	1.25	<0.05	6.42	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW08	SW09	BORR MW31	BH9.2	BORR MW37
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	20-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007640-006	EP2007640-007	EP2007640-008	EP2007640-009	EP2007640-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.45	1.41	1.86	2.09	1.03	
Iron	7439-89-6	0.05	mg/L	1.49	10.9	3.81	2.74	6.49	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	0.85	<0.01	0.05	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.02	0.03	0.85	<0.01	0.05	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.31	<0.01	0.48	1.89	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	2.4	1.7	0.5	<0.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.8	2.4	2.2	2.4	<0.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.02	0.16	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	0.04	<0.01	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	5.31	3.89	2.13	7.72	30.5	
∅ Total Cations	----	0.01	meq/L	4.95	4.07	2.36	7.17	30.4	
∅ Ionic Balance	----	0.01	%	3.57	2.22	5.04	3.67	0.18	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW06	WFD03	RB02	TB02 (TBW618)	----
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2007640-011	EP2007640-012	EP2007640-013	EP2007640-014	-----	-----
				Result	Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.60	6.08	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	868	3520	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	635	2040	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	72	22	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	72	22	----	----	----	----
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	4	26	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	26	78	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	237	1020	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	25	14	----	----	----	----
Magnesium	7439-95-4	1	mg/L	25	68	----	----	----	----
Sodium	7440-23-5	1	mg/L	99	542	----	----	----	----
Potassium	7440-09-7	1	mg/L	9	2	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.18	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	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.042	----	----	----	----
Copper	7440-50-8	0.001	mg/L	0.050	0.003	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.049	0.171	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.005	0.016	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.034	0.016	----	----	----	----
Iron	7439-89-6	0.05	mg/L	1.04	6.29	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW06	WFD03	RB02	TB02 (TBW618)	----
Client sampling date / time				20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2007640-011	EP2007640-012	EP2007640-013	EP2007640-014	-----	-----
				Result	Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.41	1.05	----	----	----	----
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	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	2.48	6.60	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.04	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.07	0.04	----	----	----	----
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	1.6	<0.1	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	2.0	<0.1	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.32	0.02	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.11	<0.01	----	----	----	----
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	----	----	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	8.66	30.8	----	----	----	----
∅ Total Cations	----	0.01	meq/L	7.84	29.9	----	----	----	----
∅ Ionic Balance	----	0.01	%	4.99	1.50	----	----	----	----
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW06	WFD03	RB02	TB02 (TBW618)	----
Client sampling date / time					20-Jul-2020 00:00	20-Jul-2020 00:00	21-Jul-2020 00:00	21-Jul-2020 00:00	----
Compound	CAS Number	LOR	Unit	EP2007640-011	EP2007640-012	EP2007640-013	EP2007640-014	-----	-----
				Result	Result	Result	Result	-----	-----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ 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	%	----	----	----	91.9	----	----
Toluene-D8	2037-26-5	2	%	----	----	----	104	----	----
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	95.2	----	----



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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007640	Page	: 1 of 9
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 22-Jul-2020
Site	: ----	Issue Date	: 29-Jul-2020
Sampler	: ----	No. of samples received	: 14
Order number	: 6137041.0831	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

- **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	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	----	----	----	24-Jul-2020	20-Jul-2020	4

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
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	20-Jul-2020	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	----	----	----	24-Jul-2020	20-Jul-2020	✘
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	20-Jul-2020	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	----	----	----	24-Jul-2020	17-Aug-2020	✔



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	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	24-Jul-2020	27-Jul-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	24-Jul-2020	03-Aug-2020	✓
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	24-Jul-2020	03-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓



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
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06, BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	23-Jul-2020	17-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06, BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	23-Jul-2020	16-Jan-2021	✓
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) RB02	21-Jul-2020	23-Jul-2020	17-Jan-2021	✓	23-Jul-2020	17-Jan-2021	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06, BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	23-Jul-2020	16-Jan-2021	✓	23-Jul-2020	16-Jan-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06, BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06, BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	22-Jul-2020	17-Aug-2020	✓



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) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	28-Jul-2020	17-Aug-2020	✓	28-Jul-2020	17-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	28-Jul-2020	17-Aug-2020	✓	28-Jul-2020	17-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	22-Jul-2020	22-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW18, NORTH CREEK 2, SW07, SW09, BH9.2, SW06,	BH32.1, NORTHERN 5, SW08, BORR MW31, BORR MW37, WFD03	20-Jul-2020	----	----	----	24-Jul-2020	27-Jul-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) TB02 (TBW618)		21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) TB02 (TBW618)		21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) TB02 (TBW618)		21-Jul-2020	27-Jul-2020	04-Aug-2020	✓	27-Jul-2020	04-Aug-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	32	12.50	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	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
pH by PC Titrator	EA005-P	4	39	10.26	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	10.53	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	30	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	30	10.00	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)							
Acidity as Calcium Carbonate	ED038	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	32	12.50	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	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	29	6.90	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
Major Cations - Dissolved	ED093F	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
pH by PC Titrator	EA005-P	4	39	10.26	10.00	✓	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	10.53	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	30	6.67	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)							



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Alkalinity by PC Titrator	ED037-P	2	32	6.25	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	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	29	6.90	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
Major Cations - Dissolved	ED093F	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	5.26	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	30	6.67	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
Chloride by Discrete Analyser	ED045G	1	15	6.67	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	30	6.67	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
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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260D 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)
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.

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



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Perth WA 6832

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Project ID (as per ESDat set up; no spaces) 6137041	PO Number (to be invoiced) 6137041.0831	Laboratory: ALS Environmental
		Address: 26 Rigali Way, Wangara WA 6065
		Laboratory Contact: Lauren Ockwell (08 9406 1301)

Laboratory Quote No. EP/489/19 V5	Turnaround Time Standard	Analyses													Remarks								
Job Manager (Invoice) & GHD accounts Julia Roberts		Email Address (Results) vicki.davies@ghd.com pooranie.voganathan@ghd.com		Sample Matrix S=Soil/ SL=Sludge/ W=Water/ A=Air	Container			As per reduced suite (groundwater)	As per reduced suite (surface water)	Rinsate Blank	Field Blank	Trip Blank	HOLD										
GHD Sample ID	Lab Sample ID	Date	Time		Type B= Bottle/ Jar/ Y=Vial/ Bag/ C= Glass/ P= Plastic	Preservative Unpreserved/ HCl/ H2SO4/ HNO3/ Other	No																

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	As per reduced suite (groundwater)	As per reduced suite (surface water)	Rinsate Blank	Field Blank	Trip Blank	HOLD	Remarks
BORR MW18	1	20.7.20		W			S	X						
BH32.1	6	11		W			S	X						
NORTH CREEK 2	3	11		W			S		X					
NORTHERN S	4	11		W			S		X					
SW07	5	11		W			S		X					
SW08	6	11		W			S		X					
SW09	7	11		W			S		X					
BORR MW31	8	21.7.20		W			S	X						
BH9.2	9	11						X						
BORR MW37	10	11						X						
SW06	11	11							X					
WFD03	12	11						X						
RB02	13	11								X				
RB02 (TBW618)	14	11										X		

Environmental Division
Perth
Work Order Reference
EP2007640



Telephone: +61-8-9406 1301

Sampled by:	Date/Time:	Relinquished by:	Date/Time:
Received by: <i>MD</i>	Date/Time: 22/7/2020	Relinquished by:	Date/Time:

CERTIFICATE OF ANALYSIS

Work Order	: EP2007769	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Contact	: Rebecca Shaw
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 24-Jul-2020 12:40
Order number	: 6137041.0831	Date Analysis Commenced	: 24-Jul-2020
C-O-C number	: ----	Issue Date	: 03-Aug-2020 16:06
Sampler	: IAN OGLESBY, Tristan		
Site	: ----		
Quote number	: EP/489/19 V4_V2		
No. of samples received	: 18		
No. of samples analysed	: 18		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- ED041G: LOR raised for sulphate on sample "MT01" EP2007769-006 due to possible sample matrix interference.
- TDS by method EA-015 may bias high for sample #3, #6 and #8 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	BORR MW24	BORR MW25	BORR MW39	BH11.1	JT01
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-001	EP2007769-002	EP2007769-003	EP2007769-004	EP2007769-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	4.51	6.61	5.78	6.72	7.27	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1900	1400	234	2550	1040	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1170	813	560	1520	660	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	38	12	92	36	
Total Alkalinity as CaCO3	----	1	mg/L	<1	38	12	92	36	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	61	28	45	46	10	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	52	35	136	36	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	603	428	40	699	322	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	15	<1	14	17	
Magnesium	7439-95-4	1	mg/L	15	31	<1	53	30	
Sodium	7440-23-5	1	mg/L	353	213	46	458	145	
Potassium	7440-09-7	1	mg/L	<1	6	<1	15	4	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.21	<0.01	1.01	0.04	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	0.001	0.002	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.008	0.001	<0.001	0.003	<0.001	
Copper	7440-50-8	0.001	mg/L	0.055	0.021	0.049	0.049	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	0.020	0.003	0.338	0.108	
Nickel	7440-02-0	0.001	mg/L	0.008	0.003	0.003	0.012	<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	0.038	0.018	0.022	0.063	0.006	
Iron	7439-89-6	0.05	mg/L	0.29	1.73	0.61	30.9	0.33	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW24	BORR MW25	BORR MW39	BH11.1	JT01
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-001	EP2007769-002	EP2007769-003	EP2007769-004	EP2007769-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.43	0.93	17.7	0.06	0.37	
Iron	7439-89-6	0.05	mg/L	1.71	25.1	20.2	31.5	1.30	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.06	0.03	0.20	0.04	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.03	0.06	0.03	0.20	0.04	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.10	0.05	0.62	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.2	1.1	0.5	0.5	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.3	0.2	1.2	0.6	1.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.05	0.07	1.02	0.37	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	0.01	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	17.8	13.9	2.10	24.4	10.6	
∅ Total Cations	----	0.01	meq/L	16.6	12.7	2.00	25.4	9.73	
∅ Ionic Balance	----	0.01	%	3.41	4.49	2.34	1.97	4.07	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MT01	NORTHERN 3	BORR MW05	BORR MW10	BORR MW12
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-006	EP2007769-007	EP2007769-008	EP2007769-009	EP2007769-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.96	6.38	7.19	6.54	6.82	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	183	11200	454	504	541	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	204	7710	392	336	340	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	37	5	45	27	30	
Total Alkalinity as CaCO3	----	1	mg/L	37	5	45	27	30	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	17	10	11	27	15	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	444	46	54	33	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	37	3690	100	115	142	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	13	90	9	20	7	
Magnesium	7439-95-4	1	mg/L	4	230	6	16	12	
Sodium	7440-23-5	1	mg/L	25	1770	76	64	79	
Potassium	7440-09-7	1	mg/L	2	57	3	6	7	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.26	0.11	0.10	0.07	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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.006	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.037	0.009	0.003	<0.001	0.040	
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	0.219	0.003	0.012	0.008	
Nickel	7440-02-0	0.001	mg/L	0.002	0.004	<0.001	<0.001	0.005	
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	0.044	0.015	<0.005	<0.005	0.026	
Iron	7439-89-6	0.05	mg/L	0.43	0.24	0.47	2.51	1.05	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MT01	NORTHERN 3	BORR MW05	BORR MW10	BORR MW12
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-006	EP2007769-007	EP2007769-008	EP2007769-009	EP2007769-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.26	0.16	8.20	0.50	0.84	
Iron	7439-89-6	0.05	mg/L	0.43	1.06	1.25	7.62	5.16	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.14	0.04	0.37	0.12	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.02	0.14	0.04	0.37	0.12	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.07	0.02	0.25	0.97	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.3	1.1	0.9	0.9	0.6	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	4.3	1.2	0.9	1.2	1.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.16	0.04	0.09	0.02	0.05	
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	<0.01	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	1.78	113	4.68	4.91	5.29	
∅ Total Cations	----	0.01	meq/L	2.12	102	4.32	5.25	4.95	
∅ Ionic Balance	----	0.01	%	8.55	5.37	3.91	3.39	3.32	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW19	BORR MW19b	BORR MW20	SOUTHERN 4	SOUTHERN 3
Client sampling date / time				23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-011	EP2007769-012	EP2007769-013	EP2007769-014	EP2007769-015	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.61	7.18	6.33	7.81	7.66	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1990	1050	6650	5780	1870	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1180	647	4250	3500	1170	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	63	58	45	102	98	
Total Alkalinity as CaCO3	----	1	mg/L	63	58	45	102	98	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	40	12	40	4	9	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	35	80	133	137	122	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	615	251	2050	1710	527	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	18	20	74	59	26	
Magnesium	7439-95-4	1	mg/L	49	21	176	144	42	
Sodium	7440-23-5	1	mg/L	320	158	1060	952	308	
Potassium	7440-09-7	1	mg/L	6	4	5	22	14	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	0.05	0.18	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<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	<0.001	<0.001	<0.001	<0.001	0.001	
Cobalt	7440-48-4	0.001	mg/L	0.003	0.002	0.011	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.045	0.005	0.024	0.026	0.004	
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	0.145	0.066	0.186	0.006	0.060	
Nickel	7440-02-0	0.001	mg/L	0.006	0.004	0.008	0.003	0.002	
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	0.006	0.020	0.028	0.022	
Iron	7439-89-6	0.05	mg/L	4.71	<0.05	0.26	0.15	0.86	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW19	BORR MW19b	BORR MW20	SOUTHERN 4	SOUTHERN 3
Client sampling date / time				23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007769-011	EP2007769-012	EP2007769-013	EP2007769-014	EP2007769-015	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.82	2.57	3.77	0.43	0.21	
Iron	7439-89-6	0.05	mg/L	5.14	1.34	5.39	0.37	1.04	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.05	<0.01	0.09	0.02	0.04	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.05	<0.01	0.09	0.02	0.04	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	13.8	2.55	0.03	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	2.5	0.7	3.5	4.4	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.2	16.3	3.2	3.5	4.4	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.06	0.07	0.03	0.15	0.88	
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	0.67	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	19.3	9.90	61.5	53.1	19.4	
∅ Total Cations	----	0.01	meq/L	19.0	9.70	64.4	56.8	18.5	
∅ Ionic Balance	----	0.01	%	0.87	1.04	2.32	3.31	2.26	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WFD04	RB04	TB04 (TBW619)	----	----
Client sampling date / time				23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2007769-016	EP2007769-017	EP2007769-018	-----	-----	
				Result	Result	Result	----	----	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.74	----	----	----	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1880	----	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1170	----	----	----	----	
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	99	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	99	----	----	----	----	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	10	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	121	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	528	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	27	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	43	----	----	----	----	
Sodium	7440-23-5	1	mg/L	310	----	----	----	----	
Potassium	7440-09-7	1	mg/L	14	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.18	----	----	----	----	
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	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.005	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.060	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.021	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.89	----	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WFD04	RB04	TB04 (TBW619)	----	----
Client sampling date / time					23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2007769-016	EP2007769-017	EP2007769-018	-----	-----	
				Result	Result	Result	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.22	----	----	----	----	
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	----	----	----	
Nickel	7440-02-0	0.001	mg/L	----	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	----	<0.001	----	----	----	
Zinc	7440-66-6	0.005	mg/L	----	<0.005	----	----	----	
Iron	7439-89-6	0.05	mg/L	1.03	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	----	----	----	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.03	----	----	----	----	
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	4.4	----	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	4.4	----	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.88	----	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.68	----	----	----	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	19.4	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	18.7	----	----	----	----	
∅ Ionic Balance	----	0.01	%	1.74	----	----	----	----	
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	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WFD04	RB04	TB04 (TBW619)	----	----
Client sampling date / time					23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2007769-016	EP2007769-017	EP2007769-018	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
[^] 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	%	----	----	87.6	----	----	
Toluene-D8	2037-26-5	2	%	----	----	104	----	----	
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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007769	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 24-Jul-2020
Site	: ----	Issue Date	: 03-Aug-2020
Sampler	: IAN OGLESBY, Tristan	No. of samples received	: 18
Order number	: 6137041.0831	No. of samples analysed	: 18

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 BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	----	----	----	29-Jul-2020	22-Jul-2020	7
Clear Plastic Bottle - Natural BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	----	----	----	29-Jul-2020	23-Jul-2020	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) BORR MW24, BORR MW39, JT01, NORTHERN 3	22-Jul-2020	----	----	----	29-Jul-2020	22-Jul-2020	✖
Clear Plastic Bottle - Natural (EA005-P) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	23-Jul-2020	----	----	----	29-Jul-2020	23-Jul-2020	✖



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	
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	29-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	29-Jul-2020	20-Aug-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR MW05, BORR MW12,	BORR MW10, BORR MW19	23-Jul-2020	----	----	----	29-Jul-2020	30-Jul-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR MW19b, SOUTHERN 4, WFD04	BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	30-Jul-2020	30-Jul-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	29-Jul-2020	05-Aug-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	29-Jul-2020	06-Aug-2020	✓



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	
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	29-Jul-2020	05-Aug-2020	✓
Clear Plastic Bottle - Natural (ED038) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	29-Jul-2020	06-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (ED041G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (ED045G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓



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	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	28-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	28-Jul-2020	20-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	28-Jul-2020	18-Jan-2021	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	28-Jul-2020	19-Jan-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	27-Jul-2020	18-Jan-2021	✓	27-Jul-2020	18-Jan-2021	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04,	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3, RB04	23-Jul-2020	27-Jul-2020	19-Jan-2021	✓	27-Jul-2020	19-Jan-2021	✓



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) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	31-Jul-2020	19-Aug-2020	✓	03-Aug-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	31-Jul-2020	20-Aug-2020	✓	03-Aug-2020	20-Aug-2020	✓



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) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	31-Jul-2020	19-Aug-2020	✓	03-Aug-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	31-Jul-2020	20-Aug-2020	✓	03-Aug-2020	20-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	24-Jul-2020	24-Jul-2020	✓
Clear Plastic Bottle - Natural (EK071G) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	24-Jul-2020	25-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW24, BORR MW39, JT01, NORTHERN 3	BORR MW25, BH11.1, MT01,	22-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW05, BORR MW12, BORR MW19b, SOUTHERN 4, WFD04	BORR MW10, BORR MW19, BORR MW20, SOUTHERN 3,	23-Jul-2020	----	----	----	29-Jul-2020	30-Jul-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) TB04 (TBW619)		23-Jul-2020	29-Jul-2020	06-Aug-2020	✓	29-Jul-2020	06-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) TB04 (TBW619)		23-Jul-2020	29-Jul-2020	06-Aug-2020	✓	29-Jul-2020	06-Aug-2020	✓

Page : 8 of 12
 Work Order : EP2007769
 Client : GHD PTY LTD
 Project : 6137041



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) TB04 (TBW619)	23-Jul-2020	29-Jul-2020	06-Aug-2020	✓	29-Jul-2020	06-Aug-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	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	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	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
Major Cations - Dissolved	ED093F	2	16	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
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	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	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	4	33	12.12	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 Volatiles/BTEX	EP080	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	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	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	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
Major Cations - Dissolved	ED093F	1	16	6.25	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
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	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	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	2	33	6.06	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 Volatiles/BTEX	EP080	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	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	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	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
Major Cations - Dissolved	ED093F	1	16	6.25	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	5.26	5.26	✓	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	2	33	6.06	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 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
Chloride by Discrete Analyser	ED045G	1	19	5.26	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	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	2	33	6.06	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 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
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)
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 liberated thiocyanate forms highly-coloured ferric thiocyanate 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.
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.



Analytical Methods	Method	Matrix	Method Descriptions
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)
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. 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 orthophosphate 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)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260D 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)
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.

CERTIFICATE OF ANALYSIS

Work Order	: EP2007775	Page	: 1 of 14
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Contact	: Rebecca Shaw
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 24-Jul-2020 12:40
Order number	: 6137041.0831	Date Analysis Commenced	: 24-Jul-2020
C-O-C number	: ----	Issue Date	: 06-Aug-2020 14:22
Sampler	: IAN OGLESBY, Tristan		
Site	: ----		
Quote number	: EP/489/19 V4_V2		
No. of samples received	: 13		
No. of samples analysed	: 13		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- EP204 and EP234-1 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- TDS by method EA-015 may bias high for sample #9, 10 and 12 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	BORR MW21	BORR MW22	BORR MW22b	BH13.2	NORTH CREEK 4
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007775-001	EP2007775-002	EP2007775-003	EP2007775-004	EP2007775-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	6.03	6.39	7.20	6.08	7.54	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	7300	3070	534	9910	958	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	6320	----	
Total Dissolved Solids @180°C	----	10	mg/L	4580	1750	350	----	568	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	26	21	62	14	43	
Total Alkalinity as CaCO3	----	1	mg/L	26	21	62	14	43	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	34	19	14	55	7	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	308	158	64	439	38	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2140	874	82	3140	289	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	57	24	7	84	18	
Magnesium	7439-95-4	1	mg/L	140	68	10	212	28	
Sodium	7440-23-5	1	mg/L	1150	549	90	1660	181	
Potassium	7440-09-7	1	mg/L	7	1	2	6	5	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.04	0.03	0.08	0.02	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	0.002	<0.001	<0.001	0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	0.038	0.030	<0.001	0.025	0.004	
Copper	7440-50-8	0.001	mg/L	0.031	0.004	0.019	0.054	0.002	
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	0.344	0.081	0.007	0.545	0.077	
Nickel	7440-02-0	0.001	mg/L	0.071	0.023	0.002	0.036	0.004	
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	0.042	0.064	0.014	0.046	0.009	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW21	BORR MW22	BORR MW22b	BH13.2	NORTH CREEK 4
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007775-001	EP2007775-002	EP2007775-003	EP2007775-004	EP2007775-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Iron	7439-89-6	0.05	mg/L	0.87	0.84	0.06	0.32	0.38	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	2.86	2.05	0.70	0.52	0.43	
Iron	7439-89-6	0.05	mg/L	4.61	2.64	0.55	0.90	1.24	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.03	0.22	0.02	0.02	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.04	0.03	0.22	0.02	0.02	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	4.89	4.15	0.11	1.21	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	1.0	1.0	0.2	1.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.3	5.9	5.2	0.3	2.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.06	0.07	0.08	0.03	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	0.02	0.02	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	67.3	28.4	4.88	98.0	9.80	
∅ Total Cations	----	0.01	meq/L	64.6	30.7	5.14	94.0	11.2	
∅ Ionic Balance	----	0.01	%	2.07	3.96	2.53	2.08	6.67	
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	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW21	BORR MW22	BORR MW22b	BH13.2	NORTH CREEK 4
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007775-001	EP2007775-002	EP2007775-003	EP2007775-004	EP2007775-005	
				Result	Result	Result	Result	Result	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ 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	
EP204: Glyphosate and AMPA									
Glyphosate	1071-83-6	10	µg/L	----	----	----	----	<10	
EP234A: OP Pesticides									
Azinphos-ethyl	2642-71-9	0.02	µg/L	----	----	----	----	<0.02	
Azinphos-methyl	86-50-0	0.02	µg/L	----	----	----	----	<0.02	
Bromophos-ethyl	4824-78-6	0.10	µg/L	----	----	----	----	<0.10	
Carbofenthoion	786-19-6	0.02	µg/L	----	----	----	----	<0.02	
Chlorfenvinphos	470-90-6	0.02	µg/L	----	----	----	----	<0.02	
Chlorpyrifos	2921-88-2	0.02	µg/L	----	----	----	----	<0.02	
Chlorpyrifos-methyl	5598-13-0	0.2	µg/L	----	----	----	----	<0.2	
Coumaphos	56-72-4	0.01	µg/L	----	----	----	----	<0.01	
Demeton-O & Demeton-S	298-03-3/126-75-0	0.02	µg/L	----	----	----	----	<0.02	
Demeton-S-methyl	919-86-8	0.02	µg/L	----	----	----	----	<0.02	
Demeton-O	298-03-3	0.02	µg/L	----	----	----	----	<0.02	
Demeton-S	126-75-0	0.02	µg/L	----	----	----	----	<0.02	
Diazinon	333-41-5	0.01	µg/L	----	----	----	----	<0.01	
Dichlorvos	62-73-7	0.20	µg/L	----	----	----	----	<0.20	
Dimethoate	60-51-5	0.02	µg/L	----	----	----	----	<0.02	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BORR MW21	BORR MW22	BORR MW22b	BH13.2	NORTH CREEK 4
Client sampling date / time					22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007775-001	EP2007775-002	EP2007775-003	EP2007775-004	EP2007775-005	
				Result	Result	Result	Result	Result	
EP234A: OP Pesticides - Continued									
Disulfoton	298-04-4	0.05	µg/L	----	----	----	----	----	<0.05
Ethion	563-12-2	0.02	µg/L	----	----	----	----	----	<0.02
EPN	2104-64-5	0.05	µg/L	----	----	----	----	----	<0.05
Ethoprophos	13194-48-4	0.01	µg/L	----	----	----	----	----	<0.01
Fenamiphos	22224-92-6	0.01	µg/L	----	----	----	----	----	<0.01
Fenchlorphos (Ronnell)	299-84-3	10	µg/L	----	----	----	----	----	<10
Fenitrothion	122-14-5	2	µg/L	----	----	----	----	----	<2
Fensulfothion	115-90-2	0.01	µg/L	----	----	----	----	----	<0.01
Fenthion	55-38-9	0.05	µg/L	----	----	----	----	----	<0.05
Malathion	121-75-5	0.02	µg/L	----	----	----	----	----	<0.02
Mevinphos	7786-34-7	0.02	µg/L	----	----	----	----	----	<0.02
Monocrotophos	6923-22-4	0.02	µg/L	----	----	----	----	----	<0.02
Omethoate	1113-02-6	0.01	µg/L	----	----	----	----	----	<0.01
Parathion	56-38-2	0.2	µg/L	----	----	----	----	----	<0.2
Parathion-methyl	298-00-0	0.5	µg/L	----	----	----	----	----	<0.5
Phorate	298-02-2	0.1	µg/L	----	----	----	----	----	<0.1
Pirimiphos-ethyl	23505-41-1	0.01	µg/L	----	----	----	----	----	<0.01
Pirimiphos-methyl	29232-93-7	0.01	µg/L	----	----	----	----	----	<0.01
Profenofos	41198-08-7	0.01	µg/L	----	----	----	----	----	<0.01
Prothiofos	34643-46-4	0.1	µg/L	----	----	----	----	----	<0.1
Sulfotep	3689-24-5	0.005	µg/L	----	----	----	----	----	<0.005
Sulprofos	35400-43-2	0.05	µg/L	----	----	----	----	----	<0.05
Terbufos	13071-79-9	0.01	µg/L	----	----	----	----	----	<0.01
Temephos	3383-96-8	0.02	µg/L	----	----	----	----	----	<0.02
Tetrachlorvinphos	22248-79-9	0.01	µg/L	----	----	----	----	----	<0.01
Triazophos	24017-47-8	0.005	µg/L	----	----	----	----	----	<0.005
Trichlorfon	52-68-6	0.02	µg/L	----	----	----	----	----	<0.02
Trichloronate	327-98-0	0.5	µg/L	----	----	----	----	----	<0.5
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	111	108	113	117	111	
Toluene-D8	2037-26-5	2	%	97.7	98.2	97.4	97.6	96.6	
4-Bromofluorobenzene	460-00-4	2	%	97.7	96.7	97.8	97.4	99.2	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB03	FB03	TB03 (TBW620)	BORR MW08	BORR MW46
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007775-006	EP2007775-007	EP2007775-008	EP2007775-009	EP2007775-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	----	----	----	6.63	6.55	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	712	319	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	518	244	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	51	43	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	51	43	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	----	----	----	48	57	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	1	82	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	----	218	23	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	----	27	42	
Magnesium	7439-95-4	1	mg/L	----	----	----	17	6	
Sodium	7440-23-5	1	mg/L	----	----	----	83	17	
Potassium	7440-09-7	1	mg/L	----	----	----	11	2	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	----	0.21	<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	----	----	----	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	----	----	----	<0.001	0.003	
Copper	7440-50-8	0.001	mg/L	----	----	----	0.018	0.009	
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	----	----	----	0.080	0.024	
Nickel	7440-02-0	0.001	mg/L	----	----	----	0.002	0.003	
Selenium	7782-49-2	0.01	mg/L	----	----	----	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	----	----	----	0.019	<0.005	
Iron	7439-89-6	0.05	mg/L	----	----	----	1.50	4.49	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB03	FB03	TB03 (TBW620)	BORR MW08	BORR MW46
Client sampling date / time				22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007775-006	EP2007775-007	EP2007775-008	EP2007775-009	EP2007775-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	----	1.06	6.52	
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	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	----	----	----	1.92	31.5	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.52	0.08	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	----	----	----	0.52	0.08	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	<0.01	0.09	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	2.4	0.5	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	2.4	0.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.76	0.05	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	----	----	----	0.65	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	----	----	----	0.3	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	7.19	3.22	
∅ Total Cations	----	0.01	meq/L	----	----	----	6.64	3.38	
∅ Ionic Balance	----	0.01	%	----	----	----	3.99	2.50	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	<20	<20	<20	<20	
C10 - C14 Fraction	----	50	µg/L	----	----	----	<50	<50	
C15 - C28 Fraction	----	100	µg/L	----	----	----	110	<100	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB03	FB03	TB03 (TBW620)	BORR MW08	BORR MW46
Client sampling date / time					22-Jul-2020 00:00	22-Jul-2020 00:00	22-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007775-006	EP2007775-007	EP2007775-008	EP2007775-009	EP2007775-010	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	----	50	µg/L	----	----	----	<50	<50	
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	----	110	<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	
>C16 - C34 Fraction	----	100	µg/L	----	----	----	150	<100	
>C34 - C40 Fraction	----	100	µg/L	----	----	----	<100	<100	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	----	150	<100	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	----	<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	109	107	
Toluene-D8	2037-26-5	2	%	----	97.5	97.7	97.9	98.5	
4-Bromofluorobenzene	460-00-4	2	%	----	95.9	95.2	96.3	95.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		CENTENARY Rd CULVERT	SW10	FB04	----	----
Client sampling date / time		23-Jul-2020 00:00		23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2007775-011	EP2007775-012	EP2007775-013	-----	-----
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.25	7.33	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1060	974	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	730	736	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	48	50	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	48	50	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	12	4	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	63	61	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	321	280	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	20	36	----	----	----
Magnesium	7439-95-4	1	mg/L	28	24	----	----	----
Sodium	7440-23-5	1	mg/L	148	119	----	----	----
Potassium	7440-09-7	1	mg/L	10	32	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.17	0.10	----	----	----
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	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.017	0.002	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.043	0.015	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.003	0.003	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.024	0.010	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	CENTENARY Rd CULVERT	SW10	FB04	----	----
Client sampling date / time					23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2007775-011	EP2007775-012	EP2007775-013	-----	-----
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Iron	7439-89-6	0.05	mg/L		1.05	1.43	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.34	0.14	----	----	----
Iron	7439-89-6	0.05	mg/L		1.37	2.52	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.03	0.08	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		0.03	0.08	----	----	----
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		3.6	5.0	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		3.6	5.0	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.92	1.09	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.72	0.64	----	----	----
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L		<0.1	<0.1	----	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		11.3	10.2	----	----	----
∅ Total Cations	----	0.01	meq/L		10.0	9.77	----	----	----
∅ Ionic Balance	----	0.01	%		6.24	2.01	----	----	----
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	CENTENARY Rd CULVERT	SW10	FB04	----	----
Client sampling date / time				23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2007775-011	EP2007775-012	EP2007775-013	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ 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	----	----	
EP204: Glyphosate and AMPA									
Glyphosate	1071-83-6	10	µg/L	<10	<10	----	----	----	
EP234A: OP Pesticides									
Azinphos-ethyl	2642-71-9	0.02	µg/L	<0.02	<0.02	----	----	----	
Azinphos-methyl	86-50-0	0.02	µg/L	<0.02	<0.02	----	----	----	
Bromophos-ethyl	4824-78-6	0.10	µg/L	<0.10	<0.10	----	----	----	
Carbofenthion	786-19-6	0.02	µg/L	<0.02	<0.02	----	----	----	
Chlorfenvinphos	470-90-6	0.02	µg/L	<0.02	<0.02	----	----	----	
Chlorpyrifos	2921-88-2	0.02	µg/L	<0.02	<0.02	----	----	----	
Chlorpyrifos-methyl	5598-13-0	0.2	µg/L	<0.2	<0.2	----	----	----	
Coumaphos	56-72-4	0.01	µg/L	<0.01	<0.01	----	----	----	
Demeton-O & Demeton-S	298-03-3/126-75-0	0.02	µg/L	<0.02	<0.02	----	----	----	
Demeton-S-methyl	919-86-8	0.02	µg/L	<0.02	<0.02	----	----	----	
Demeton-O	298-03-3	0.02	µg/L	<0.02	<0.02	----	----	----	
Demeton-S	126-75-0	0.02	µg/L	<0.02	<0.02	----	----	----	
Diazinon	333-41-5	0.01	µg/L	<0.01	<0.01	----	----	----	
Dichlorvos	62-73-7	0.20	µg/L	<0.20	<0.20	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	CENTENARY Rd CULVERT	SW10	FB04	----	----
Client sampling date / time				23-Jul-2020 00:00	23-Jul-2020 00:00	23-Jul-2020 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2007775-011	EP2007775-012	EP2007775-013	-----	-----	
				Result	Result	Result	----	----	
EP234A: OP Pesticides - Continued									
Dimethoate	60-51-5	0.02	µg/L	<0.02	<0.02	----	----	----	
Disulfoton	298-04-4	0.05	µg/L	<0.05	<0.05	----	----	----	
Ethion	563-12-2	0.02	µg/L	<0.02	<0.02	----	----	----	
EPN	2104-64-5	0.05	µg/L	<0.05	<0.05	----	----	----	
Ethoprophos	13194-48-4	0.01	µg/L	<0.01	<0.01	----	----	----	
Fenamiphos	22224-92-6	0.01	µg/L	<0.01	<0.01	----	----	----	
Fenclorophos (Ronnel)	299-84-3	10	µg/L	<10	<10	----	----	----	
Fenitrothion	122-14-5	2	µg/L	<2	<2	----	----	----	
Fensulfothion	115-90-2	0.01	µg/L	<0.01	<0.01	----	----	----	
Fenthion	55-38-9	0.05	µg/L	<0.05	<0.05	----	----	----	
Malathion	121-75-5	0.02	µg/L	<0.02	<0.02	----	----	----	
Mevinphos	7786-34-7	0.02	µg/L	<0.02	<0.02	----	----	----	
Monocrotophos	6923-22-4	0.02	µg/L	<0.02	<0.02	----	----	----	
Omethoate	1113-02-6	0.01	µg/L	<0.01	<0.01	----	----	----	
Parathion	56-38-2	0.2	µg/L	<0.2	<0.2	----	----	----	
Parathion-methyl	298-00-0	0.5	µg/L	<0.5	<0.5	----	----	----	
Phorate	298-02-2	0.1	µg/L	<0.1	<0.1	----	----	----	
Pirimiphos-ethyl	23505-41-1	0.01	µg/L	<0.01	<0.01	----	----	----	
Pirimiphos-methyl	29232-93-7	0.01	µg/L	<0.01	<0.01	----	----	----	
Profenofos	41198-08-7	0.01	µg/L	<0.01	<0.01	----	----	----	
Prothiofos	34643-46-4	0.1	µg/L	<0.1	<0.1	----	----	----	
Sulfotep	3689-24-5	0.005	µg/L	<0.005	<0.005	----	----	----	
Sulprofos	35400-43-2	0.05	µg/L	<0.05	<0.05	----	----	----	
Terbufos	13071-79-9	0.01	µg/L	<0.01	<0.01	----	----	----	
Temephos	3383-96-8	0.02	µg/L	<0.02	<0.02	----	----	----	
Tetrachlorvinphos	22248-79-9	0.01	µg/L	<0.01	<0.01	----	----	----	
Triazophos	24017-47-8	0.005	µg/L	<0.005	<0.005	----	----	----	
Trichlorfon	52-68-6	0.02	µg/L	<0.02	<0.02	----	----	----	
Trichloronate	327-98-0	0.5	µg/L	<0.5	<0.5	----	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	116	112	122	----	----	
Toluene-D8	2037-26-5	2	%	96.7	97.0	97.1	----	----	
4-Bromofluorobenzene	460-00-4	2	%	94.8	97.8	96.7	----	----	



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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007775	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 24-Jul-2020
Site	: ----	Issue Date	: 06-Aug-2020
Sampler	: IAN OGLESBY, Tristan	No. of samples received	: 13
Order number	: 6137041.0831	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

- 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	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	----	----	----	30-Jul-2020	22-Jul-2020	8
Clear Plastic Bottle - Natural BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	----	----	----	30-Jul-2020	23-Jul-2020	7

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
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BORR MW21, BORR MW22b, NORTH CREEK 4	22-Jul-2020	BORR MW22, BH13.2,	----	----	----	30-Jul-2020	22-Jul-2020	*
Clear Plastic Bottle - Natural (EA005-P) BORR MW08, CENTENARY Rd CULVERT,	23-Jul-2020	BORR MW46, SW10	----	----	----	30-Jul-2020	23-Jul-2020	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BORR MW21, BORR MW22b, NORTH CREEK 4	22-Jul-2020	BORR MW22, BH13.2,	----	----	----	30-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BORR MW08, CENTENARY Rd CULVERT,	23-Jul-2020	BORR MW46, SW10	----	----	----	30-Jul-2020	20-Aug-2020	✓



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	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
Clear Plastic Bottle - Natural (EA015H) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	30-Jul-2020	30-Jul-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	30-Jul-2020	05-Aug-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	30-Jul-2020	06-Aug-2020	✓
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	29-Jul-2020	05-Aug-2020	✓
Clear Plastic Bottle - Natural (ED038) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	29-Jul-2020	06-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (ED041G) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Natural (ED045G) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓



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
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW21, BORR MW22b, NORTH CREEK 4 BORR MW22, BH13.2	22-Jul-2020	----	----	----	29-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW08, CENTENARY Rd CULVERT, BORR MW46, SW10	23-Jul-2020	----	----	----	29-Jul-2020	20-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW21, BORR MW22b, NORTH CREEK 4 BORR MW22, BH13.2	22-Jul-2020	----	----	----	29-Jul-2020	18-Jan-2021	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW08, CENTENARY Rd CULVERT, BORR MW46, SW10	23-Jul-2020	----	----	----	29-Jul-2020	19-Jan-2021	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW21, BORR MW22b, NORTH CREEK 4, BORR MW22, BH13.2, RB03	22-Jul-2020	28-Jul-2020	18-Jan-2021	✓	28-Jul-2020	18-Jan-2021	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW08, CENTENARY Rd CULVERT, BORR MW46, SW10	23-Jul-2020	28-Jul-2020	19-Jan-2021	✓	28-Jul-2020	19-Jan-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW21, BORR MW22b, NORTH CREEK 4 BORR MW22, BH13.2	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BORR MW08, CENTENARY Rd CULVERT, BORR MW46, SW10	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW21, BORR MW22b, NORTH CREEK 4 BORR MW22, BH13.2	22-Jul-2020	----	----	----	24-Jul-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW08, CENTENARY Rd CULVERT, BORR MW46, SW10	23-Jul-2020	----	----	----	24-Jul-2020	20-Aug-2020	✓



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) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	05-Aug-2020	19-Aug-2020	✓	05-Aug-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	05-Aug-2020	20-Aug-2020	✓	05-Aug-2020	20-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	05-Aug-2020	19-Aug-2020	✓	05-Aug-2020	19-Aug-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	05-Aug-2020	20-Aug-2020	✓	05-Aug-2020	20-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	24-Jul-2020	24-Jul-2020	✓
Clear Plastic Bottle - Natural (EK071G) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	24-Jul-2020	25-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW08, CENTENARY Rd CULVERT,	BORR MW46, SW10	23-Jul-2020	----	----	----	29-Jul-2020	30-Jul-2020	✓



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) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	28-Jul-2020	29-Jul-2020	✓	04-Aug-2020	06-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW08		23-Jul-2020	28-Jul-2020	30-Jul-2020	✓	04-Aug-2020	06-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW46, SW10	CENTENARY Rd CULVERT,	23-Jul-2020	29-Jul-2020	30-Jul-2020	✓	04-Aug-2020	07-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW21, BORR MW22b, NORTH CREEK 4, TB03 (TBW620)	BORR MW22, BH13.2, FB03,	22-Jul-2020	04-Aug-2020	05-Aug-2020	✓	04-Aug-2020	05-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW08, CENTENARY Rd CULVERT, FB04	BORR MW46, SW10,	23-Jul-2020	04-Aug-2020	06-Aug-2020	✓	04-Aug-2020	06-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) BORR MW21, BORR MW22b, NORTH CREEK 4	BORR MW22, BH13.2,	22-Jul-2020	28-Jul-2020	29-Jul-2020	✓	04-Aug-2020	06-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW08		23-Jul-2020	28-Jul-2020	30-Jul-2020	✓	04-Aug-2020	06-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW46, SW10	CENTENARY Rd CULVERT,	23-Jul-2020	29-Jul-2020	30-Jul-2020	✓	04-Aug-2020	07-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW21, BORR MW22b, NORTH CREEK 4, TB03 (TBW620)	BORR MW22, BH13.2, FB03,	22-Jul-2020	04-Aug-2020	05-Aug-2020	✓	04-Aug-2020	05-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW08, CENTENARY Rd CULVERT, FB04	BORR MW46, SW10,	23-Jul-2020	04-Aug-2020	06-Aug-2020	✓	04-Aug-2020	06-Aug-2020	✓



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) BORR MW21, BORR MW22b, NORTH CREEK 4, TB03 (TBW620)	BORR MW22, BH13.2, FB03,	22-Jul-2020	04-Aug-2020	05-Aug-2020	✓	04-Aug-2020	05-Aug-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW08, CENTENARY Rd CULVERT, FB04	BORR MW46, SW10,	23-Jul-2020	04-Aug-2020	06-Aug-2020	✓	04-Aug-2020	06-Aug-2020	✓
EP204: Glyphosate and AMPA								
Amber Bottle Unpreserved for Specialist Organics (EP204) NORTH CREEK 4		22-Jul-2020	----	----	----	29-Jul-2020	05-Aug-2020	✓
Amber Bottle Unpreserved for Specialist Organics (EP204) CENTENARY Rd CULVERT,	SW10	23-Jul-2020	----	----	----	29-Jul-2020	06-Aug-2020	✓
EP234A: OP Pesticides								
Amber Bottle Unpreserved for Specialist Organics (EP234-1) NORTH CREEK 4		22-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
Amber Bottle Unpreserved for Specialist Organics (EP234-1) CENTENARY Rd CULVERT,	SW10	23-Jul-2020	----	----	----	29-Jul-2020	30-Jul-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	20	10.00	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	4	36	11.11	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
Glyphosate and AMPA	EP204	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	30	13.33	10.53	✓	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	1	9	11.11	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	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	20	10.00	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	4	36	11.11	10.00	✓	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
Glyphosate and AMPA	EP204	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	30	13.33	10.53	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
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	9	11.11	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	20	5.00	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	2	36	5.56	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
Glyphosate and AMPA	EP204	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	30	6.67	5.26	✓	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	9	11.11	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	2	36	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
Glyphosate and AMPA	EP204	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
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	35	5.71	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	9	11.11	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 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 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 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 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 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 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
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 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 Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM 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.
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 Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM 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 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 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 Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. 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 Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimony tartrate reacts in acid medium with orthophosphate 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 Schedule B(3)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM 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 Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 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 Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 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 Schedule B(3)
Glyphosate and AMPA	EP204	WATER	In house: Pre-column derivatisation LCMS (ES in negative mode). Water samples are derivatised with 9-fluorenyl methoxycarbonyl chloroformate (FMOC) in alkaline condition. The derivatives of glyphosate and AMPA are separated by a C8 column and determined by MS.
Pesticides by LCMSMS (Positive Ion Mode)	EP234-1	WATER	In house: LC-MSMS, direct injection. A sample is filtered and injected directly onto the LC-MSMS. Analysis is by LC/MSMS, ESI Positive Mode.
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 Schedule B(3)



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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 Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM 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.

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 1

Project ID (as per ESDat set up; no spaces)
6137041

PO Number (to be invoiced)
6137041.0831

Laboratory: ALS Environmental
Address: 26 Rigali Way, Wangara WA 6065
Laboratory Contact: Lauren Ockwell (08 9406 1301)

Laboratory Quote No.
EP/489/19 V5

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Julia Roberts

Email Address (Results)
vicki.davies@ghd.com
pooranie.yoganathan@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix: s-Soil/ sl-Sludge/ W-Water/ A-Air	Container			Analyses										Remarks						
					Type: B-Bottle/ Jar/Vial/ Bag/ G-Glass/ P-Plastic	Preservative: Unpreserved/ HCl/ H2SO4/ HNO3/ Other	No	As per normal suite (groundwater)	As per normal suite (surface water)	Rinsate Blank	Field Blank	Trip Blank								HOLD				
BORR MW21	1	22.7.20		Σ			8	X																
BORR MW22	2	"		Σ			10	X																
BORR MW22b	3	"		Σ			8	X																
BH13.2	4	"		Σ			8	X																
NORTH CREEK 4	5	"		Σ			9		X															
RBO3	6	"		Σ			1			X														
FBO3	7	"		Σ			2				X													
TBO3 (TBW620)	8	"		Σ			1					X												
BORR MW08	9	23.7.20		Σ			8	X																
BORR MW46	10	"		Σ			8	X																
CENTENARY RA CUMBERT 11		"					9		X															
SW10	12	"					11		X															
FBO4	13	"					2				X													

Environmental Division
Perth
Work Order Reference
EP2007775



Telephone: +61-8-9406 1301

Sampled by: Ian Ogilby Tristan Cuthberts
Received by: [Signature]

Date/Time: 23.7.20
Date/Time: 24.7.2020

Relinquished by: Ian Ogilby Tristan Cuthberts

Date/Time: 23.7.20
Date/Time:

1240

CERTIFICATE OF ANALYSIS

Work Order : **EP2007908**
Client : **GHD PTY LTD**
Contact : Julia Roberts
Address : 999 HAY STREET
 PERTH WA, AUSTRALIA 6000

Telephone : ----
Project : 6137041
Order number : 6137041.0831
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EP/489/19 V4_V2
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 10
Laboratory : Environmental Division Perth
Contact : Rebecca Shaw
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 29-Jul-2020 12:40
Date Analysis Commenced : 29-Jul-2020
Issue Date : 05-Aug-2020 16:40



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EK061G: TKN LCS recovery falls outside ALS Dynamic Control Limit. However, it is within the acceptance criteria based on ALS DQO. No further action is required.
- EK067G: Total phosphorus LOR raised for sample #5 due to possible sample matrix interference.
- Ionic Balance out of acceptable limits for sample #5 due to analytes not quantified in this report. Major anions (ED041/45G) and major cations (ED093F) have been confirmed by re-preparation and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium, sodium and ammonia for #5.
- 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: GROUNDWATER (Matrix: WATER)				Client sample ID	BORR MW04	BORR MW06	BORR MW09	BH27.1	BORR S 09
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007908-001	EP2007908-002	EP2007908-003	EP2007908-004	EP2007908-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.62	7.21	6.64	6.07	6.01	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	3680	555	599	1690	273	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	2120	390	446	1110	192	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	270	42	9	8	69	
Total Alkalinity as CaCO3	----	1	mg/L	270	42	9	8	69	
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L	39	21	15	66	15	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	188	118	40	238	20	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	939	80	170	430	46	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	155	40	45	58	7	
Magnesium	7439-95-4	1	mg/L	54	8	8	34	8	
Sodium	7440-23-5	1	mg/L	490	51	45	194	26	
Potassium	7440-09-7	1	mg/L	5	8	11	14	8	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.23	<0.01	0.84	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	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	<0.001	0.005	<0.001	
Copper	7440-50-8	0.001	mg/L	0.010	0.011	<0.001	0.039	0.050	
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	0.140	0.061	<0.001	0.136	0.004	
Nickel	7440-02-0	0.001	mg/L	0.002	0.004	<0.001	0.008	0.006	
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	0.012	0.011	<0.005	0.033	0.028	
Iron	7439-89-6	0.05	mg/L	4.44	2.82	<0.05	16.4	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BORR MW04	BORR MW06	BORR MW09	BH27.1	BORR S 09
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2007908-001	EP2007908-002	EP2007908-003	EP2007908-004	EP2007908-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	1.27	3.26	0.18	3.06	7.55	
Iron	7439-89-6	0.05	mg/L	10.3	7.08	0.05	17.3	2.75	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.19	0.21	<0.01	0.40	0.70	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.18	0.21	<0.01	0.40	0.70	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	1.05	0.02	9.39	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.9	0.3	0.8	2.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.3	0.9	1.4	0.8	11.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.11	0.08	0.02	0.08	<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	<0.01	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	35.8	5.55	5.81	17.2	3.09	
∅ Total Cations	----	0.01	meq/L	----	----	----	----	2.39	
∅ Total Cations	----	0.01	meq/L	33.6	5.08	5.14	14.5	----	
∅ Ionic Balance	----	0.01	%	----	----	----	----	12.8	
∅ Ionic Balance	----	0.01	%	3.14	4.47	6.08	8.68	----	
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	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BORR MW04	BORR MW06	BORR MW09	BH27.1	BORR S 09
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00
Compound	CAS Number	LOR	Unit	EP2007908-001	EP2007908-002	EP2007908-003	EP2007908-004	EP2007908-005
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ 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	110	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	110	<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	%	97.1	102	92.2	98.1	99.5
Toluene-D8	2037-26-5	2	%	97.3	97.5	99.3	97.2	98.9
4-Bromofluorobenzene	460-00-4	2	%	100	102	101	102	102



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		WFD05	----	----	----	----
Client sampling date / time		27-Jul-2020 00:00		----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2007908-006	-----	-----	-----	-----
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.57	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	578	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	434	----	----	----	----
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	8	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	8	----	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	13	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	39	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	166	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	47	----	----	----	----
Magnesium	7439-95-4	1	mg/L	8	----	----	----	----
Sodium	7440-23-5	1	mg/L	45	----	----	----	----
Potassium	7440-09-7	1	mg/L	11	----	----	----	----
EG020F: Dissolved 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	----	----	----	----
Cobalt	7440-48-4	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	0.002	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.008	----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	WFD05	----	----	----	----
Client sampling date / time				27-Jul-2020 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	EP2007908-006	-----	-----	-----	-----	
				Result	----	----	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.17	----	----	----	----	
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	----	----	----	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.02	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.16	----	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	----	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.5	----	----	----	----	
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	----	----	----	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	5.65	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	5.24	----	----	----	----	
∅ Ionic Balance	----	0.01	%	3.78	----	----	----	----	
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	----	----	----	----	
^ 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	----	----	----	----	



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	WFD05	----	----	----	----
Client sampling date / time				27-Jul-2020 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2007908-006	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>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	%	99.3	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	99.9	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	99.9	----	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB05	FB05	TB05	----	----
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	27-Jul-2020 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2007908-007	EP2007908-008	EP2007908-009	-----	-----	
				Result	Result	Result	----	----	
EG020T: Total Metals by ICP-MS									
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	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	<20	<20	----	----	
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	----	----	
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	%	----	94.9	102	----	----	
Toluene-D8	2037-26-5	2	%	----	99.2	98.4	----	----	
4-Bromofluorobenzene	460-00-4	2	%	----	99.7	100	----	----	



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



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007908	Page	: 1 of 10
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 29-Jul-2020
Site	: ----	Issue Date	: 05-Aug-2020
Sampler	: ----	No. of samples received	: 9
Order number	: 6137041.0831	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** Matrix Spike outliers occur.
- Laboratory Control 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
Laboratory Control Spike (LCS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	QC-MRG2-31732830	----	Total Kjeldahl Nitrogen as N	----	101 %	75.8-100%	Recovery greater than upper control limit

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							
BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	----	----	----	31-Jul-2020	27-Jul-2020	4

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	Container / Client Sample ID(s)	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)								
BORR MW04, BORR MW09, BORR S 09,	27-Jul-2020	BORR MW06, BH27.1, WFD05	----	----	----	31-Jul-2020	27-Jul-2020	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
BORR MW04, BORR MW09, BORR S 09,	27-Jul-2020	BORR MW06, BH27.1, WFD05	----	----	----	31-Jul-2020	24-Aug-2020	✓



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	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	03-Aug-2020	03-Aug-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	31-Jul-2020	10-Aug-2020	✓
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	30-Jul-2020	10-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	30-Jul-2020	24-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	30-Jul-2020	23-Jan-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) BORR MW04, BORR MW09, BORR S 09, RB05	BORR MW06, BH27.1, WFD05,	27-Jul-2020	30-Jul-2020	23-Jan-2021	✓	30-Jul-2020	23-Jan-2021	✓



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) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	03-Aug-2020	24-Aug-2020	✓	03-Aug-2020	24-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	03-Aug-2020	24-Aug-2020	✓	03-Aug-2020	24-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) BORR MW04, BORR MW09, BORR S 09,	BORR MW06, BH27.1, WFD05	27-Jul-2020	----	----	----	31-Jul-2020	03-Aug-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) BH27.1, WFD05	BORR S 09,	27-Jul-2020	03-Aug-2020	03-Aug-2020	✓	03-Aug-2020	12-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW04, BORR MW09	BORR MW06,	27-Jul-2020	31-Jul-2020	03-Aug-2020	✓	03-Aug-2020	09-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW04, BORR MW09, BORR S 09, FB05,	BORR MW06, BH27.1, WFD05, TB05	27-Jul-2020	04-Aug-2020	10-Aug-2020	✓	04-Aug-2020	10-Aug-2020	✓



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) BH27.1, WFD05	BORR S 09,	27-Jul-2020	03-Aug-2020	03-Aug-2020	✓	03-Aug-2020	12-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BORR MW04, BORR MW09	BORR MW06,	27-Jul-2020	31-Jul-2020	03-Aug-2020	✓	03-Aug-2020	09-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW04, BORR MW09, BORR S 09, FB05,	BORR MW06, BH27.1, WFD05, TB05	27-Jul-2020	04-Aug-2020	10-Aug-2020	✓	04-Aug-2020	10-Aug-2020	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) BORR MW04, BORR MW09, BORR S 09, FB05,	BORR MW06, BH27.1, WFD05, TB05	27-Jul-2020	04-Aug-2020	10-Aug-2020	✓	04-Aug-2020	10-Aug-2020	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	19	10.53	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	18	11.11	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
Major Cations - Dissolved	ED093F	2	19	10.53	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
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	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.53	✓	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	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	19	10.53	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	18	11.11	10.00	✓	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
Major Cations - Dissolved	ED093F	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
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	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.53	✓	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	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	19	5.26	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	18	5.56	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
Major Cations - Dissolved	ED093F	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	5.56	5.26	✓	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	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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
Chloride by Discrete Analyser	ED045G	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	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 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	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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
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 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 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 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 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 Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ ²⁻ by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . 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 BaSO ₄ suspension is measured by a photometer and the SO ₄ ²⁻ concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
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 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 Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM 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.
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-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM 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 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 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 Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. 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 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 orthophosphate 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 Schedule B(3)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM 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 Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 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 Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 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 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 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 Schedule B(3)

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Work Order : EP2007908
Client : GHD PTY LTD
Project : 6137041



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM 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.

CERTIFICATE OF ANALYSIS

Work Order : **EP2007909**
Client : **GHD PTY LTD**
Contact : Julia Roberts
Address : 999 HAY STREET
 PERTH WA, AUSTRALIA 6000

Telephone : ----
Project : 6137041
Order number : 6137041.0831
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EP/489/19 V4_V2
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 6
Laboratory : Environmental Division Perth
Contact : Rebecca Shaw
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 29-Jul-2020 12:40
Date Analysis Commenced : 29-Jul-2020
Issue Date : 05-Aug-2020 16:17



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 iron concentration is less than dissolved for sample EP2007909-004. However, the difference is within experimental variation of the methods.
- EG041G: Turbidimetric sulfate LOR raised for sample #3 due to possible sample matrix interference.
- EK061G: TKN LCS recovery falls outside ALS Dynamic Control Limit. However, it is within the acceptance criteria based on ALS DQO. No further action is required.
- TDS by method EA-015 may bias high for EP2007909 #3 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: GROUNDWATER (Matrix: WATER)				Client sample ID			MR MW05	BORR MW11	----	----	----
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	----	----	----	----	----	
Compound	CAS Number	LOR	Unit	EP2007909-001	EP2007909-002	-----	-----	-----	-----	-----	
				Result	Result	----	----	----	----	----	
EA005P: pH by PC Titrator											
pH Value	----	0.01	pH Unit	6.51	7.79	----	----	----	----	----	
EA010P: Conductivity by PC Titrator											
Electrical Conductivity @ 25°C	----	1	µS/cm	22100	1940	----	----	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C											
Total Dissolved Solids @180°C	----	10	mg/L	15600	1380	----	----	----	----	----	
ED037P: Alkalinity by PC Titrator											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	55	275	----	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	55	275	----	----	----	----	----	
ED038A: Acidity											
Acidity as CaCO3	----	1	mg/L	84	29	----	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1130	76	----	----	----	----	----	
ED045G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L	7300	474	----	----	----	----	----	
ED093F: Dissolved Major Cations											
Calcium	7440-70-2	1	mg/L	180	26	----	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	664	40	----	----	----	----	----	
Sodium	7440-23-5	1	mg/L	3800	298	----	----	----	----	----	
Potassium	7440-09-7	1	mg/L	43	10	----	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS											
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.04	----	----	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	0.004	<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	----	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	0.009	<0.001	----	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.052	0.031	----	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.187	0.091	----	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.039	0.004	----	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.042	0.011	----	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	6.83	0.27	----	----	----	----	----	



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	MR MW05	BORR MW11	----	----	----
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2007909-001	EP2007909-002	-----	-----	-----	
				Result	Result	----	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	5.34	7.21	----	----	----	
Iron	7439-89-6	0.05	mg/L	18.1	14.8	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.16	<0.01	----	----	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L	0.16	<0.01	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.07	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	1.3	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.5	1.4	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.06	0.21	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.02	----	----	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	230	20.4	----	----	----	
∅ Total Cations	----	0.01	meq/L	230	17.8	----	----	----	
∅ Ionic Balance	----	0.01	%	0.11	6.90	----	----	----	



Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID			SW11	WRM NORTH SITE 5	----	----	----
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	----	----	----	----	----	
Compound	CAS Number	LOR	Unit	EP2007909-003	EP2007909-004	-----	-----	-----	-----	-----	
				Result	Result	----	----	----	----	----	
EA005P: pH by PC Titrator											
pH Value	----	0.01	pH Unit	7.74	7.28	----	----	----	----	----	
EA010P: Conductivity by PC Titrator											
Electrical Conductivity @ 25°C	----	1	µS/cm	313	848	----	----	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C											
Total Dissolved Solids @180°C	----	10	mg/L	286	636	----	----	----	----	----	
ED037P: Alkalinity by PC Titrator											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	69	34	----	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	69	34	----	----	----	----	----	
ED038A: Acidity											
Acidity as CaCO3	----	1	mg/L	4	7	----	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<2	44	----	----	----	----	----	
ED045G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L	53	251	----	----	----	----	----	
ED093F: Dissolved Major Cations											
Calcium	7440-70-2	1	mg/L	12	17	----	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	6	23	----	----	----	----	----	
Sodium	7440-23-5	1	mg/L	43	124	----	----	----	----	----	
Potassium	7440-09-7	1	mg/L	3	7	----	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS											
Aluminium	7429-90-5	0.01	mg/L	0.04	0.11	----	----	----	----	----	
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	----	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.034	0.004	----	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.009	0.035	----	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.004	0.001	----	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.017	0.009	----	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.49	1.12	----	----	----	----	----	



Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW11	WRM NORTH SITE 5	----	----	----
Client sampling date / time				27-Jul-2020 00:00	27-Jul-2020 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2007909-003	EP2007909-004	-----	-----	-----	
				Result	Result	----	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.08	0.43	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.82	0.99	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	----	----	----	
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	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	1.8	3.0	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.8	3.0	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.08	0.51	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.35	----	----	----	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.87	8.68	----	----	----	
∅ Total Cations	----	0.01	meq/L	3.04	8.31	----	----	----	
∅ Ionic Balance	----	0.01	%	2.81	2.13	----	----	----	

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2007909	Page	: 1 of 8
Client	: GHD PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Julia Roberts	Telephone	: +61-8-9406 1301
Project	: 6137041	Date Samples Received	: 29-Jul-2020
Site	: ----	Issue Date	: 05-Aug-2020
Sampler	: ----	No. of samples received	: 4
Order number	: 6137041.0831	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** Matrix Spike outliers occur.
- Laboratory Control 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
Laboratory Control Spike (LCS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	QC-MRG2-31732830	----	Total Kjeldahl Nitrogen as N	----	101 %	75.8-100%	Recovery greater than upper control limit

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							
MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	----	----	----	31-Jul-2020	27-Jul-2020	4

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Ammonia as N by Discrete analyser	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Total Metals by ICP-MS - Suite A	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	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)								
MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	31-Jul-2020	27-Jul-2020	*



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	
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	31-Jul-2020	24-Aug-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	03-Aug-2020	03-Aug-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	31-Jul-2020	10-Aug-2020	✓
ED038A: Acidity								
Clear Plastic Bottle - Natural (ED038) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	30-Jul-2020	10-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
ED093F: Dissolved Major Cations								
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (ED093F) MR MW05, WRM NORTH SITE 5	BORR MW11,	27-Jul-2020	----	----	----	30-Jul-2020	24-Aug-2020	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) SW11		27-Jul-2020	----	----	----	30-Jul-2020	24-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F) MR MW05, WRM NORTH SITE 5	BORR MW11,	27-Jul-2020	----	----	----	30-Jul-2020	23-Jan-2021	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) SW11		27-Jul-2020	----	----	----	30-Jul-2020	23-Jan-2021	✓
EG020T: Total Metals by ICP-MS								
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) MR MW05, WRM NORTH SITE 5	BORR MW11,	27-Jul-2020	30-Jul-2020	23-Jan-2021	✓	30-Jul-2020	23-Jan-2021	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) SW11		27-Jul-2020	30-Jul-2020	23-Jan-2021	✓	30-Jul-2020	23-Jan-2021	✓



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) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	29-Jul-2020	24-Aug-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	03-Aug-2020	24-Aug-2020	✓	03-Aug-2020	24-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	03-Aug-2020	24-Aug-2020	✓	03-Aug-2020	24-Aug-2020	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	29-Jul-2020	29-Jul-2020	✓
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) MR MW05, SW11,	BORR MW11, WRM NORTH SITE 5	27-Jul-2020	----	----	----	31-Jul-2020	03-Aug-2020	✓



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	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	10.00	*	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	23	13.04	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
Major Cations - Dissolved	ED093F	2	19	10.53	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
pH by PC Titrator	EA005-P	1	6	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.53	✓	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	14	14.29	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
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	23	8.70	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
Major Cations - Dissolved	ED093F	1	19	5.26	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
pH by PC Titrator	EA005-P	2	6	33.33	10.00	✓	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.53	✓	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	14	7.14	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
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Chloride by Discrete Analyser	ED045G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	23	8.70	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
Major Cations - Dissolved	ED093F	1	19	5.26	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
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	5.56	5.26	✔	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	14	14.29	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 Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	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	14	7.14	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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	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 Metals by ICP-MS - Suite A	EG020A-T	0	14	0.00	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



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 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 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 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 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 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 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
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 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 Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM 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.
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 Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Ammonium as N	EK055G-NH4	WATER	Ammonium in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH and Temperature. Ammonia is determined by direct colorimetry by Discrete Analyser according to APHA 4500-NH3 G. This method is compliant with NEPM 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 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 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 Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. 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 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 orthophosphate 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 Schedule B(3)
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2- D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM 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 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 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 Schedule B(3)

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000

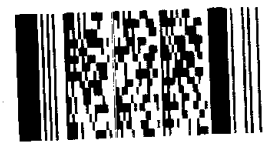
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per ESDot set up; no spaces): **6137041**
 PO Number (to be invoiced): **6137041.0831**
 Laboratory: **ALS Environmental**
 Address: **26 Rigali Way, Wangara WA 6065**
 Laboratory Contact: **Lauren Ockwell (08 9406 1301)**

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix: Soil/S Sludge/Water/Air	Container	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No	As per reduced suite (groundwater)	As per reduced suite (surface water)	Analyses						Remarks			
										Rinsate Blank	Field Blank	Trip Blank							
MR MWOS	1	27.7.20					5	X											
BORR MW11	2	"					5	X											
SW11	3	"							X										
WRM NORTH SITE 54		"							X										

Environmental Division
Perth
Work Order Reference
EP2007909



Telephone : + 61-8-9406 1301

Sampled by: _____ Date/Time: _____ Relinquished by: _____ Date/Time: _____
 Received by: *LW wffg* Date/Time: *29/7 1240* Relinquished by: _____ Date/Time: _____

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Vicki Davies**

Report **733336-W**

Project name

Project ID **6137041**

Received Date **Jul 22, 2020**

Client Sample ID			WFS01	WFS02
Sample Matrix			Water	Water
Eurofins Sample No.			P20-JI36445	P20-JI36446
Date Sampled			Jul 20, 2020	Jul 20, 2020
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	0.02	mg/L	< 0.02	-
TRH C10-C14	0.05	mg/L	0.06	-
TRH C15-C28	0.1	mg/L	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	-
BTEX				
Benzene	0.001	mg/L	< 0.001	-
Toluene	0.001	mg/L	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	83	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene ^{N02}	0.01	mg/L	< 0.01	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	-
TRH C6-C10	0.02	mg/L	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
TRH >C10-C16	0.05	mg/L	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	-
Acidity (as CaCO3)				
Acidity (as CaCO3)	10	mg/L	28	78
Ammonia (as N)				
Ammonia (as N)	0.01	mg/L	0.52	0.12
Ammonium Ion (as N)				
Ammonium Ion (as N)	0.01	mg/L	0.55	0.13
Chloride				
Chloride	1	mg/L	98	1100
Conductivity (at 25°C)				
Conductivity (at 25°C)	10	uS/cm	370	3300
Nitrate & Nitrite (as N)				
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05
pH (at 25°C)				
pH (at 25°C)	0.1	pH Units	6.2	5.8
Phosphate total (as P)				
Phosphate total (as P)	0.01	mg/L	0.01	0.01
Phosphorus filterable reactive (as P)				
Phosphorus filterable reactive (as P)	0.01	mg/L	0.02	< 0.01
Sulphate (as S)				
Sulphate (as S)	5	mg/L	< 5	23
Sulphide (as S)				
Sulphide (as S)	0.05	mg/L	0.10	< 0.05

Client Sample ID			WFS01	WFS02
Sample Matrix			Water	Water
Eurofins Sample No.			P20-JI36445	P20-JI36446
Date Sampled			Jul 20, 2020	Jul 20, 2020
Test/Reference	LOR	Unit		
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	250	1900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	0.6	< 0.2
Alkalinity (speciated)				
Total Alkalinity (as CaCO ₃)	20	mg/L	26	26
Heavy Metals				
Aluminium	0.05	mg/L	1.8	0.58
Aluminium (filtered)	0.05	mg/L	0.81	< 0.05
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001
Iron	0.05	mg/L	0.91	6.3
Iron (filtered)	0.05	mg/L	0.68	5.8
Manganese (filtered)	0.005	mg/L	< 0.005	0.18
Nickel (filtered)	0.001	mg/L	< 0.001	0.022
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001
Zinc (filtered)	0.005	mg/L	< 0.005	0.047
Alkali Metals				
Sodium	0.5	mg/L	69	610

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Perth	Jul 22, 2020	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Perth	Jul 22, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Perth	Jul 22, 2020	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Perth	Jul 22, 2020	
ASS Groundwater Quality Suite - WA Department of Environment and Conservation			
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Perth	Jul 22, 2020	14 Days
Ammonia (as N) - Method: LTM-INO-4200 Ammonia by Discrete Analyser	Perth	Jul 22, 2020	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Jul 23, 2020	28 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Perth	Jul 22, 2020	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Perth	Jul 22, 2020	0 Hours
Phosphate total (as P) - Method: APHA 4500-P E. Phosphorus	Melbourne	Jul 23, 2020	28 Days
Phosphorus filterable reactive (as P) - Method: APHA 4500-P Phosphate (filterable reactive)	Melbourne	Jul 23, 2020	2 Days
Sulphate (as S) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Jul 23, 2020	28 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Jul 23, 2020	7 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Perth	Jul 22, 2020	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Perth	Jul 22, 2020	180 Days
Acid Sulphate Metals : Metals M9 filtered - Method:	Perth	Jul 22, 2020	180 Days
Alkali Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Perth	Jul 22, 2020	180 Days
Ammonium Ion (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Perth	Jul 22, 2020	7 Days
Sulphide (as S) - Method: APHA 4500-S C & D - Sulphide	Melbourne	Jul 23, 2020	7 Days
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N) - Method: LTM-INO-4350 Aqueous Inorganic Analytes by Discrete Analyser	Perth	Jul 22, 2020	28 Days
Total Kjeldahl Nitrogen (as N) - Method: LTM-INO-4310 TKN in Waters & Soils by FIA	Melbourne	Jul 23, 2020	7 Days

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Order No.: 6137041.083
Report #: 733336
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jul 22, 2020 11:15 AM
Due: Jul 29, 2020
Priority: 5 Day
Contact Name: Vicki Davies

Project Name:
Project ID: 6137041

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Ammonium Ion (as N)	Sulphide (as S)	ASS Groundwater Quality Suite - WA Department of Environment and	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736						X		X	X
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	WFS01	Jul 20, 2020		Water	P20-JI36445	X	X	X	X
2	WFS02	Jul 20, 2020		Water	P20-JI36446	X	X	X	
Test Counts						2	2	2	1

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Phosphorus filterable reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Sulphide (as S)	mg/L	< 0.05			0.05	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Alkalinity (speciated)							
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Alkali Metals							
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	97			70-130	Pass	
TRH C10-C14	%	96			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	101			70-130	Pass	
Toluene	%	105			70-130	Pass	
Ethylbenzene	%	104			70-130	Pass	
m&p-Xylenes	%	105			70-130	Pass	
Xylenes - Total*	%	106			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	91			70-130	Pass	
TRH C6-C10	%	95			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	110			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	106			70-130	Pass	
Ammonium Ion (as N)	%	106			70-130	Pass	
Chloride	%	106			70-130	Pass	
Conductivity (at 25°C)	%	97			70-130	Pass	
Nitrate & Nitrite (as N)	%	110			70-130	Pass	
Phosphate total (as P)	%	96			70-130	Pass	
Sulphate (as S)	%	98			70-130	Pass	
Sulphide (as S)	%	90			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	103			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	90			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	%	100			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	104			80-120	Pass	
Aluminium (filtered)	%	99			80-120	Pass	
Arsenic (filtered)	%	97			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium (filtered)	%	100			80-120	Pass	
Iron	%	100			80-120	Pass	
Iron (filtered)	%	99			80-120	Pass	
Manganese (filtered)	%	96			80-120	Pass	
Nickel (filtered)	%	98			80-120	Pass	
Selenium (filtered)	%	94			80-120	Pass	
Zinc (filtered)	%	99			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Sodium	%	103			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1				
TRH C6-C9	P20-JI35995	NCP	%	88		70-130	Pass	
TRH C10-C14	P20-JI35985	NCP	%	84		70-130	Pass	
Spike - % Recovery								
BTEX				Result 1				
Benzene	P20-JI35995	NCP	%	98		70-130	Pass	
Toluene	P20-JI35995	NCP	%	95		70-130	Pass	
Ethylbenzene	P20-JI35995	NCP	%	88		70-130	Pass	
m&p-Xylenes	P20-JI35995	NCP	%	90		70-130	Pass	
o-Xylene	P20-JI35995	NCP	%	94		70-130	Pass	
Xylenes - Total*	P20-JI35995	NCP	%	91		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
Naphthalene	P20-JI35995	NCP	%	106		70-130	Pass	
TRH C6-C10	P20-JI35995	NCP	%	85		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
TRH >C10-C16	P20-JI35985	NCP	%	96		70-130	Pass	
Spike - % Recovery								
				Result 1				
Chloride	P20-JI36547	NCP	%	87		70-130	Pass	
Nitrate & Nitrite (as N)	P20-JI36445	CP	%	104		70-130	Pass	
Phosphate total (as P)	P20-JI36574	NCP	%	94		70-130	Pass	
Sulphate (as S)	P20-JI34393	NCP	%	90		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B20-JI36937	NCP	%	72		70-130	Pass	
Spike - % Recovery								
Alkalinity (speciated)				Result 1				
Total Alkalinity (as CaCO3)	P20-JI36279	NCP	%	102		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Aluminium	P20-JI35995	NCP	%	97		75-125	Pass	
Aluminium (filtered)	P20-JI36616	NCP	%	104		75-125	Pass	
Arsenic (filtered)	P20-JI36616	NCP	%	103		75-125	Pass	
Cadmium (filtered)	P20-JI36616	NCP	%	104		75-125	Pass	
Chromium (filtered)	P20-JI36616	NCP	%	107		75-125	Pass	
Iron	P20-JI35995	NCP	%	99		75-125	Pass	
Iron (filtered)	P20-JI36616	NCP	%	99		75-125	Pass	
Manganese (filtered)	P20-JI36616	NCP	%	103		75-125	Pass	
Nickel (filtered)	P20-JI36616	NCP	%	103		75-125	Pass	
Selenium (filtered)	P20-JI36616	NCP	%	103		75-125	Pass	
Zinc (filtered)	P20-JI36616	NCP	%	106		75-125	Pass	
Spike - % Recovery								
Alkali Metals				Result 1				
Sodium	P20-JI35995	NCP	%	98		75-125	Pass	
Spike - % Recovery								
				Result 1				
Ammonia (as N)	P20-JI36446	CP	%	109		70-130	Pass	
Ammonium Ion (as N)	P20-JI36446	CP	%	109		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	P20-JI35994	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	P20-JI35994	NCP	mg/L	< 0.05	0.05	<1	30%	Pass	
TRH C15-C28	P20-JI35994	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	P20-JI35994	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	P20-JI35994	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	P20-JI35994	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	P20-JI35994	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	P20-JI35994	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	P20-JI35994	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	P20-JI35994	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	P20-JI35994	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	P20-JI35994	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	P20-JI35994	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	P20-JI35994	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	P20-JI35994	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Acidity (as CaCO ₃)	P20-JI36616	NCP	mg/L	20	22	6.0	30%	Pass	
Ammonia (as N)	P20-JI36445	CP	mg/L	0.52	0.51	1.0	30%	Pass	
Ammonium Ion (as N)	P20-JI36445	CP	mg/L	0.55	0.54	1.0	30%	Pass	
Chloride	P20-JI35994	NCP	mg/L	280	280	2.0	30%	Pass	
Conductivity (at 25°C)	P20-JI36278	NCP	uS/cm	1400	1400	<1	30%	Pass	
Nitrate & Nitrite (as N)	P20-JI36445	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
pH (at 25°C)	P20-JI36278	NCP	pH Units	4.9	4.8	<1	30%	Pass	
Phosphate total (as P)	P20-JI36618	NCP	mg/L	0.33	0.31	7.0	30%	Pass	
Sulphate (as S)	P20-JI35994	NCP	mg/L	17	17	3.0	30%	Pass	
Sulphide (as S)	M20-JI37916	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	P20-JI36573	NCP	mg/L	1200	1300	7.0	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M20-JI36576	NCP	mg/L	59	65	8.9	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Total Alkalinity (as CaCO ₃)	P20-JI36278	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	P20-JI35994	NCP	mg/L	0.22	0.20	9.0	30%	Pass	
Aluminium (filtered)	P20-JI36575	NCP	mg/L	0.20	0.22	7.0	30%	Pass	
Arsenic (filtered)	P20-JI36575	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	P20-JI36575	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	P20-JI36575	NCP	mg/L	0.002	0.002	3.0	30%	Pass	
Iron	P20-JI35994	NCP	mg/L	0.50	0.47	6.0	30%	Pass	
Iron (filtered)	P20-JI36575	NCP	mg/L	2.3	2.3	1.0	30%	Pass	
Manganese (filtered)	P20-JI36575	NCP	mg/L	0.091	0.091	<1	30%	Pass	
Nickel (filtered)	P20-JI36575	NCP	mg/L	0.001	0.001	6.0	30%	Pass	
Selenium (filtered)	P20-JI36575	NCP	mg/L	0.003	0.003	2.0	30%	Pass	
Zinc (filtered)	P20-JI36575	NCP	mg/L	< 0.005	0.008	97	30%	Fail	Q15

Duplicate										
Alkali Metals					Result 1	Result 2	RPD			
Sodium	P20-JI35994	NCP	mg/L		160	160	4.0	30%	Pass	

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Patrick Patfield	Senior Analyst-Organic (WA)
Patrick Patfield	Senior Analyst-Volatile (WA)
Rhys Thomas	Senior Analyst-Inorganic (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Robert Johnston

From: Ian Oglesby <Ian.Oglesby@ghd.com>
Sent: Tuesday, 21 July 2020 23:23
To: !AU06_CAU001_EnviroWA
Subject: GHD - 6137041 - COC
Attachments: GHD - 6137041 - COC.pdf

EXTERNAL EMAIL *

Hi Team

Please schedule the two samples, which should arrive Wednesday via TOLL as per the attached COC and analysis below.

Groundwater Suite.

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)
TRH/BTEXN	W-04	USEPA 8015A, USEPA 8260B	1 - 100 µg/L
Acid Sulphate Soil CW Suite - Extended Cl, SO ₄ , Alkalinity, Acidity, pH, E.C., TDS, Dissolved Ca, Mg, Na, K, Fe, Mn, Al by ICP-AES or MS. Total N, TKN, NO _x , Ammonia, Total & Reactive P; Total Al & Fe; Sulfide; Dissolved As, Cd, Co, Cu, Pb, Fe, Mn, Al, Cr, Ni, Se, Zn by ICPMS	ASSCW-2	Various	0.0001 - 10 mg/L, 0.01 pH Unit, 1 µS/cm, 0.01 %, 0.01 meq/L
Ammonium as N	EK055C- NH4	Calculation	0.01 mg/L

Reduced Groundwater Suite.

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)
Ammonium as N	EK055C- NH4	Calculation	0.01 mg/L
Acid Sulphate Soil CW Suite - Extended Cl, SO ₄ , Alkalinity, Acidity, pH, E.C., TDS, Dissolved Ca, Mg, Na, K, Fe, Mn, Al by ICP-AES or MS. Total N, TKN, NO _x , Ammonia, Total & Reactive P; Total Al & Fe; Sulfide; Dissolved As, Cd, Co, Cu, Pb, Fe, Mn, Al, Cr, Ni, Se, Zn by ICPMS	ASSCW-2 **	Various	0.0001 - 10 mg/L, 0.01 meq/L, 0.01 pH Unit, 1 µS/cm, 0.01 %

Many Thanks

Ian Oglesby
Environmental Scientist – Contaminated Sites

GHD

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Equipment calibration sheets



Calibration Certificate

This document certifies that the instrument detailed has been calibrated to the parameters

Certificate Print Date: 17-Jun-2019

Call ID / Order No:

Calibration Date: 17-Jun-2019

Job No / Pack No:

Next Calibration Due: 17-Jun-2020

Customer: AMS SA Rental-ID 399986	Serial No: 15J101500
Description: Xylem ProDSS Handheld with GPS	

Calibration Summary

Frequency: Yearly
 Temp: 0°C
 As Found: Out of Tolerance
 Result: Pass
Humidity: 0%
 Certificate:

<u>Desc</u>	<u>As Found</u>		<u>As Left (Cal Status)</u>	
	<u>Actual</u>	<u>Result</u>	<u>Actual</u>	<u>Result</u>
PH4	3.95	Pass	4.0	Pass
PH7	6.9	Pass	6.99	Pass
Specific Conductivity	3048.0	Fail	2444.0	Pass
DO Zero	0.5	Pass	0.0	Pass
DO %	95.9	Pass	99.4	Pass
Turbidity 100	143.7	Fail	100.0	Pass
Turbidity 0	2.7	Fail	0.0	Pass

<u>Equip ID</u>	<u>Standard Used</u>	<u>Valid Until</u>	<u>Cert</u>
WATSOL ORP	Zobell Solution	29/10/2019	312984
WATSOL CON	2760 µS/cm @25 degrees celcius	01/08/2019	315529
320612	PH4 (pH = 4.01 +/- 0.02 @ 25 deg)	29/10/2019	
WATSOL pH7	pH 7.0 @ 25 degrees celsius	29/10/2019	317272
WATSOL Turb	100 NTU	29/10/2019	306033

Completed By: Edwin Caronongan

Signed: 



ProDSS Handheld Water Quality Meter

This instrument has been tested and calibrated to factory specifications, as detailed below:

Parameter	Standard	Result	Standard	Result	Standard	Result
Temperature	Control:	20.318 ± 0.05 °C	Instrument:	20.2	±0.2 °C ?	✓
Specific Conductivity	10 mS /cm	10.003	Cell Constant:	5.14	QC Pass?	✓
Dissolved O ₂	Saturated air	-	100.6 % @ 764.5 mmHg	100.6	QC Pass?	✓
Dissolved O ₂	Zero check	0.2%	< 2% ?	✓	-	-
pH	7.01	7.01	10.03	10.03	4.00	4.00
pH mV	Offset: -50 to +50?	-9.2 ✓	-165 to -180 from offset?	-178.5 ✓	+165 to +180 from offset?	164.6 ✓
ORP (Zobell's)	234.7 mV @ 22.1 °C	234.7	Offset:	11.2	QC Pass?	✓
Depth	Zeroed in air @ - mmHg	NA	Check at: - m	-	± - m ?	-
Turbidity	0 FNU	0.00 ✓	124 FNU	124.01 ✓	QC Pass?	✓

Battery charge: 71 % Initial: DB

Please check that the following items are received and all items are returned. Please clean equipment before returning.
Please note: A minimum \$75 service/repair charge applies to any unclean or damaged items.

Item description	Sent	Received	Returned
Sensor guard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calibration/Storage cup	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Probe weight	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charger wall block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charger wall block plug	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USB charging/download cable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thumb drive (manuals & cal certs)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USB to Micro USB adapter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quick start guide	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 sample bottles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carry case	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handheld serial #:	18A103388	Rental equipment ID:	A1256
Cable serial #:	16E100902	Rental equipment ID:	A673

Rental booking # 1230187 Checked by: David Bover Signed: [Signature] Date: 10/9/19

Calibration Standards

Standard	Type	Manufacturer	Lot #
1,000 µS/cm	Standard Conductivity Buffer	ACR	
10,000 µS/cm	Standard Conductivity Buffer	ACR	326395
50,000 µS/cm	Standard Conductivity Buffer	ACR	
4 pH	pH 4 Buffer	ACR	325418
7 pH	pH 7 Buffer	ACR	340193
10 pH	pH 10 Buffer	ACR	335400
ORP	Zobell Part A	ACR	326691
ORP	Zobell Part B	ACR	326895
DO Zero	Sodium Sulphite	Chem Supply	301762
Turbidity Zero	Deionised Water	ACR	330551
12.4/12.7 NTU	6072G Turbidity Standard	YSI	
124/126 NTU	6073G Turbidity Standard	YSI	19F19250134
1000/1010 NTU	6074G Turbidity Standard	YSI	
Chlorophyll Zero	Deionised Water	ACR	
Chlorophyll Span	Diluted Rhodamine WT	ACR	
BGA-PC Zero	Deionised Water	ACR	
BGA-PC Span	Diluted Rhodamine WT	ACR	
BGA-PE Zero	Deionised Water	ACR	
BGA-PE Span	Diluted Rhodamine WT	ACR	
1 mg/L Nitrate	Nitrate Standard	ACR	
10 mg/L Nitrate	Nitrate Standard	ACR	
100 mg/L Nitrate	Nitrate Standard	ACR	
1 mg/L Ammonium	Ammonium Standard	ACR	
10 mg/L Ammonium	Ammonium Standard	ACR	
100 mg/L Ammonium	Ammonium Standard	ACR	
Rhodamine Zero	Deionised Water	ACR	
Rhodamine Span	Diluted Rhodamine WT	ACR	

Multi Parameter Water Meter

Instrument YSI Pro DSS
 Serial No. 16K103034



Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
EC		Zero in Air			0.002mS/cm
EC		2.76mS		326685	2.76mS/cm
Temp					20.7
pH 4		pH 4.00		324985	4.00
pH 7		pH 7.00		324988	7.02
ORP		240mv @ 20°C		331622 / 330337	236.4
DO		Na ² SO ³ Zero		Holding previous cal	0.20%
DO 100%		100%		Holding previous cal	100%
Turbidity		0 NTU		Holding previous cal	0.3
Turbidity		1000 NTU		Holding previous cal	1012

Calibrated by: Sebastian Moran

Calibration date: 15/10/2019

Next calibration due: 12/04/2020



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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	<input checked="" type="checkbox"/>	
YSI 4 port Sonde	<input checked="" type="checkbox"/>	
- YSI pH / ORP probe	<input checked="" type="checkbox"/>	
- YSI-Turbidity Probe	<input checked="" type="checkbox"/>	
- YSI Cond/Temp Probe	<input checked="" type="checkbox"/>	
- YSI ODO Sensor	<input checked="" type="checkbox"/>	
Flow Cell	<input checked="" type="checkbox"/>	
Probe Guard & weight	<input checked="" type="checkbox"/>	
Storage/Calibration Sleeve (with Gasket)	<input checked="" type="checkbox"/>	
Charger & PC Cable	<input checked="" type="checkbox"/>	
Instruction Manual & Field Sheets	<input checked="" type="checkbox"/>	
Battery Charged 100%	<input checked="" type="checkbox"/>	

SENSOR CALIBRATION DETAILS

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dissolved Oxygen	<input checked="" type="checkbox"/> 100% Saturation	±2%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Pressure Compensation	1019 hPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conductivity	<input checked="" type="checkbox"/> 1288mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> Check linearity at 1.4mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Salinity	Auto Calibrated	±1%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pH	<input checked="" type="checkbox"/> pH 7.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> pH 4.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ORP	<input checked="" type="checkbox"/> 229 mV at 25 °C	±20mV	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Turbidity	0, 124 NTU / FNU Sonde – 15H101896	±0.3 NTU/FNU	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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,

Tim Collins

ECO Environmental Equipment Specialist

Date: 07.11.2019

Multi Parameter Water Meter

Instrument YSI Pro DSS
 Serial No. 15J101500



Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	x	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Value	Standard		Instrument Reading
Temperature			Checked	18.1 °C
EC	Zero	Air	Checked	0.001 mS/cm
EC	2.76mS/cm	326685	Calibrated	2.76 mS/cm
DO Zero	Zero	Sodium sulphite sol	Checked	0.1 %
DO 100%	100%	Water saturated air	Holding previous cal	100 %
Turbidity	Zero	Zero	Holding previous cal	0.3
Turbidity	1000 NTU	310308	Holding previous cal	1012

Calibrated by: Sebastian Moran

Calibration date: 12/12/2019

Next calibration due: 9/06/2020

Multi Parameter Water Meter



airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18J 104 338

Item	Test	Pass	Comments
Battery	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
	Seal		
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. ORP in mV	✓	
	3. EC/Temp.	✓	
	4. D.O.	✓	
Alarms	Beeper		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Value	Standard		Instrument Reading
Temperature			Checked	25.5 °C
pH	pH 7	324988	Calibrated	7.00
pH	pH 4	342091	Calibrated	4.02
EC	Zero	Air	Checked	0.001 mS/cm
EC	2.76mS/cm	326685	Calibrated	2.76 mS/cm
ORP (mV)	240mV at 20°C	Zobell 335411 / 335412	Calibrated	231.2 mV
DO Zero	Zero	Sodium sulphite sol 5928	Checked	0 %
DO 100%	100%	Water saturated air	Calibrated	100 %

Calibrated by: Reuben Priest

Calibration date: 11-Dec-19

Next calibration due 11-Jan-20

Multi Parameter Water Meter

Instrument YSI Pro DSS
 Serial No. 18D102527



Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
EC		Zero in Air			0.002mS/cm
EC		2.76mS		326685	2.76mS/cm
Temp					24.6
pH 4		pH 4.00		324985	4.00
pH 7		pH 7.00		324988	7.02
ORP		240mv @ 20°C		331622 / 330337	231.1
DO		Na ² SO ³ Zero		Holding previous cal	1.5%
DO 100%		100%		Holding previous cal	100%
Turbidity		0 NTU		Checked	0.3
Turbidity		1000 NTU		Checked (310308)	1048

Calibrated by: _____ **Sebastian Moran**

Calibration date: 15/01/2020

Next calibration due: 13/07/2020

EQUIPMENT INFORMATION

Instrument: YSIProDSS-3P

Serial Number: 17K102947 (Display)

19G101870 (Sonde)

EQUIPMENT CHECK

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	<input checked="" type="checkbox"/>	
YSI 4 port Sonde	<input checked="" type="checkbox"/>	
- YSI pH / ORP probe	<input checked="" type="checkbox"/>	
- YSI-Turbidity Probe	<input checked="" type="checkbox"/>	
- YSI Cond/Temp Probe	<input checked="" type="checkbox"/>	
- YSI ODO Sensor	<input checked="" type="checkbox"/>	
Flow Cell	<input checked="" type="checkbox"/>	
Probe Guard & weight	<input checked="" type="checkbox"/>	
Storage/Calibration Sleeve (with Gasket)	<input checked="" type="checkbox"/>	
Charger & PC Cable	<input checked="" type="checkbox"/>	
Instruction Manual & Field Sheets	<input checked="" type="checkbox"/>	
Battery Charged 100%	<input checked="" type="checkbox"/>	

SENSOR CALIBRATION DETAILS

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dissolved Oxygen	<input checked="" type="checkbox"/> 100% Saturation	±2%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Pressure Compensation	1008 hPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conductivity	<input checked="" type="checkbox"/> 1288mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> Check linearity at 1.4mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Salinity	Auto Calibrated	±1%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pH	<input checked="" type="checkbox"/> pH 7.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> pH 4.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ORP	<input checked="" type="checkbox"/> 222 mV at 28 °C	±20mV	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Turbidity	0, 124 NTU / FNU	±0.3 NTU/FNU	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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,

Horace Petersen

ECO Environmental Equipment Specialist

Date: 05.02.2020

EQUIPMENT INFORMATION

Instrument: YSIProDSS-4P

Serial Number: 19E102044 (Display)

19G102572 (Sonde)

EQUIPMENT CHECK

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	<input checked="" type="checkbox"/>	
YSI 4 port Sonde	<input checked="" type="checkbox"/>	
- YSI pH / ORP probe	<input checked="" type="checkbox"/>	
- YSI-Turbidity Probe	<input checked="" type="checkbox"/>	
- YSI Cond/Temp Probe	<input checked="" type="checkbox"/>	
- YSI ODO Sensor	<input checked="" type="checkbox"/>	
Flow Cell	<input checked="" type="checkbox"/>	
Probe Guard & weight	<input checked="" type="checkbox"/>	
Storage/Calibration Sleeve (with Gasket)	<input checked="" type="checkbox"/>	
Charger & PC Cable	<input checked="" type="checkbox"/>	
Instruction Manual & Field Sheets	<input checked="" type="checkbox"/>	
Battery Charged 100%	<input checked="" type="checkbox"/>	

SENSOR CALIBRATION DETAILS

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dissolved Oxygen	<input checked="" type="checkbox"/> 100% Saturation	±2%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Pressure Compensation	1016 hPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conductivity	<input checked="" type="checkbox"/> 1288mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> Check linearity at 1.4mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Salinity	Auto Calibrated	±1%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pH	<input checked="" type="checkbox"/> pH 7.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> pH 4.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ORP	<input checked="" type="checkbox"/> 225 mV at 27 °C	±20mV	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Turbidity	0, 124 NTU / FNU	±0.3 NTU/FNU	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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,

Jacques Couronne

ECO Environmental Equipment Specialist

Date: 21.02.2020

Oil / Water Interface Meter

Instrument **Geotech Interface Meter (60M)**
Serial No. **3912**



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.6 V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by: _____ **Gaurav Kanwar**

Calibration date: **14-Apr-20**

Next calibration due: **13-Jun-20**

EQUIPMENT INFORMATION

Instrument: YSIProDSS-2P

Serial Number: 15H104162 (Display)

19C104376 (Sonde)

EQUIPMENT CHECK

Enclosed

Comment

YSI Pro DSS Display	<input checked="" type="checkbox"/>
YSI 4 port Sonde	<input checked="" type="checkbox"/>
- YSI pH / ORP probe	<input checked="" type="checkbox"/>
- YSI-Turbidity Probe	<input checked="" type="checkbox"/>
- YSI Cond/Temp Probe	<input checked="" type="checkbox"/>
- YSI ODO Sensor	<input checked="" type="checkbox"/>
Flow Cell	<input checked="" type="checkbox"/>
Probe Guard & weight	<input checked="" type="checkbox"/>
Storage/Calibration Sleeve (with Gasket)	<input checked="" type="checkbox"/>
Charger & PC Cable	<input checked="" type="checkbox"/>
Instruction Manual & Field Sheets	<input checked="" type="checkbox"/>
Battery Charged 100%	<input checked="" type="checkbox"/>

SENSOR CALIBRATION DETAILS

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dissolved Oxygen	<input checked="" type="checkbox"/> 100% Saturation	±2%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Pressure Compensation	1015 hPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conductivity	<input checked="" type="checkbox"/> 1288mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> Check linearity at 1.4mS/cm	±0.5%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Salinity	Auto Calibrated	±1%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pH	<input checked="" type="checkbox"/> pH 7.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/> pH 4.00	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ORP	<input checked="" type="checkbox"/> 240 mV at 20 °C	±20mV	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Turbidity	0, 124 NTU / FNU Sonde – 15H101896	±0.3 NTU/FNU	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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,

Jacques Couronne

ECO Environmental Equipment Specialist

Date: 20.04.2020

Multi Parameter Water Meter

Instrument YSI Pro DSS
 Serial No. 16K103034



Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
	Intensity	✓	
Display	Operation	✓	
	(segments)		
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
Temp					19.9
EC		2.76mS		326685	2.76mS/cm
pH 4		pH 4.00		345749	4.00
pH 7		pH 7.00		349958	7.02
ORP		240mv @ 20°C		345754 / 340529	240.4
DO		Na ² SO ³ Zero		5928	0.6%
DO 100%		100%		Water-saturated air	100%
Turbidity		0 NTU		Distilled water	0.3
Turbidity		100 NTU		345093	100

Calibrated by: Sebastian Moran

Calibration date: 14/05/2020

Next calibration due: 14/06/2020

Multi Parameter Water Meter

Instrument YSI Pro DSS
 Serial No. 16K103034



Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
	Display	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Solution Bottle Number	Instrument Reading
Temp				19.9
EC		2.76mS	326685	2.76mS/cm
pH 4		pH 4.00	345749	4.00
pH 7		pH 7.00	344904	7.02
ORP		240mv @ 20°C	345754 / 340529	240.4
DO		Na ² SO ³ Zero	5928	0.6%
DO 100%		100%	Water-saturated air	100%
Turbidity		0 NTU	Distilled water	0.3
Turbidity		100 NTU	345093	100

Calibrated by: Sebastian Moran

Calibration date: 27/05/2020

Next calibration due: 27/06/2020



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 www.ecoenviromental.com.au
 214 Lord St Perth WA 6000

EQUIPMENT INFORMATION

Instrument: YSIProDSS-4P

Serial Number: 19E102044 (Display)

19G102572 (Sonde)

EQUIPMENT CHECK	Enclosed	Comment
YSI Pro DSS Display	<input checked="" type="checkbox"/>	
YSI 4 port Sonde	<input checked="" type="checkbox"/>	
- YSI pH / ORP probe	<input checked="" type="checkbox"/>	
- YSI-Turbidity Probe	<input checked="" type="checkbox"/>	
- YSI Cond/Temp Probe	<input checked="" type="checkbox"/>	
- YSI ODO Sensor	<input checked="" type="checkbox"/>	
Flow Cell	<input checked="" type="checkbox"/>	
Probe Guard & weight	<input checked="" type="checkbox"/>	
Storage/Calibration Sleeve (with Gasket)	<input checked="" type="checkbox"/>	
Charger & PC Cable	<input checked="" type="checkbox"/>	
Instruction Manual & Field Sheets	<input checked="" type="checkbox"/>	
Battery Charged 100%	<input checked="" type="checkbox"/>	

SENSOR CALIBRATION DETAILS

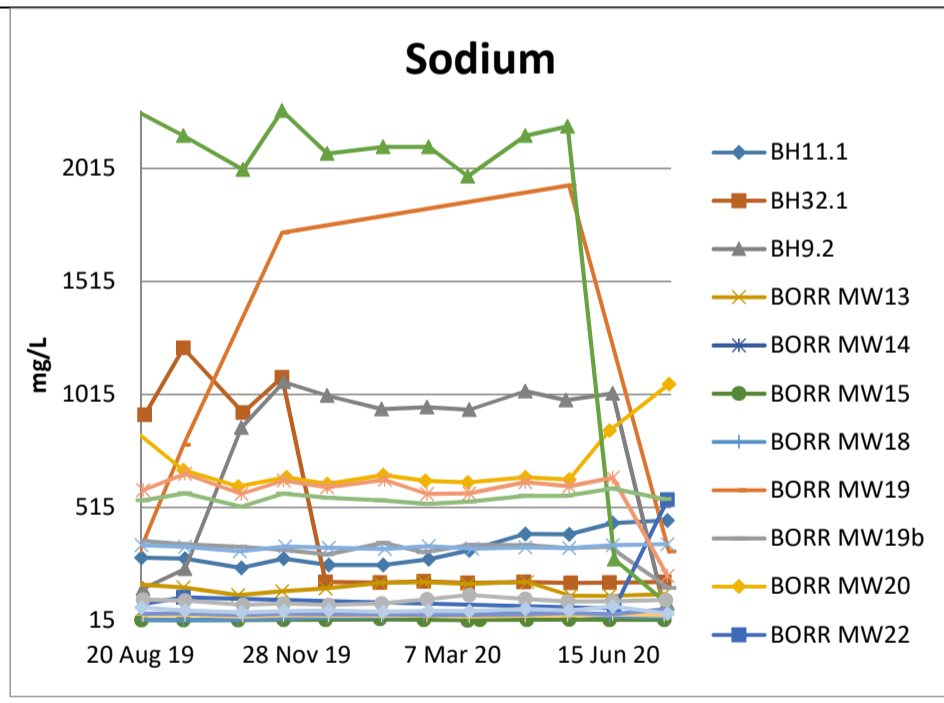
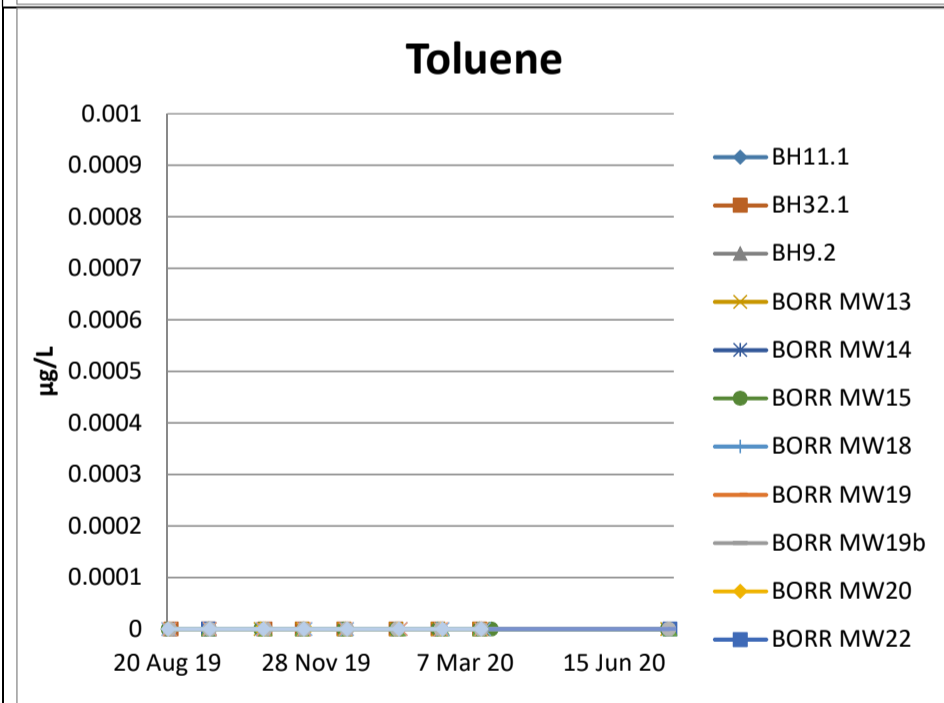
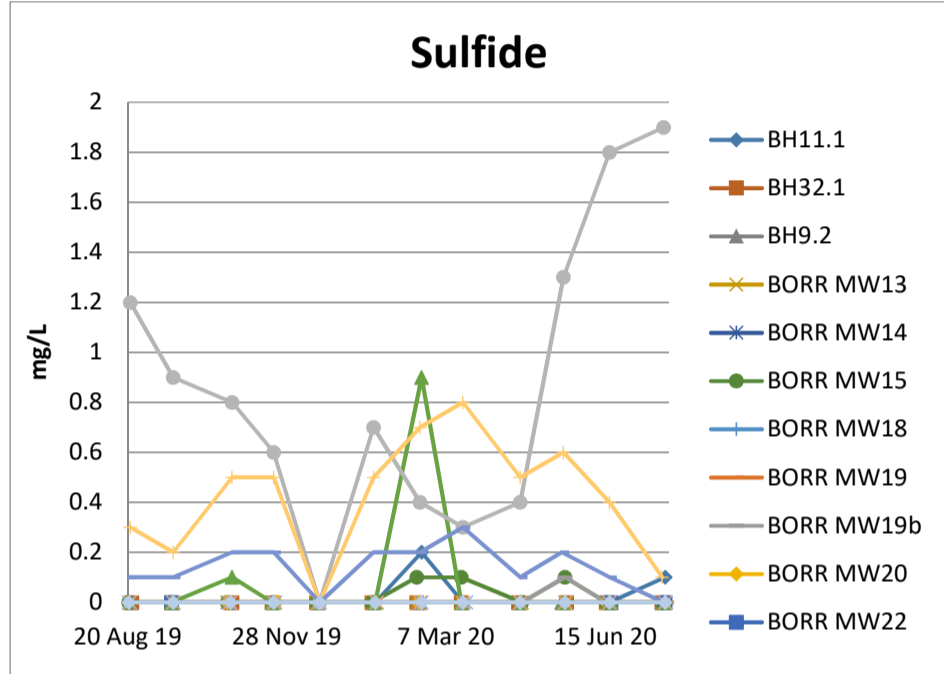
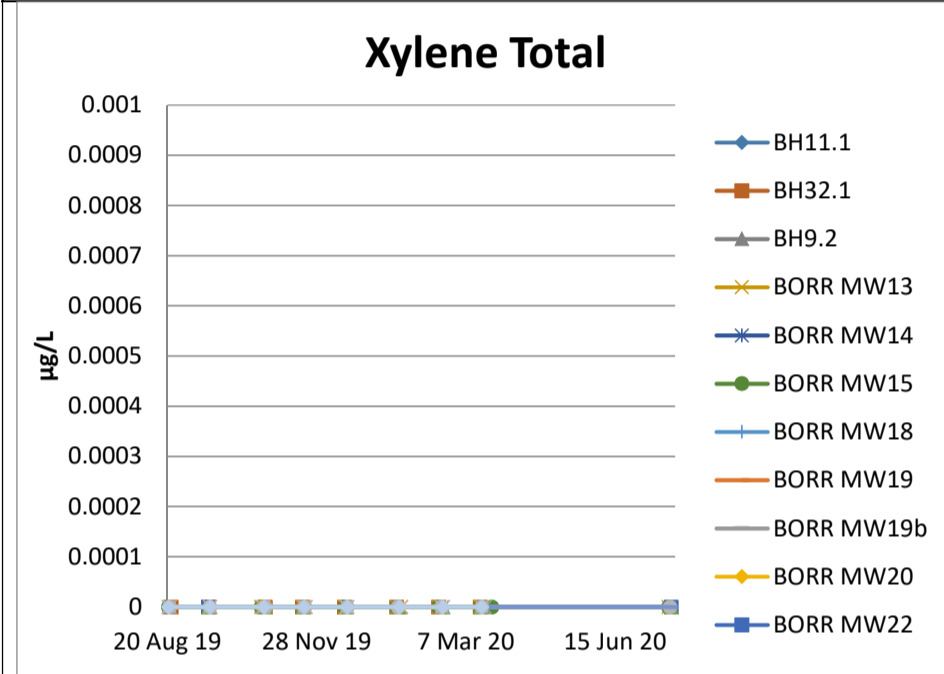
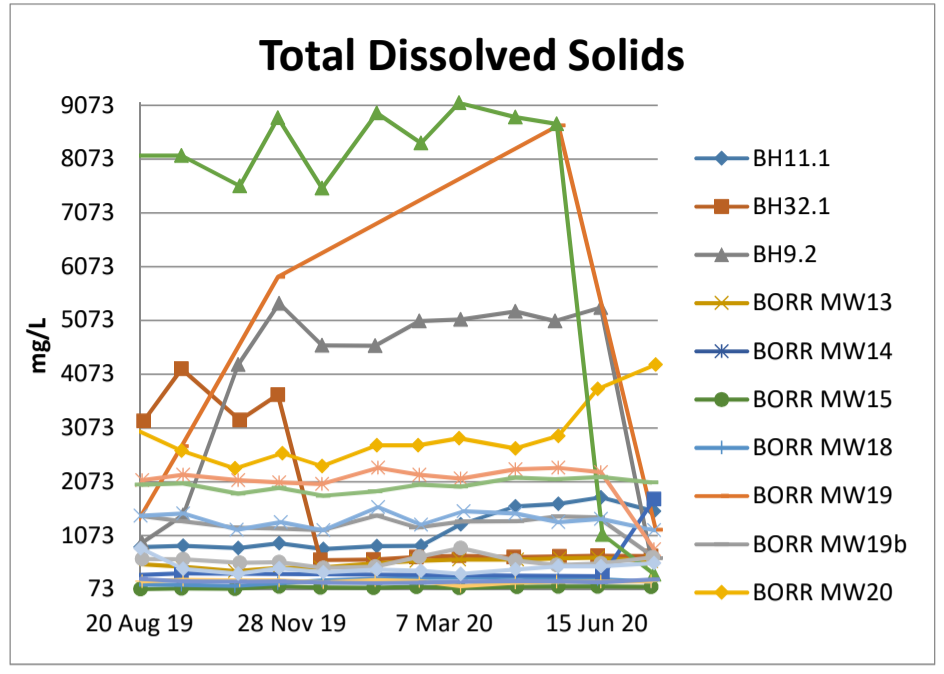
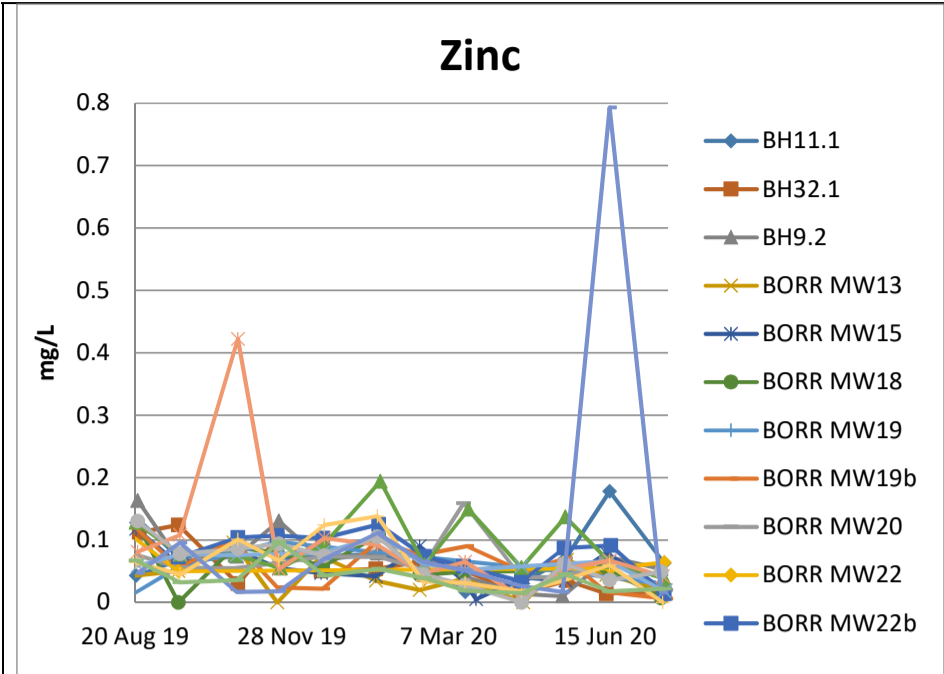
	Calibration Undertaken	Accuracy	Pass
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>
Dissolved Oxygen	100% Saturation	±2%	<input checked="" type="checkbox"/>
	Pressure Compensation	1012 hPa	<input checked="" type="checkbox"/>
Conductivity	1288mS/cm	±0.5%	<input checked="" type="checkbox"/>
	Check linearity at 1.4mS/cm	±0.5%	<input checked="" type="checkbox"/>
Salinity	Auto Calibrated	±1%	<input checked="" type="checkbox"/>
pH	pH 7.00	± 0.2	<input checked="" type="checkbox"/>
	pH 4.00	± 0.2	<input checked="" type="checkbox"/>
ORP	244 mV at 18 °C	±20mV	<input checked="" type="checkbox"/>
Turbidity	0, 124 NTU / FNU	±0.3 NTU/FNU	<input checked="" type="checkbox"/>

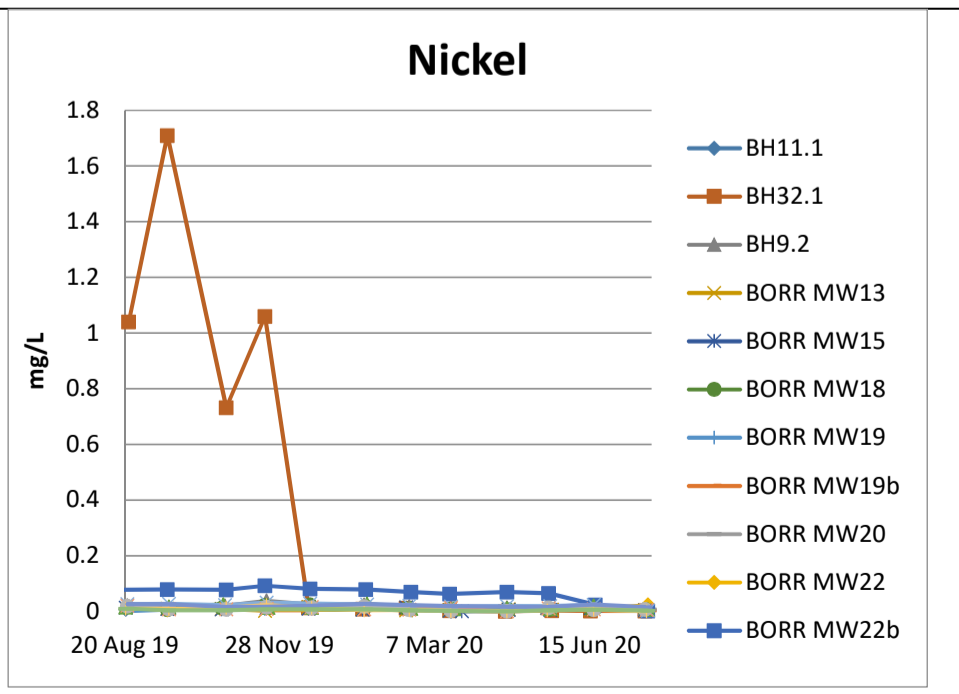
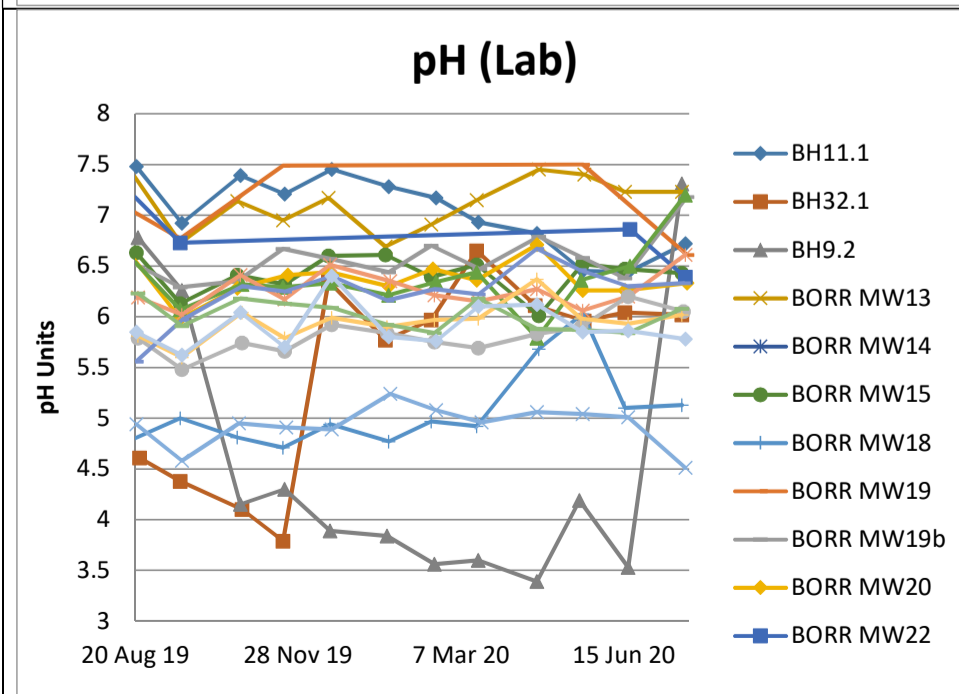
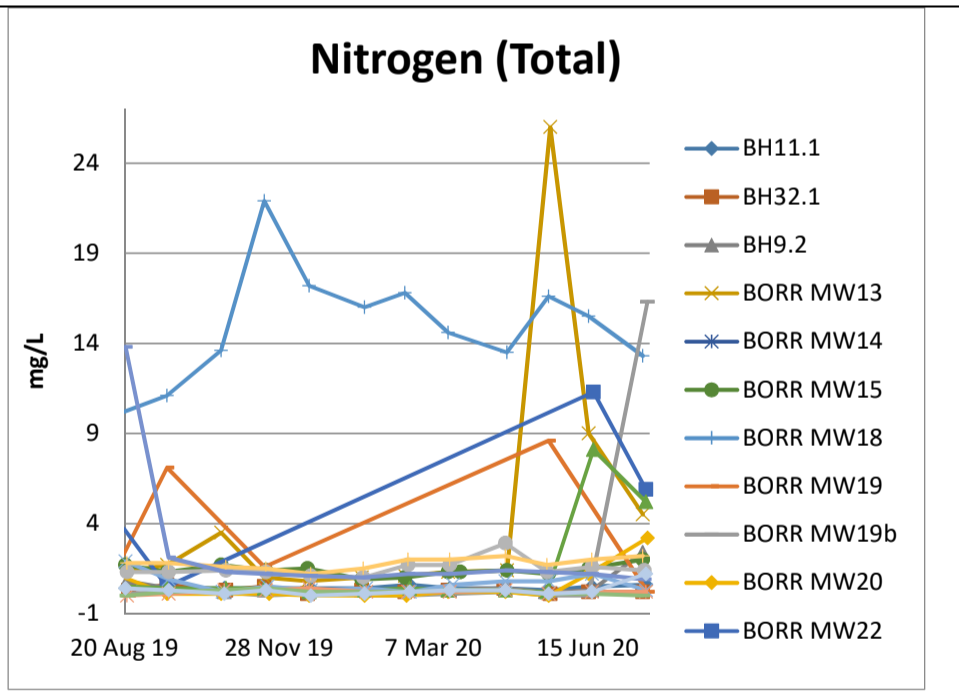
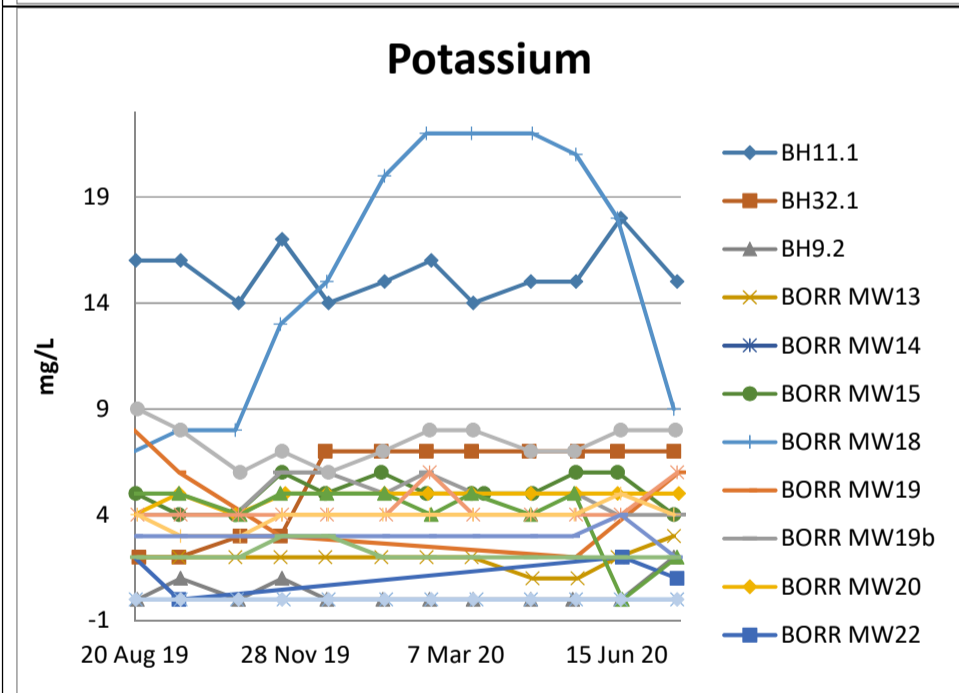
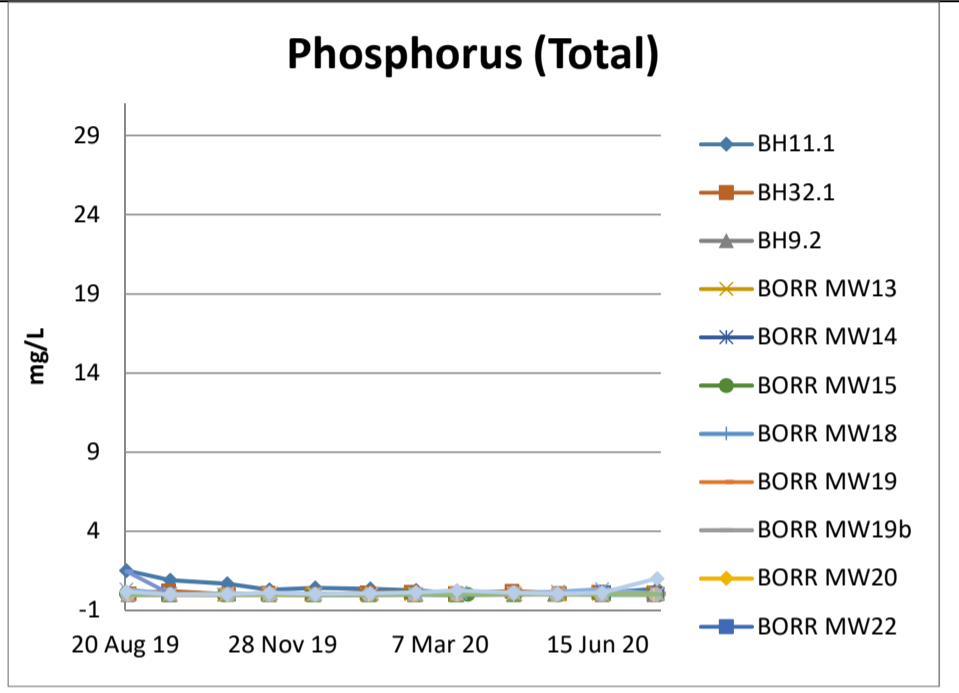
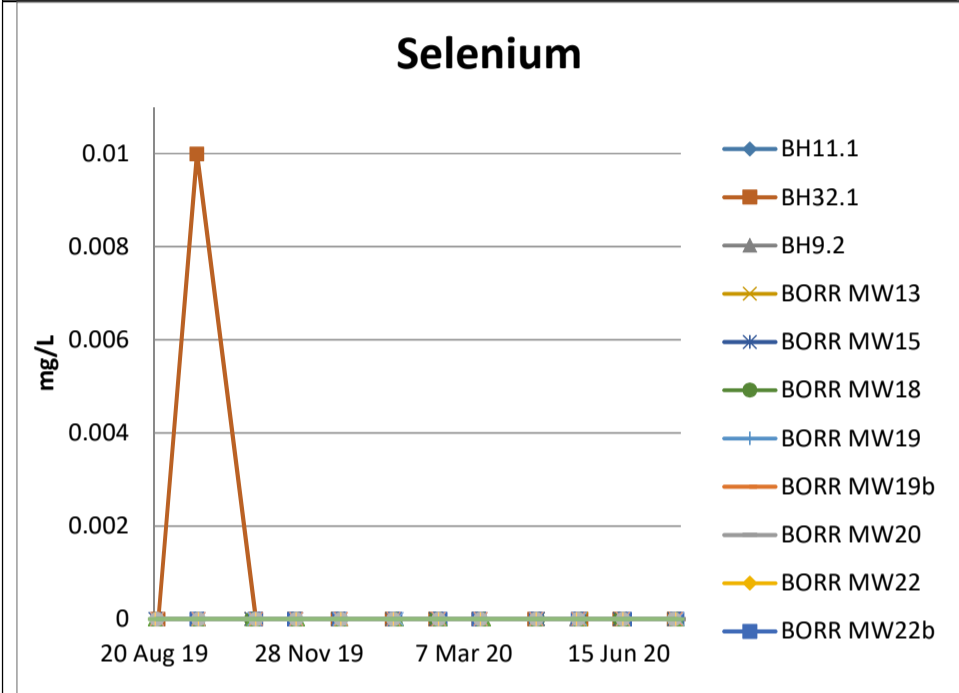
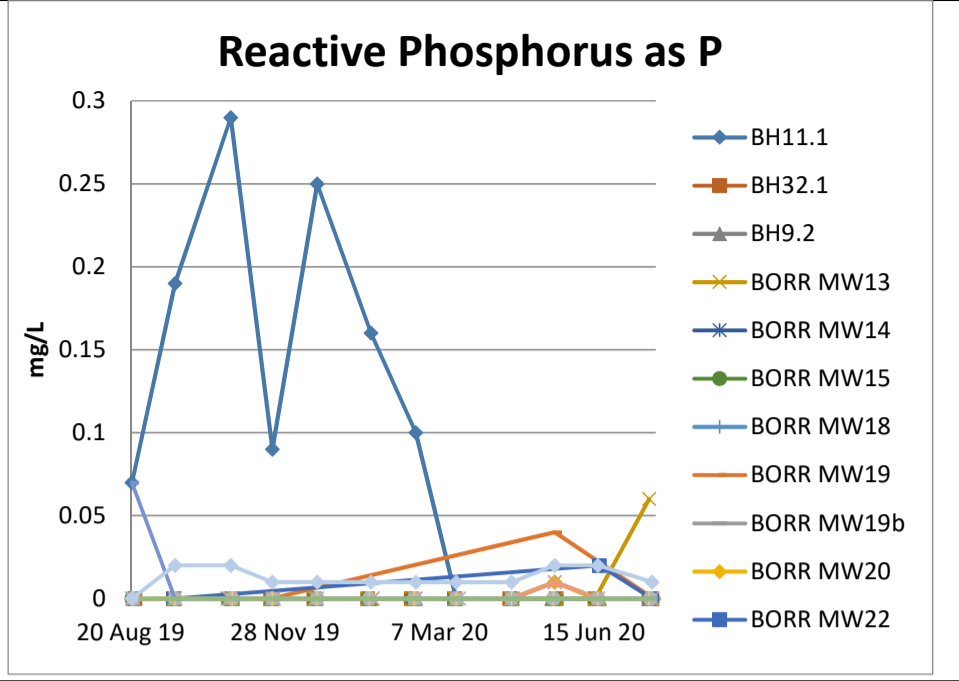
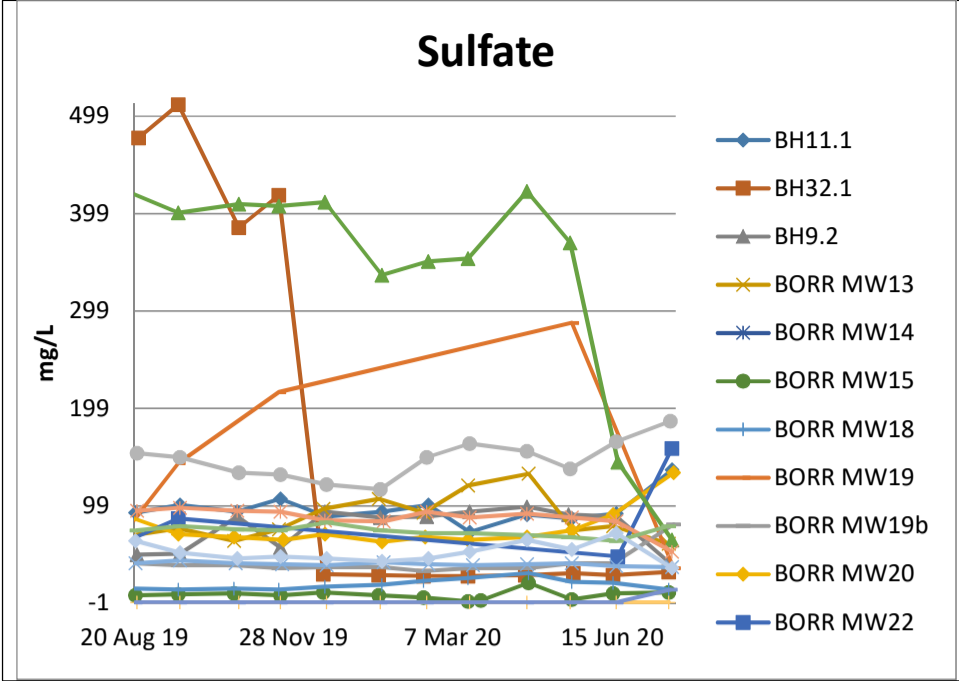
This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

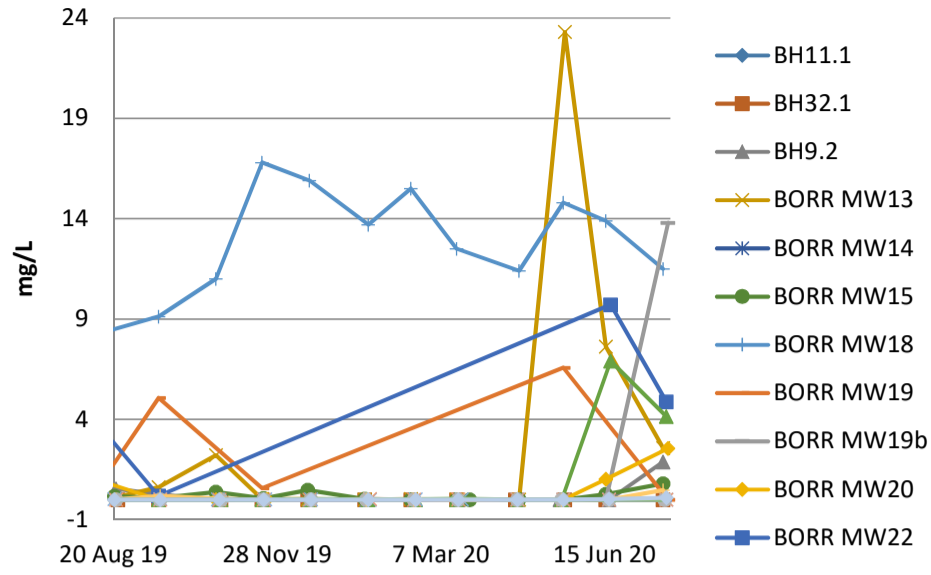
Trend graphs

North and Central Groundwater Graphs

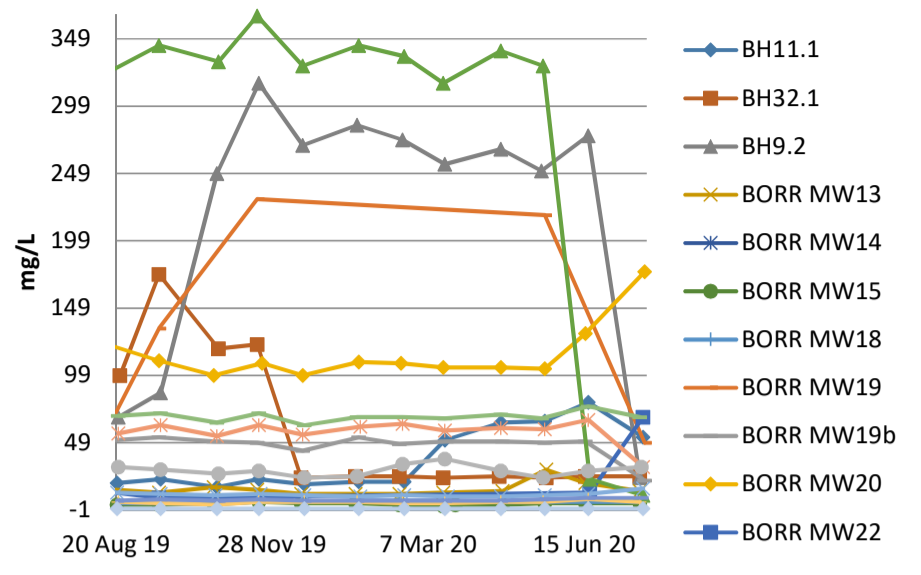




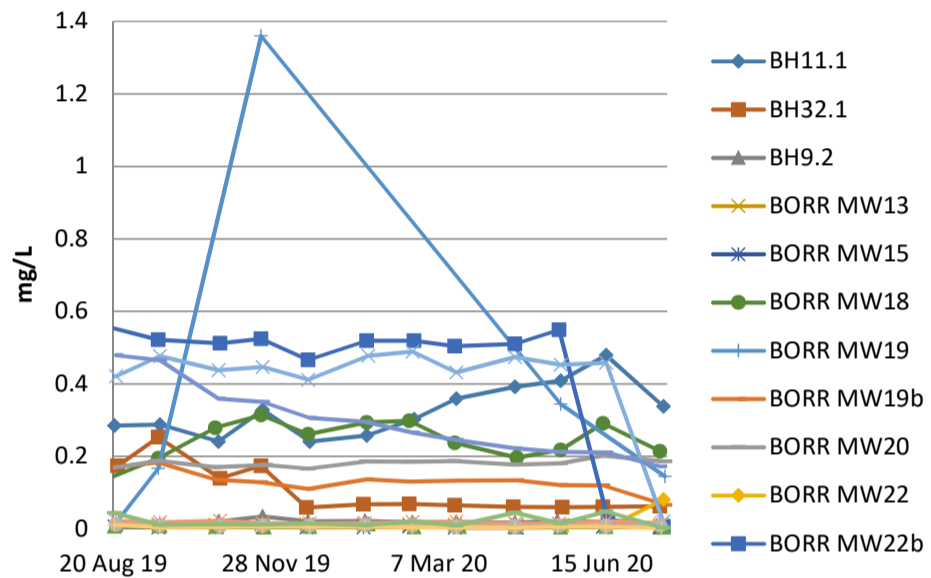
Nitrogen (Total Oxidised) (as N)



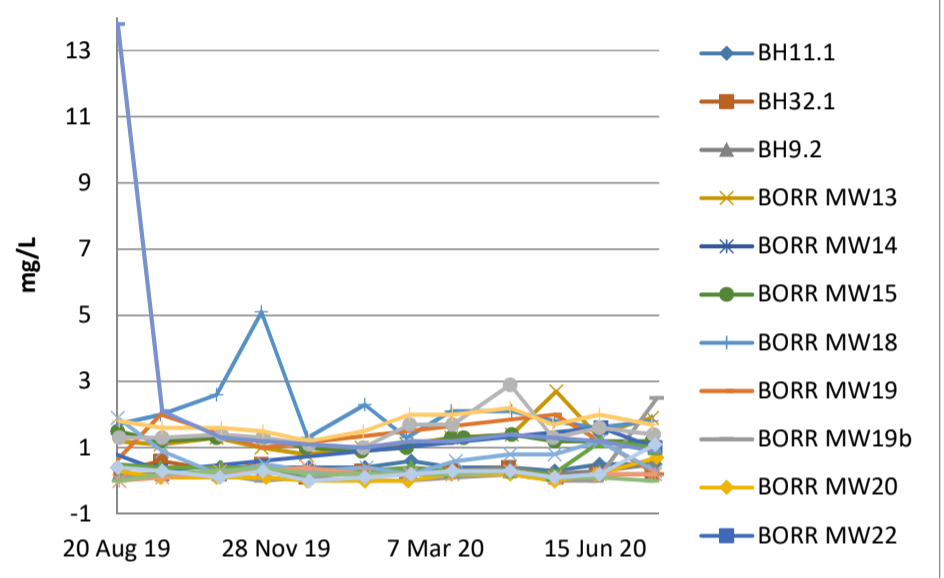
Magnesium



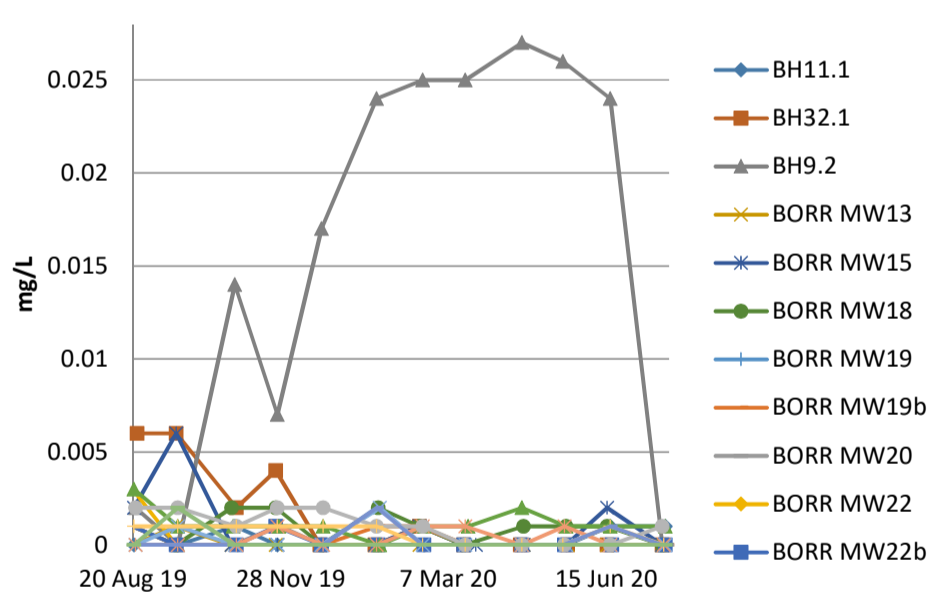
Manganese



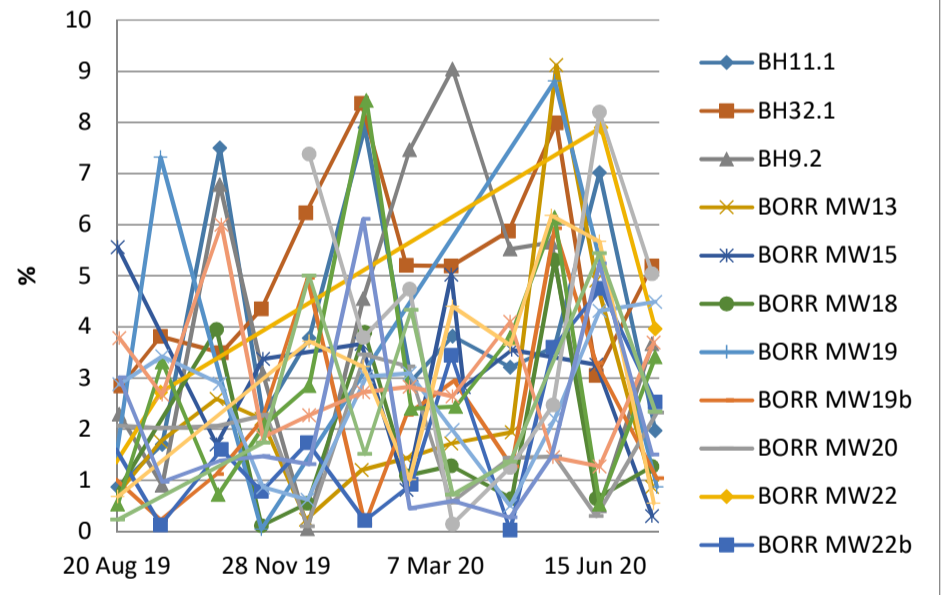
Kjeldahl Nitrogen Total



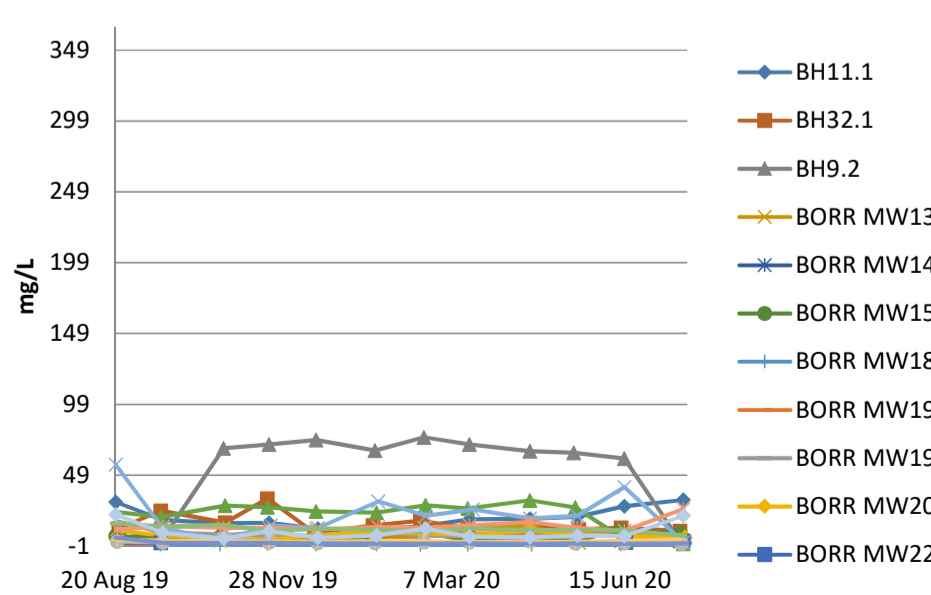
Lead



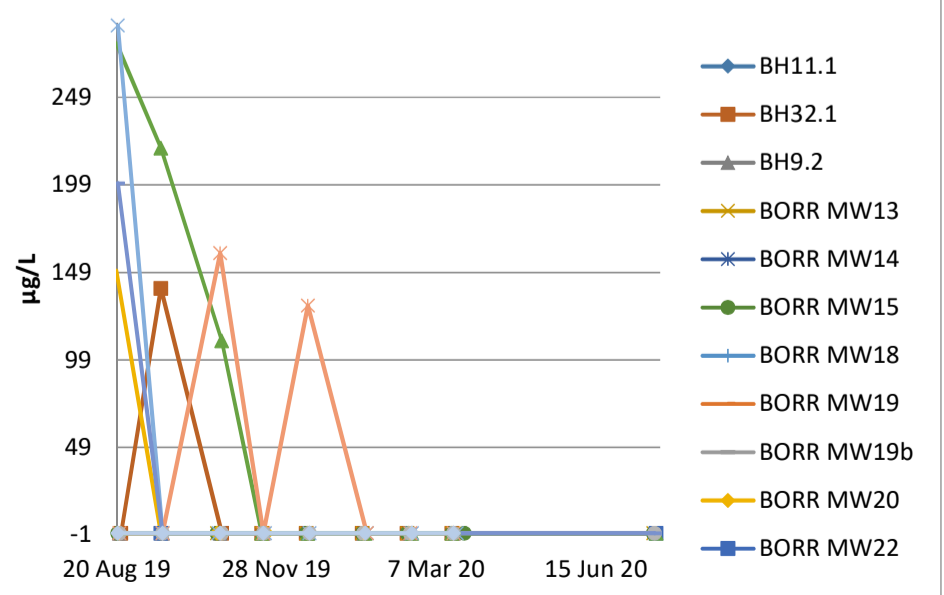
Ionic Balance



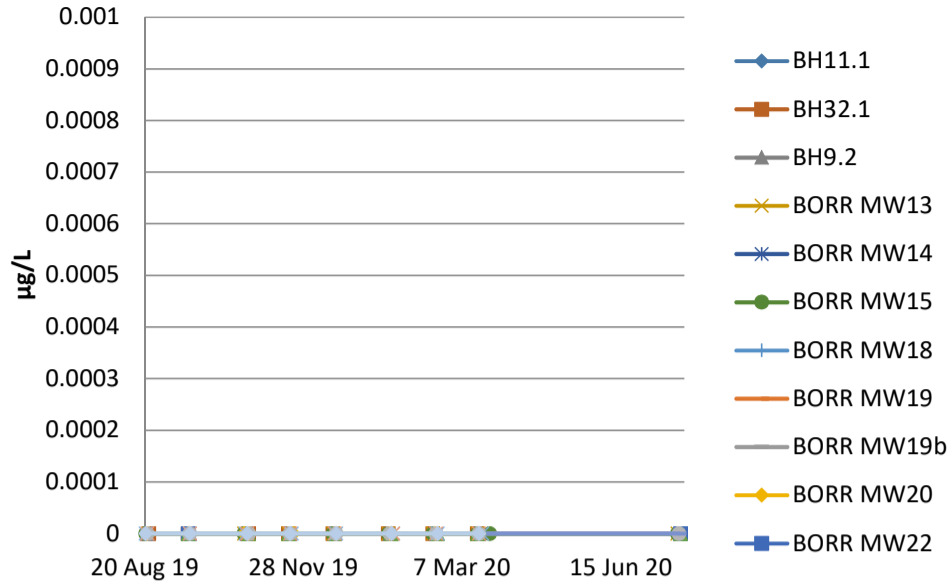
Iron



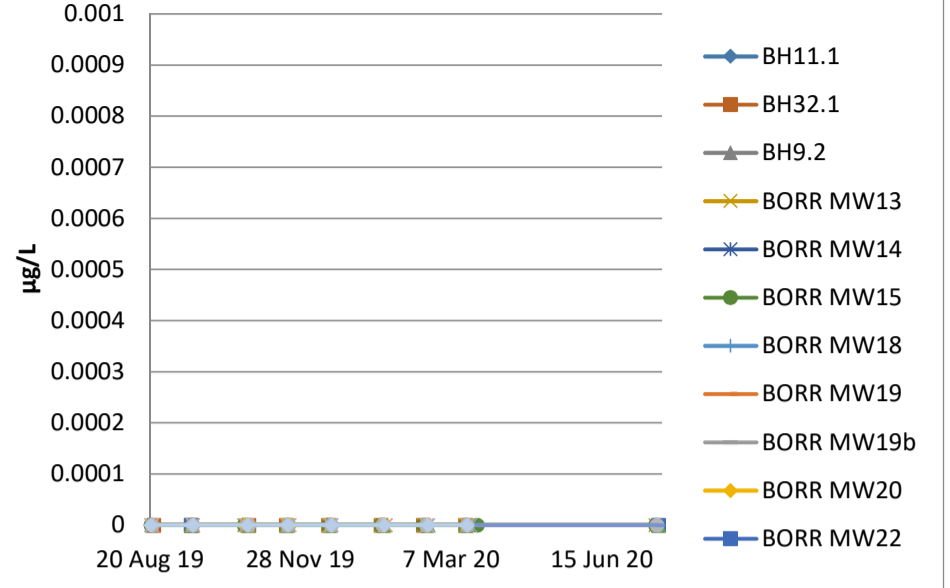
F3 (>C16-C34 Fraction)



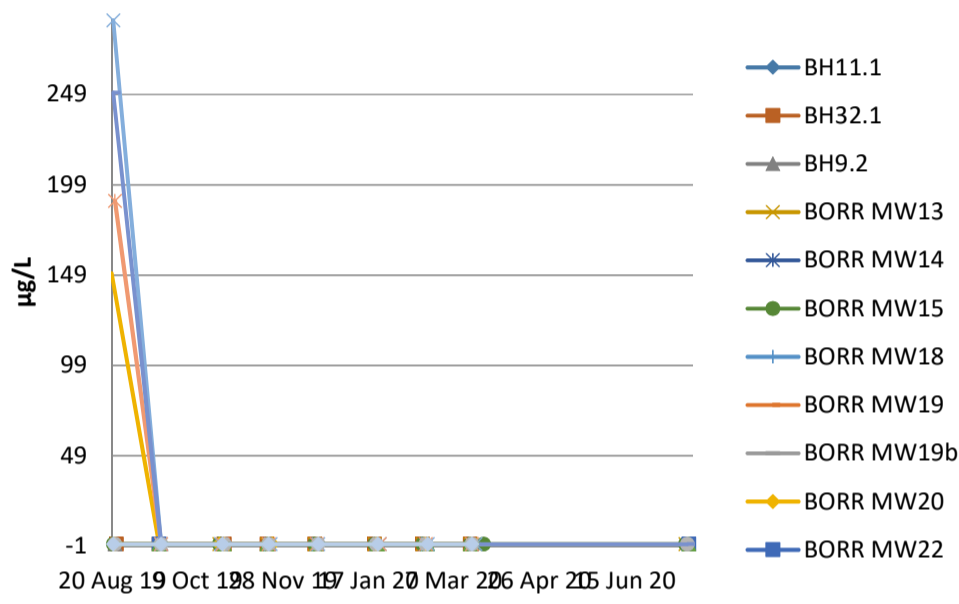
F4 (>C34-C40 Fraction)



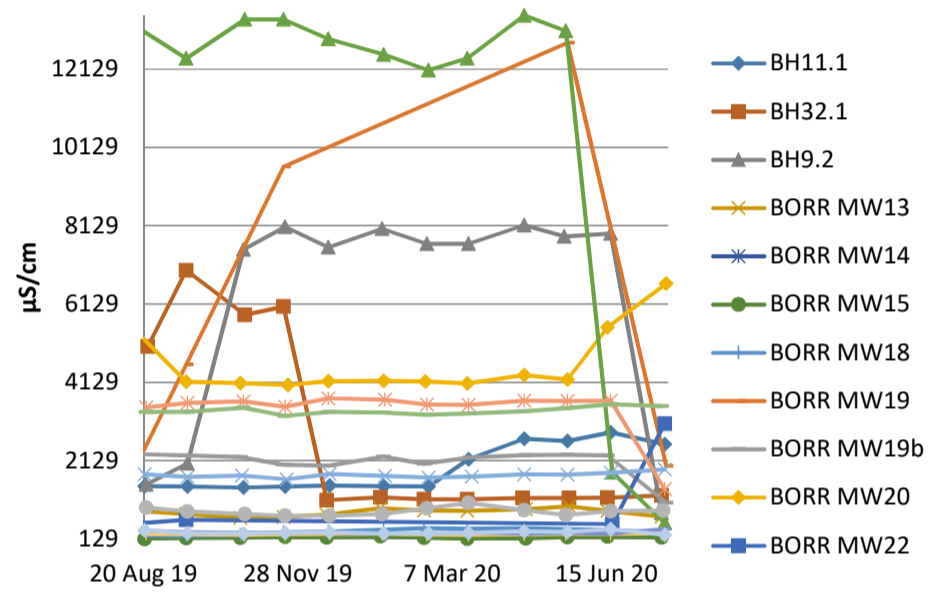
F1 (C6-C10 minus BTEX)



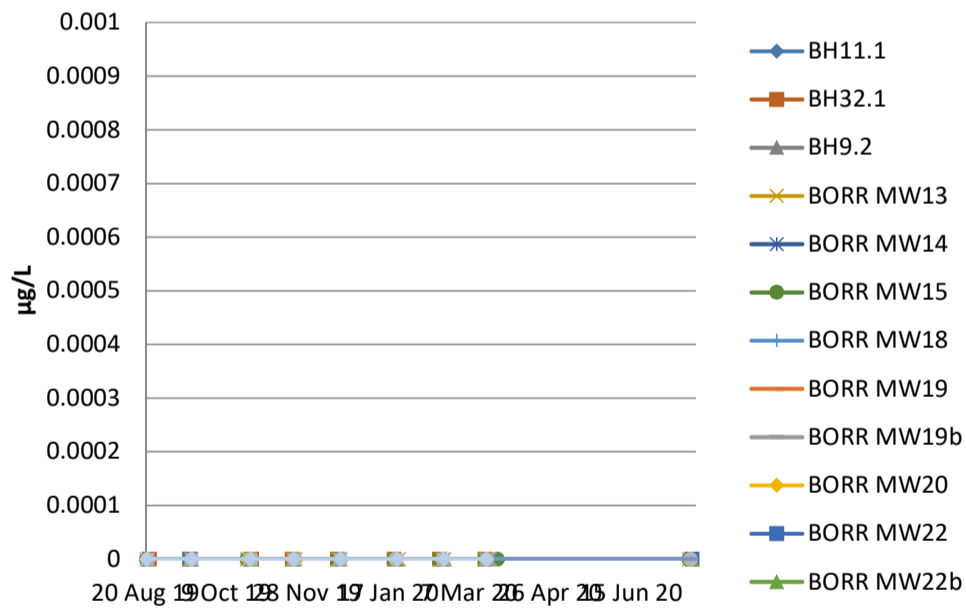
F2 (>C10-C16 minus Naphthalene)



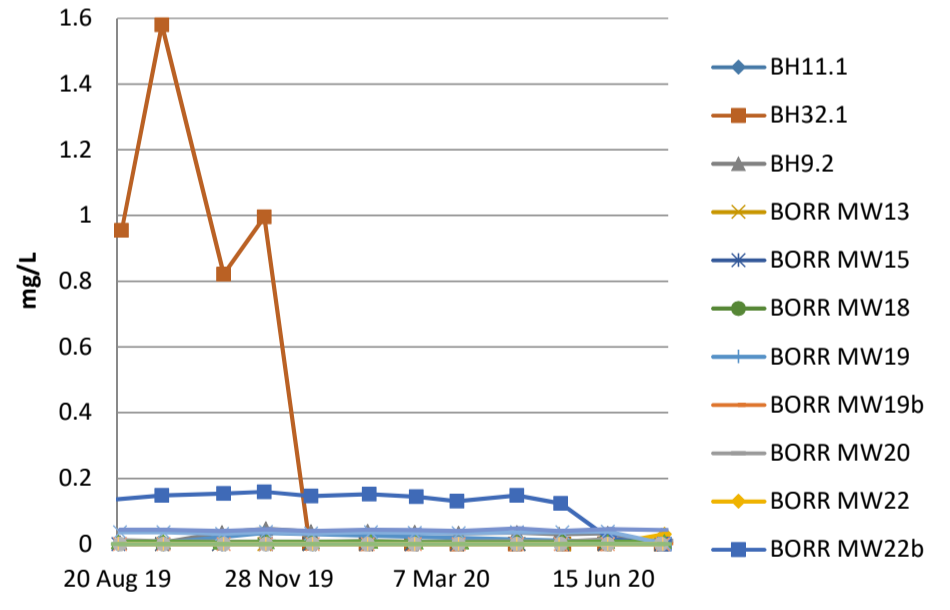
Electrical conductivity (lab)



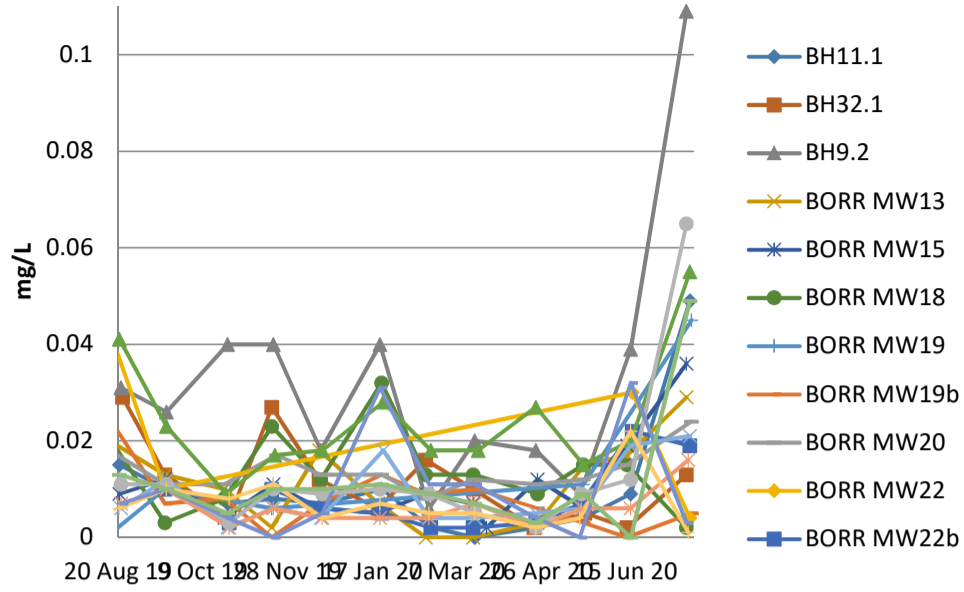
Ethylbenzene



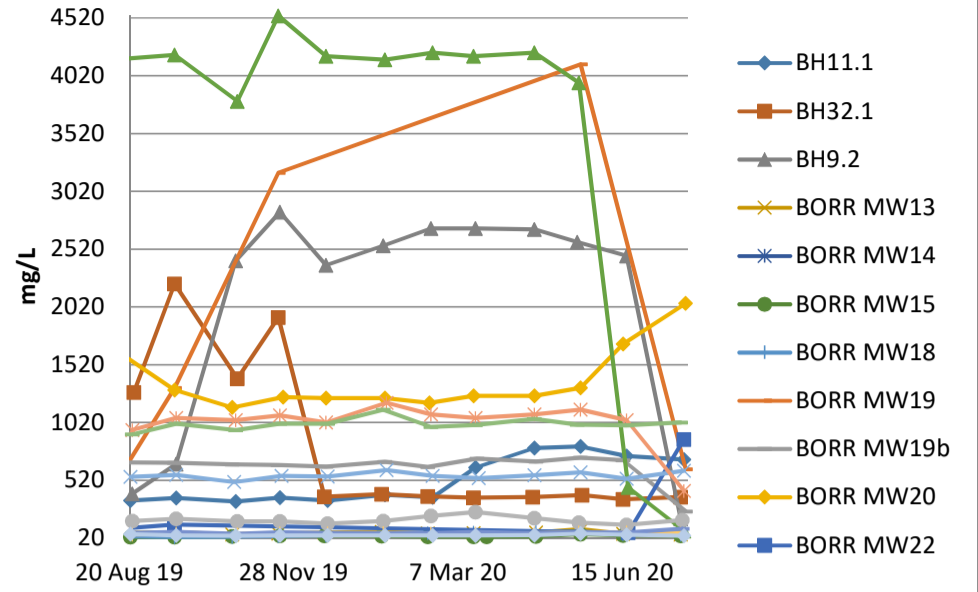
Cobalt



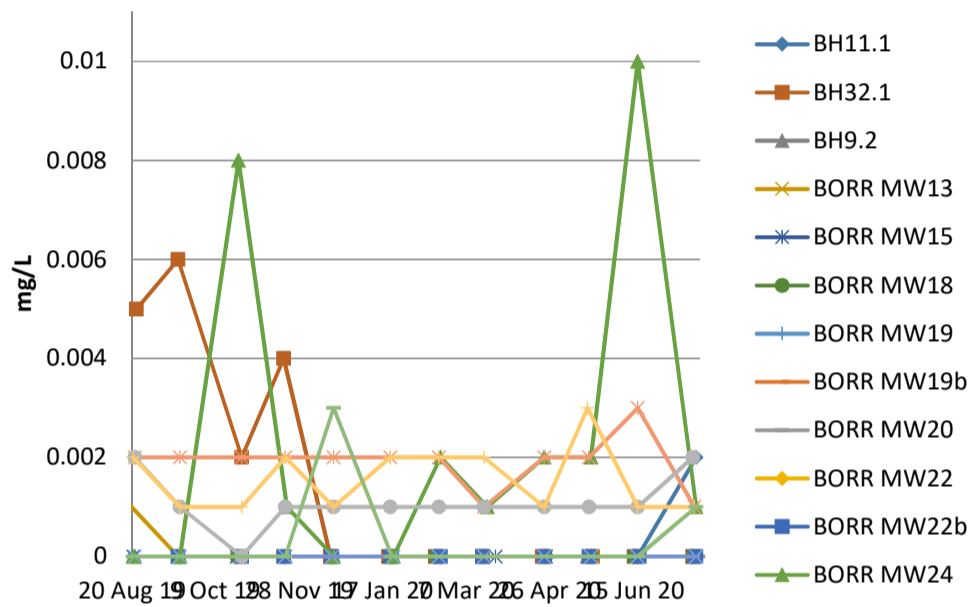
Copper



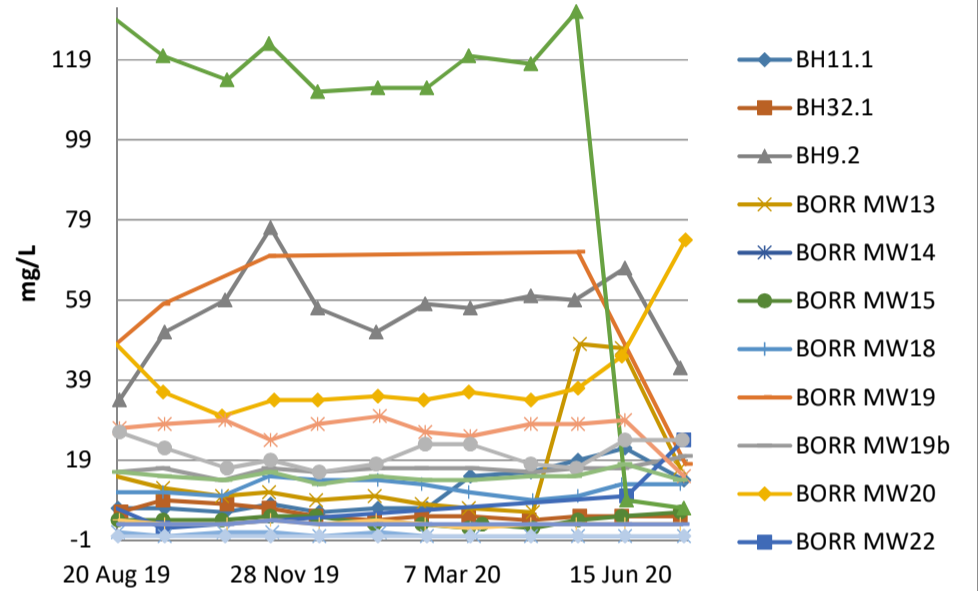
Chloride



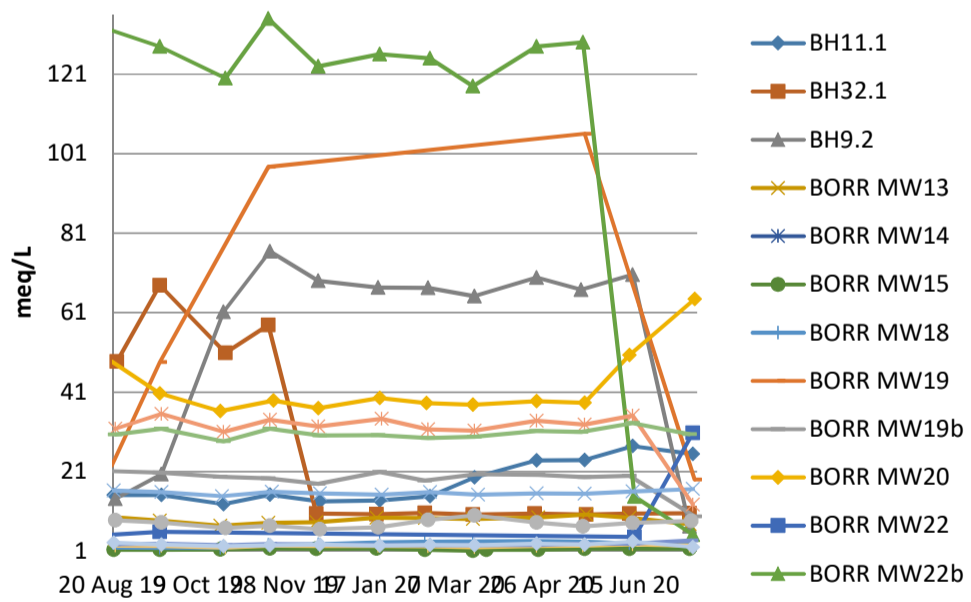
Chromium (III+VI)



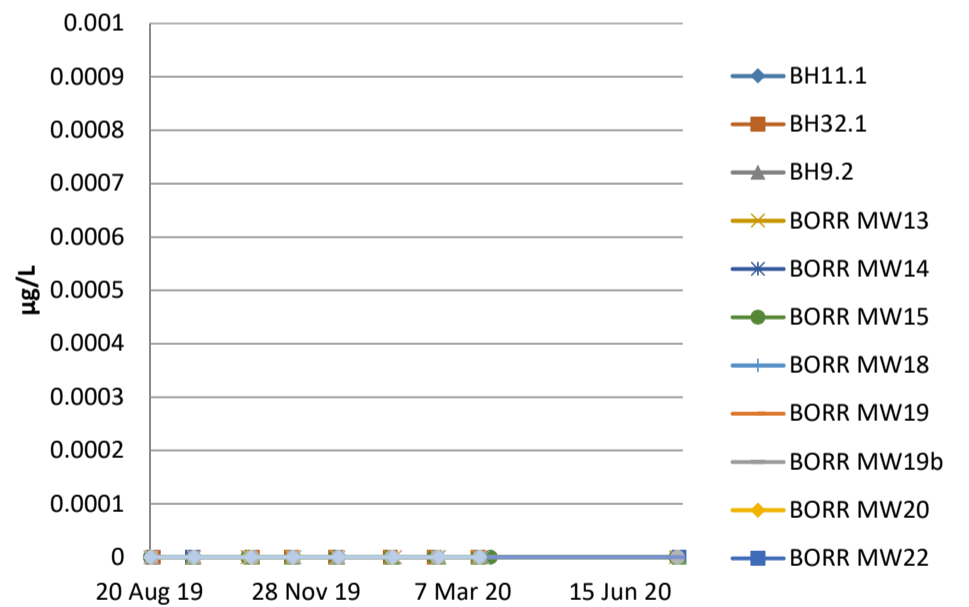
Calcium



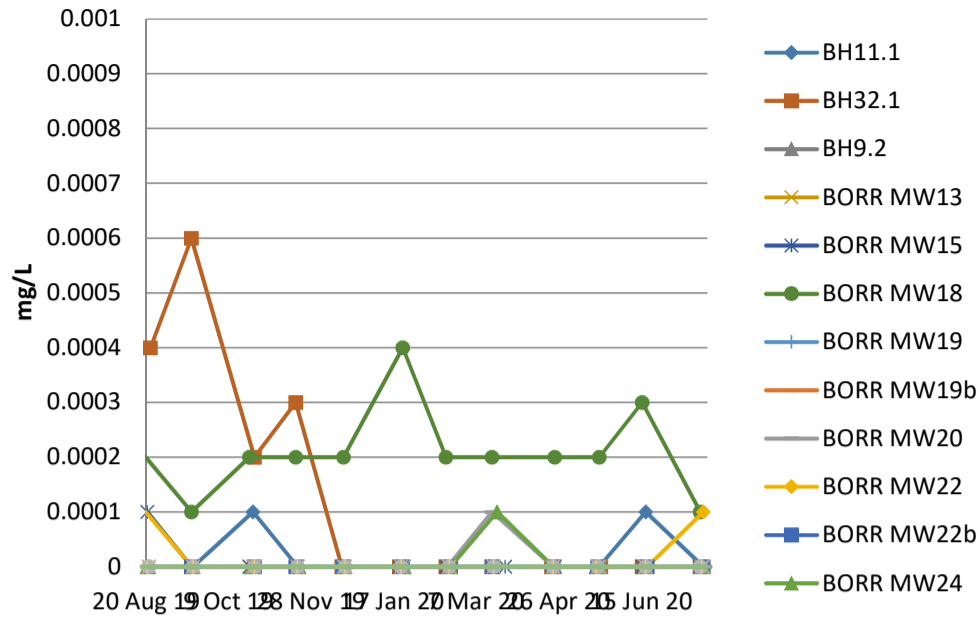
Cations Total



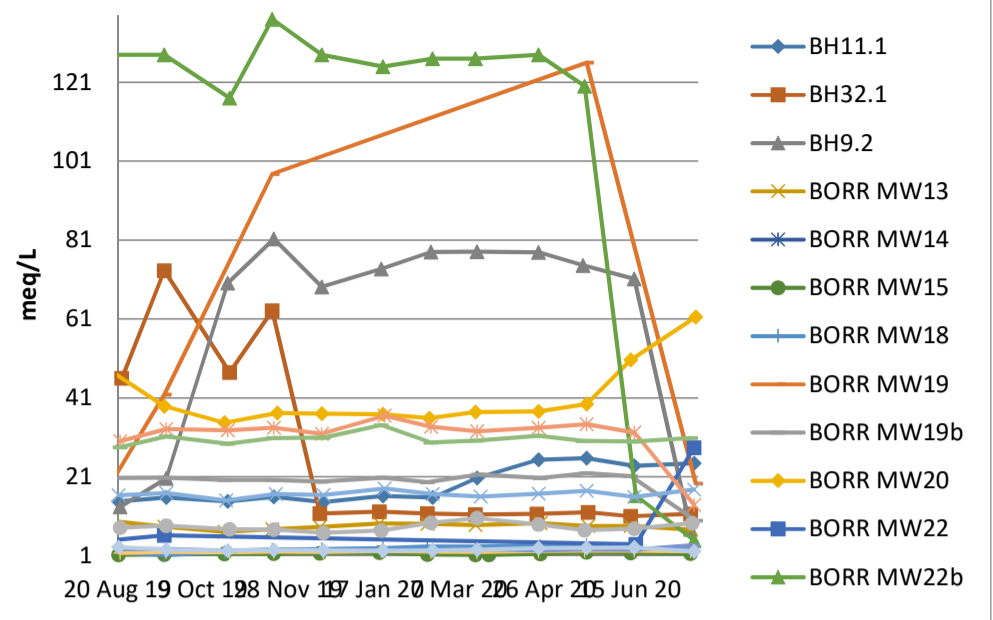
BTEX (Sum of Total) - Lab Calc



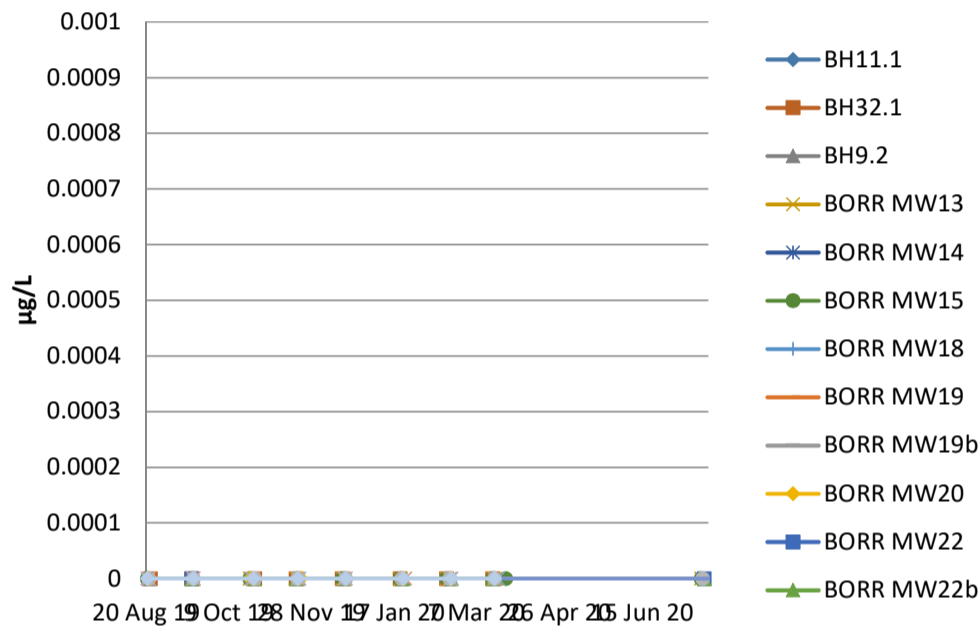
Cadmium



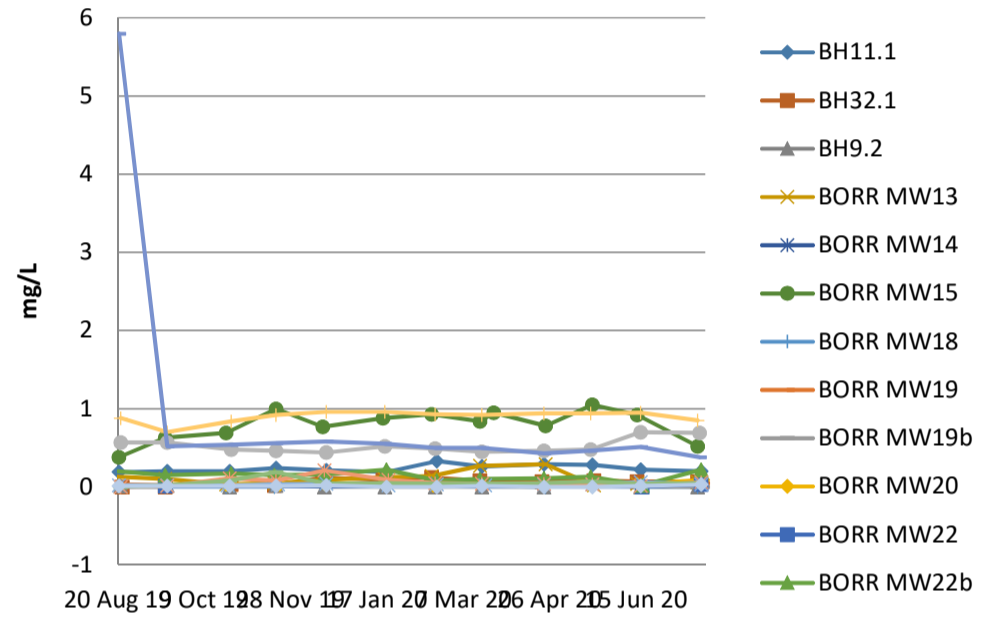
Anions Total



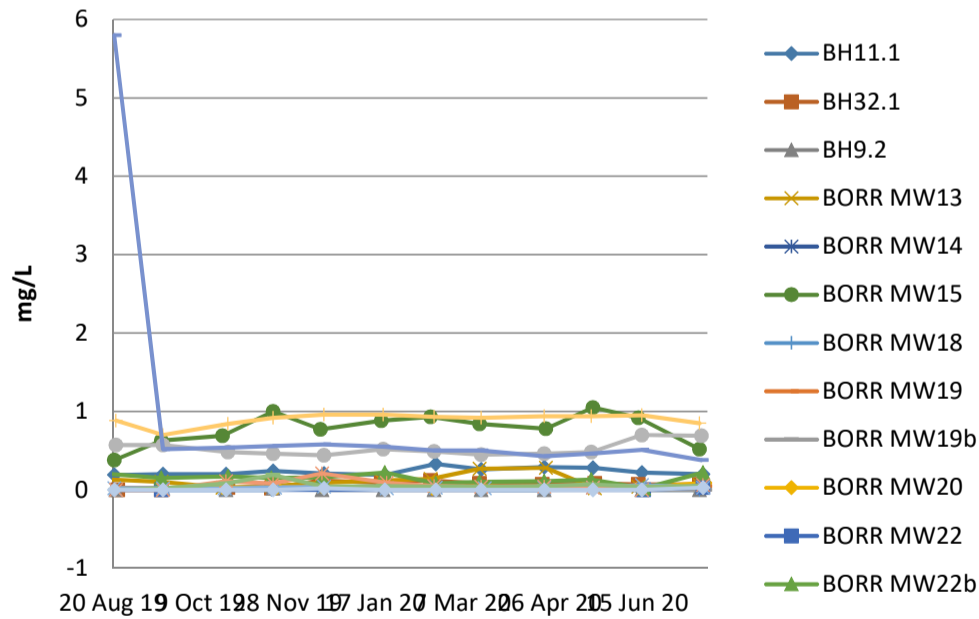
Benzene



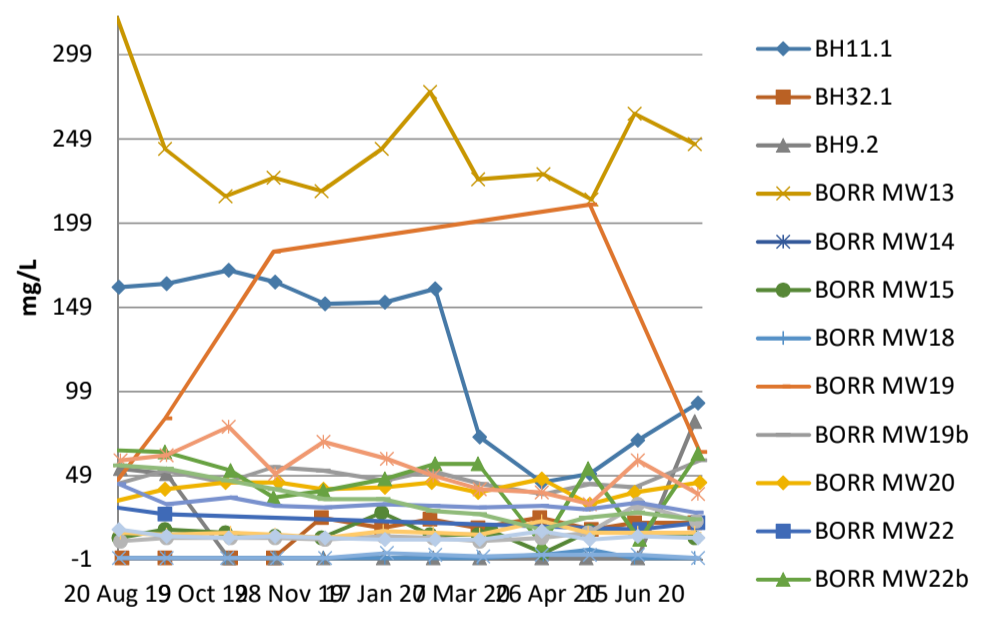
Ammonia as N



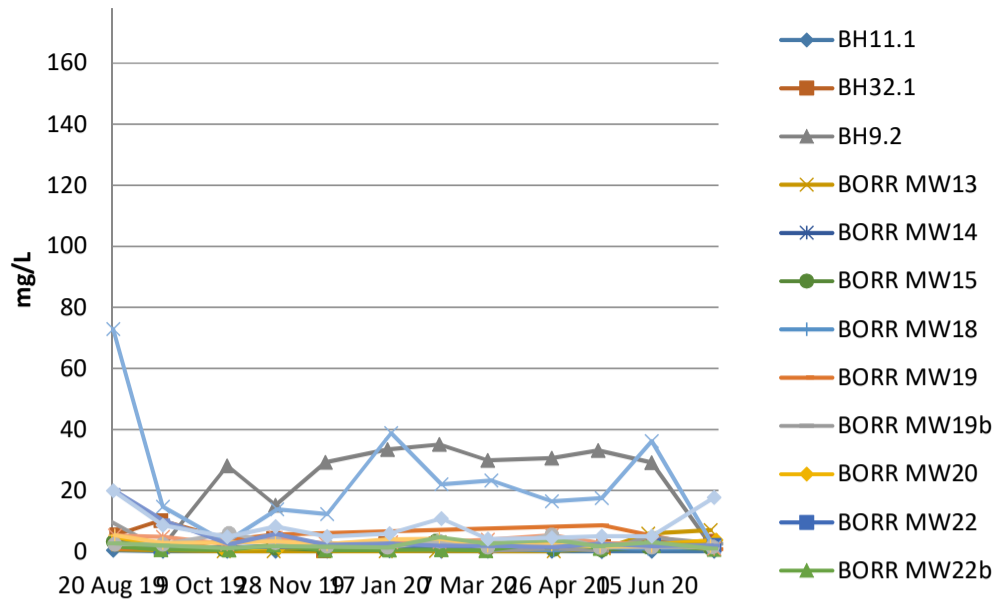
Ammonium (as N)



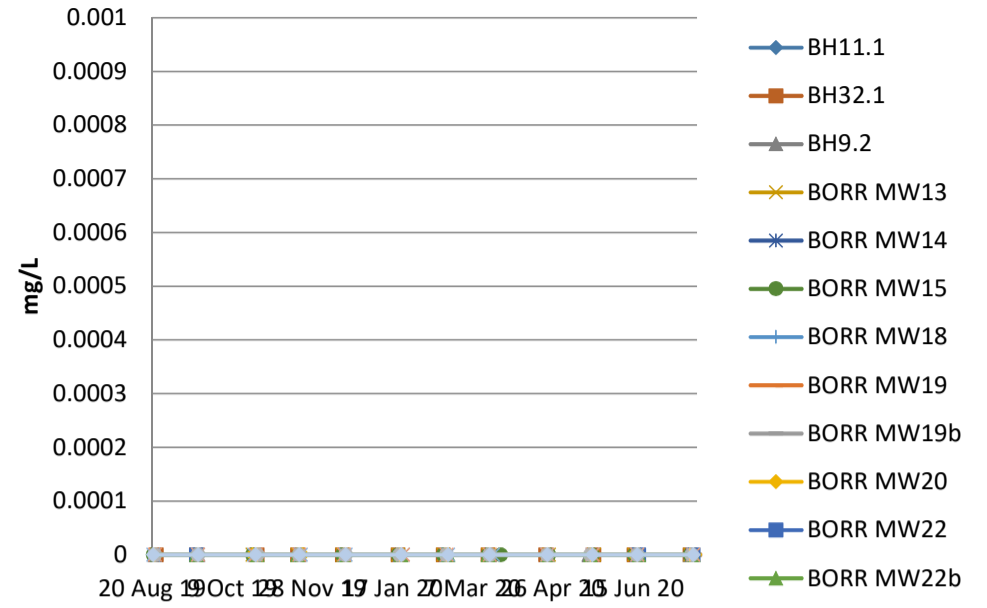
Alkalinity (total as CaCO3)



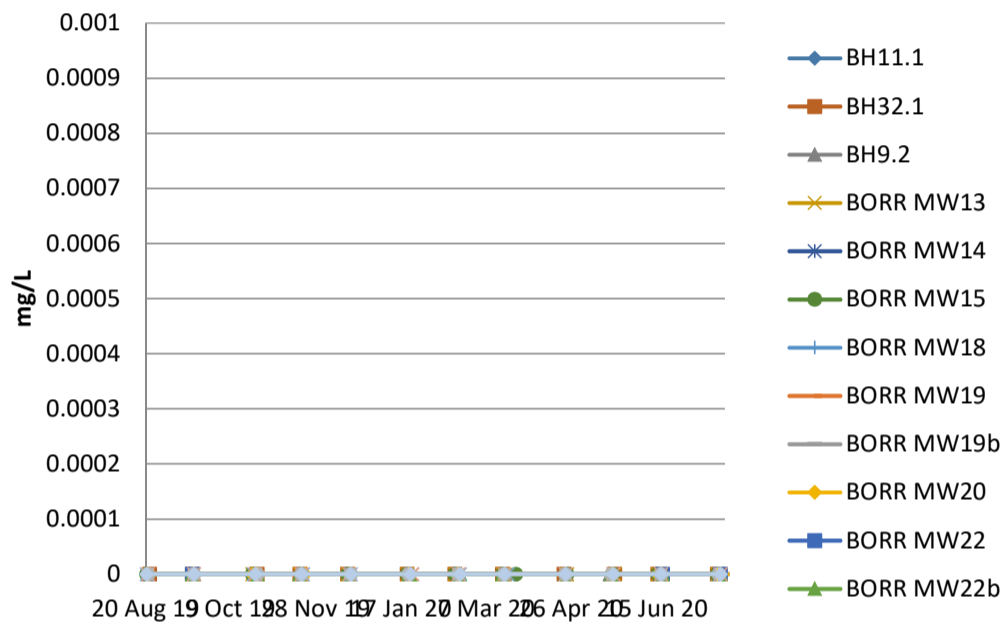
Aluminium



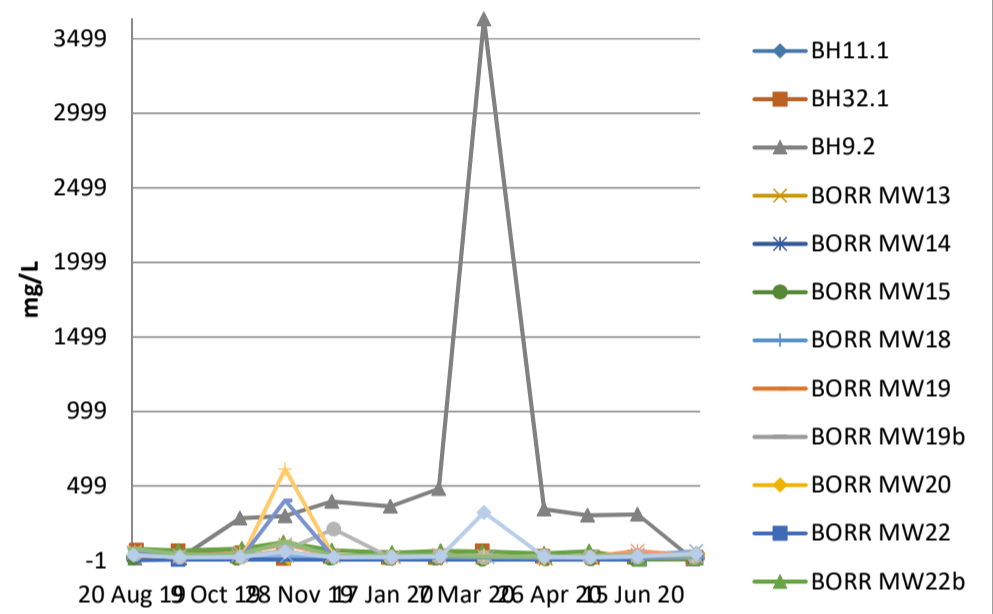
Alkalinity (Carbonate as CaCO3)



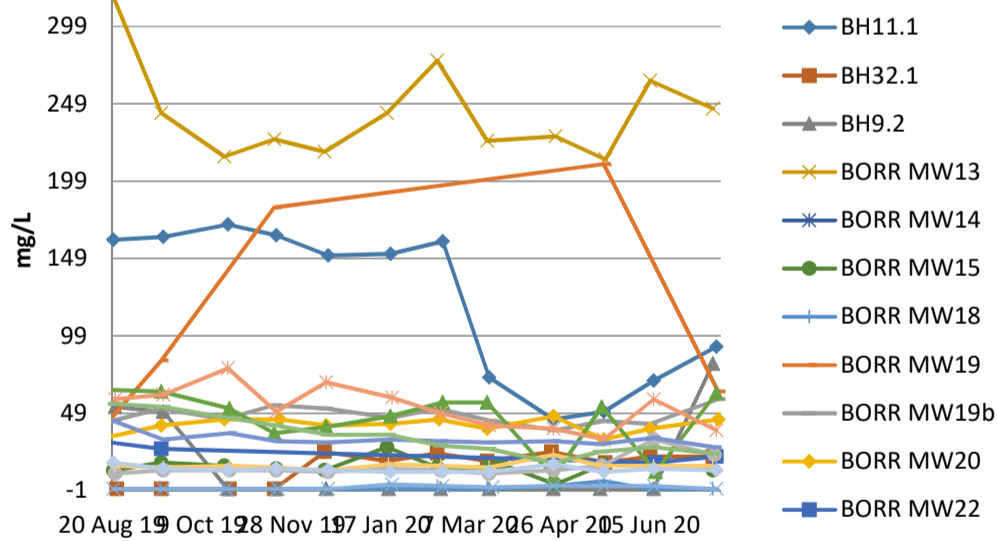
Alkalinity (Hydroxide as CaCO3)



Acidity (as CaCO3)

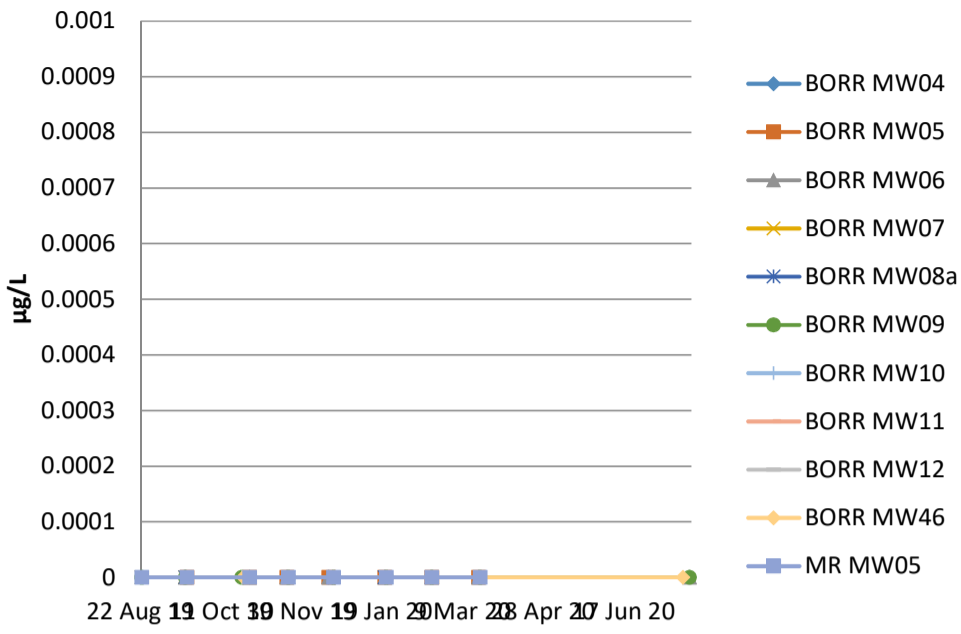


Alkalinity (Bicarbonate as CaCO3)

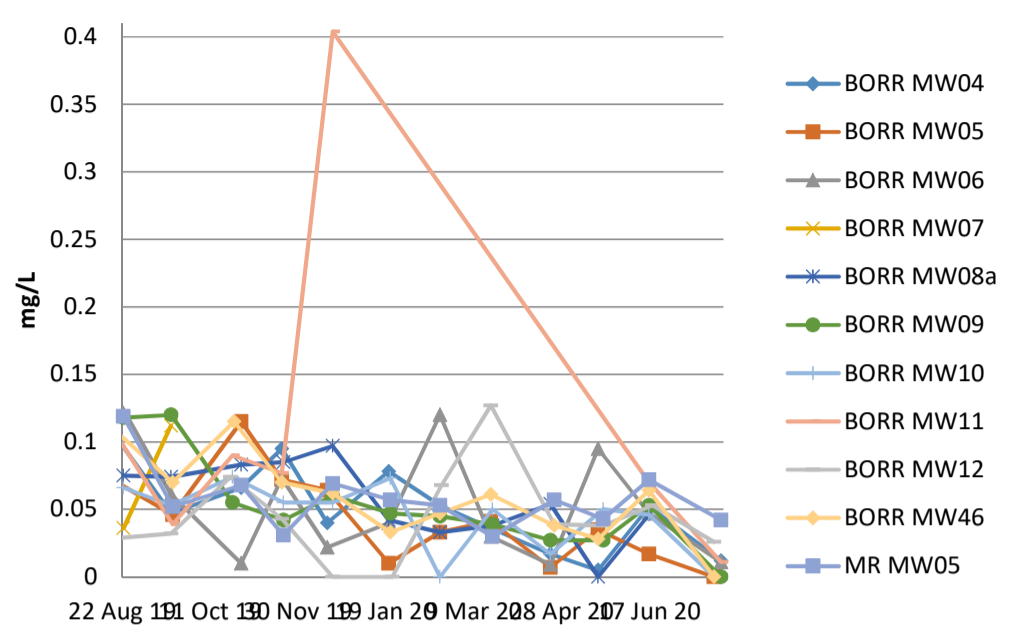


South Groundwater Graphs

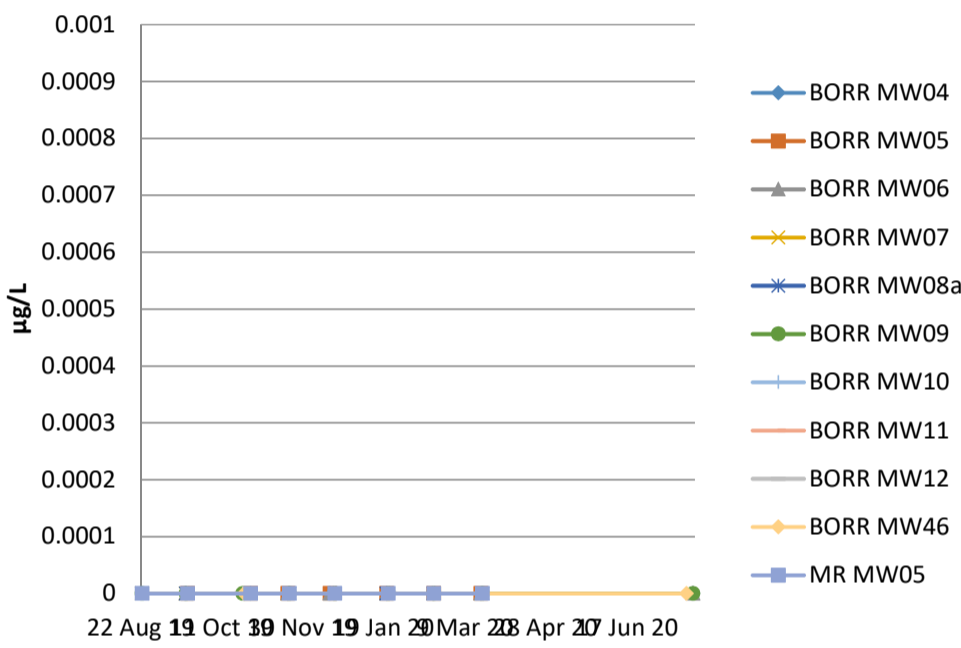
Xylene Total



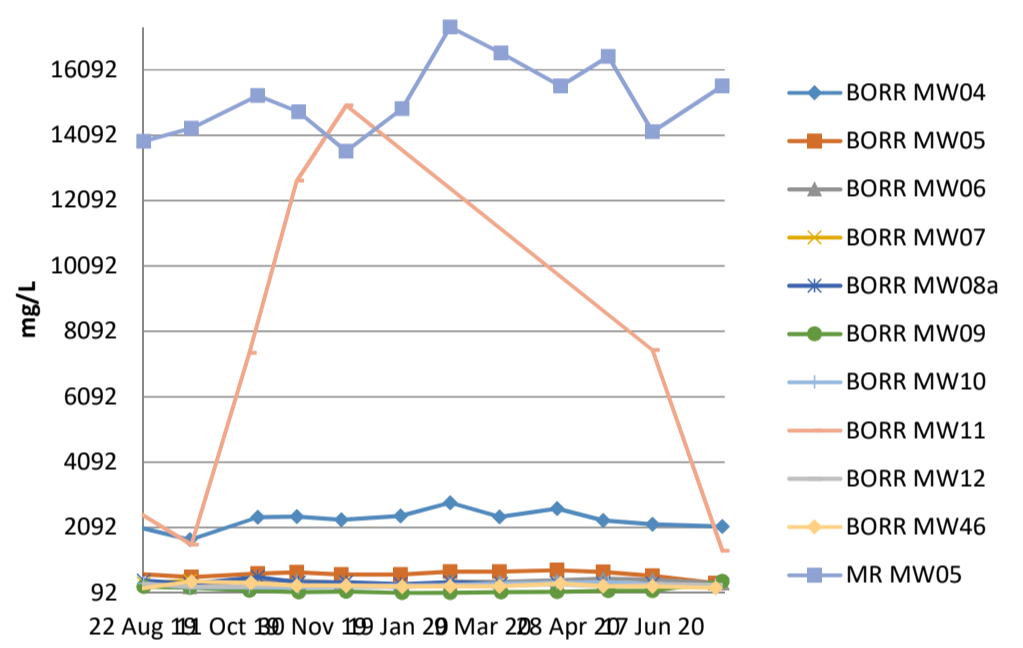
Zinc



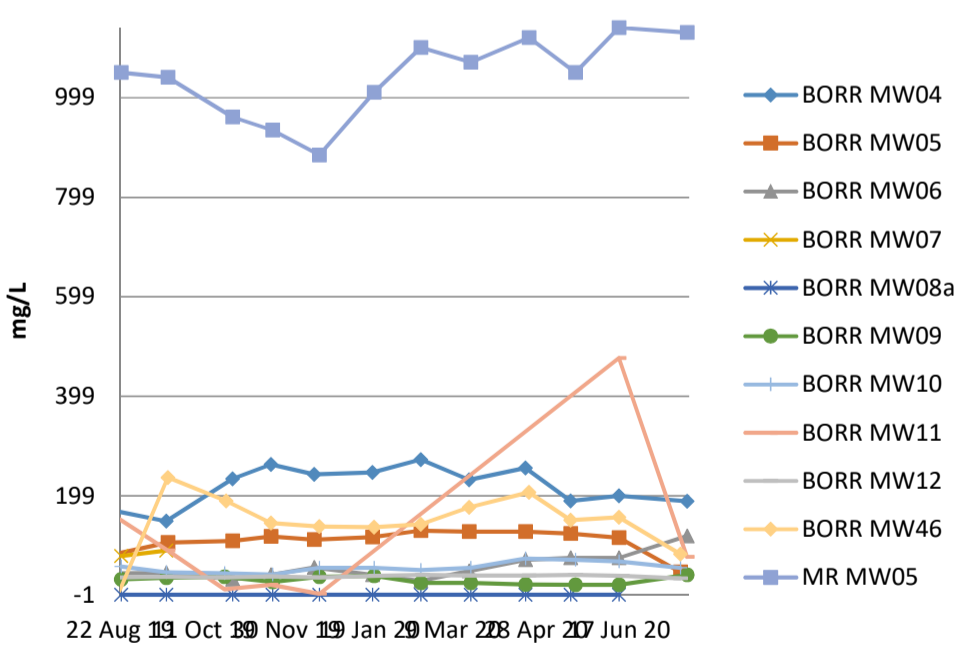
Toluene



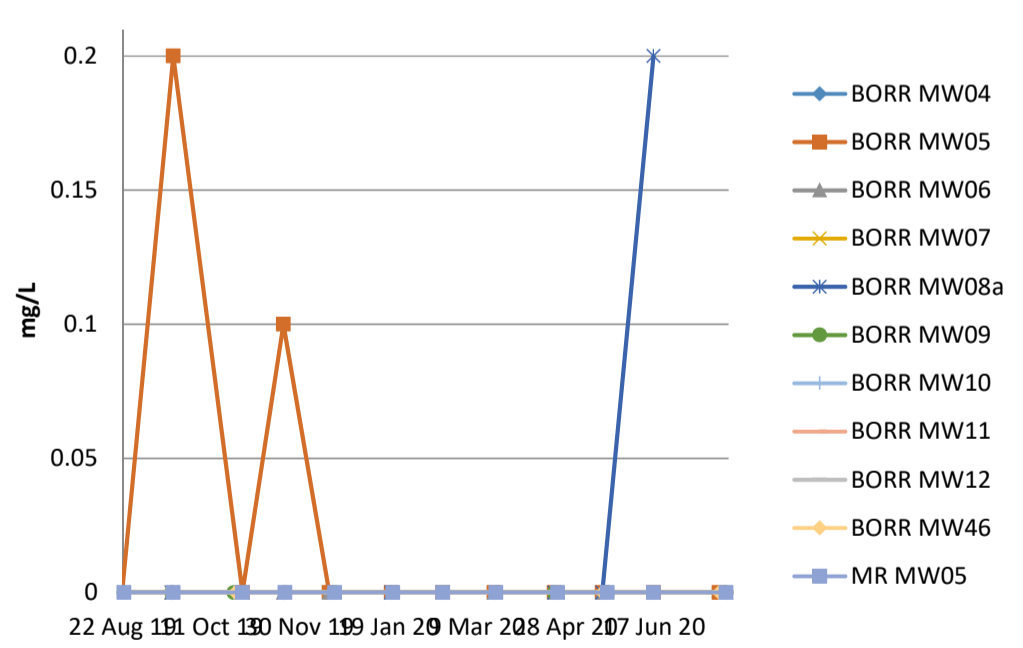
Total Dissolved Solids



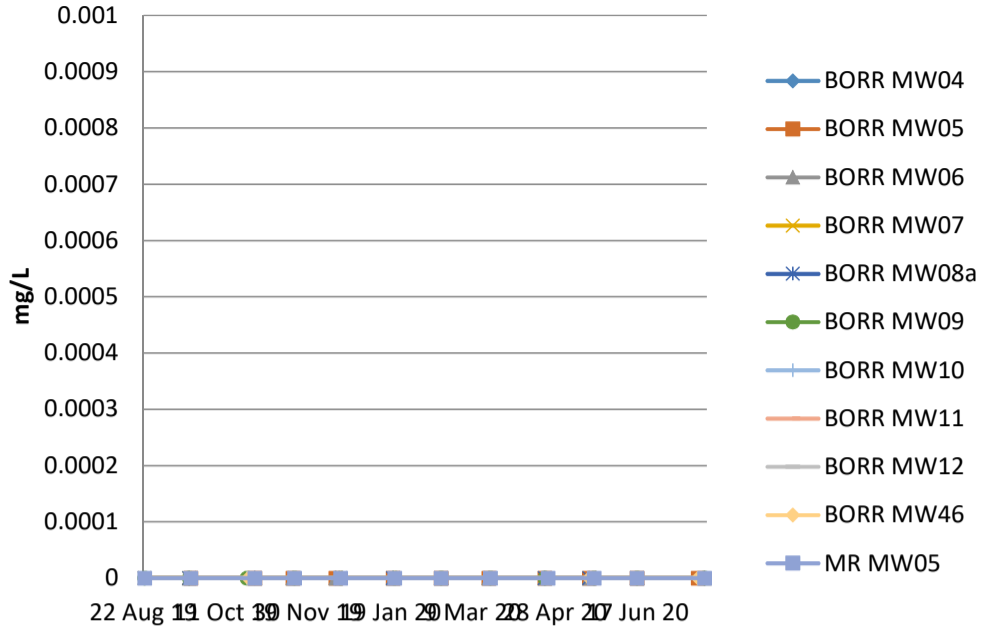
Sulfate



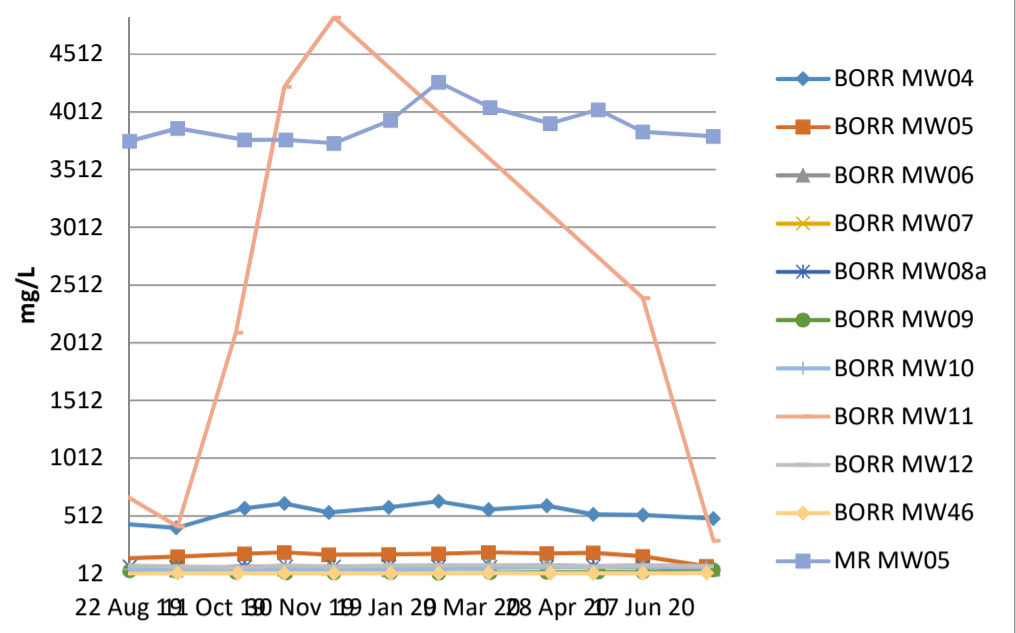
Sulfide



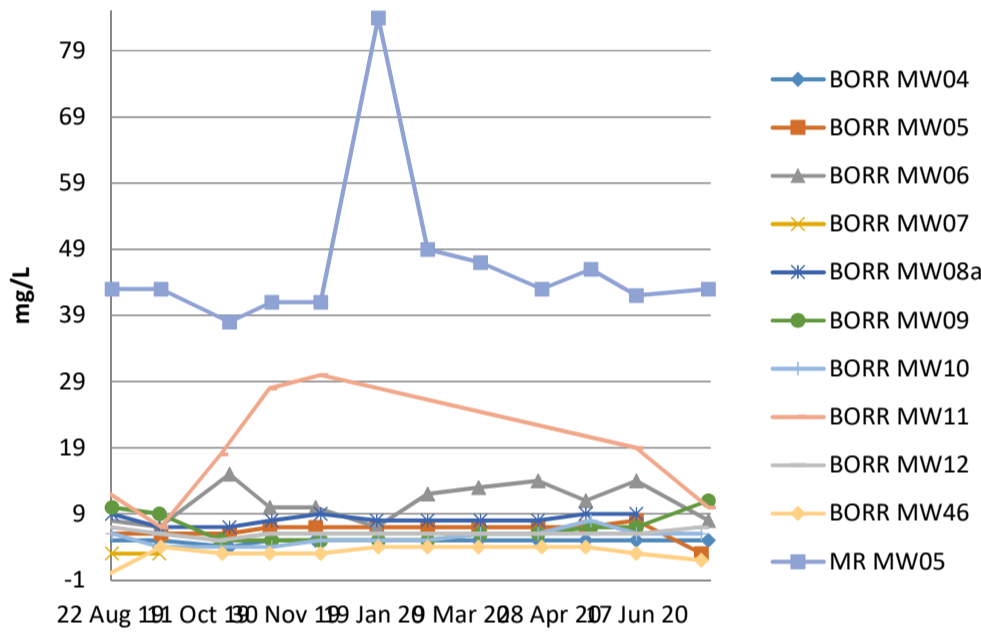
Selenium



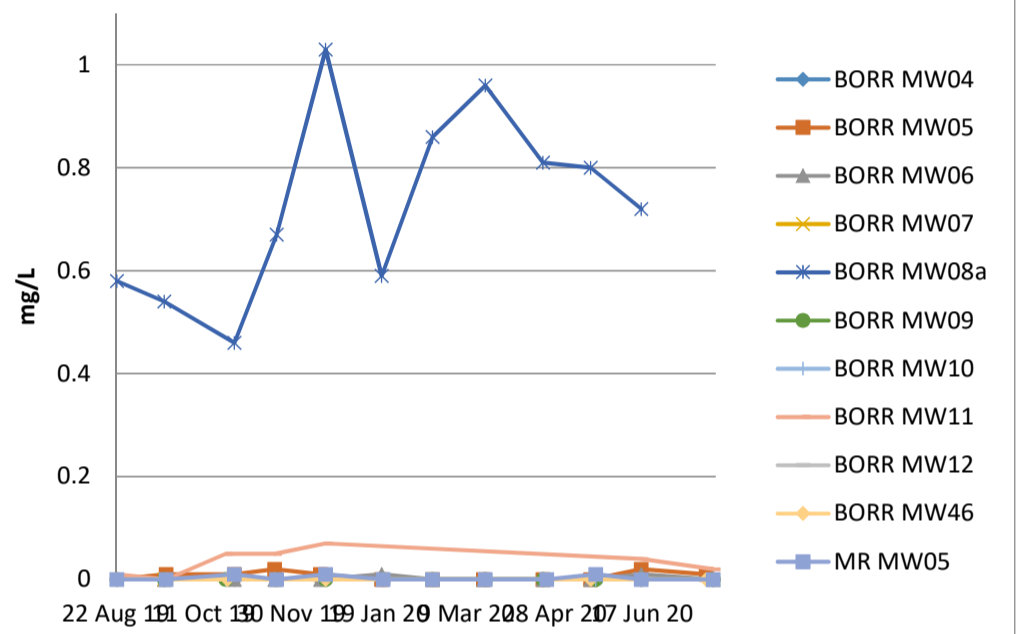
Sodium



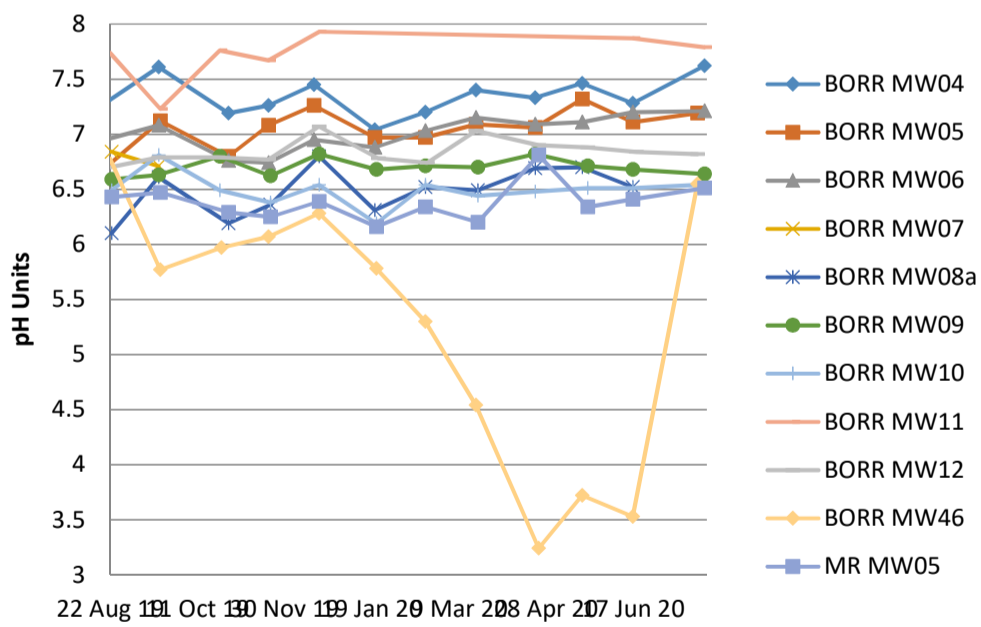
Potassium



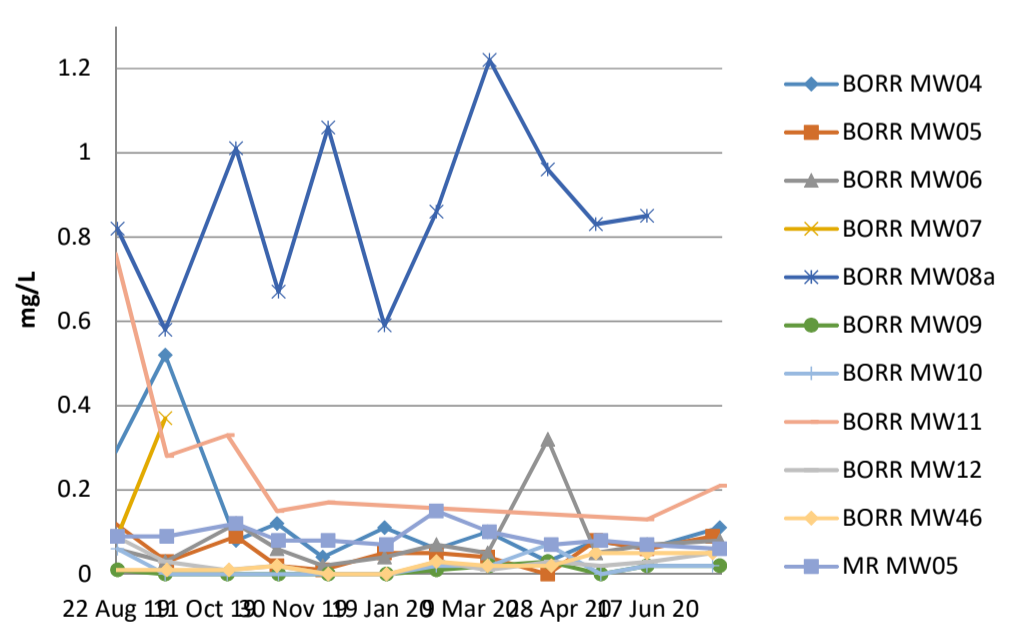
Reactive Phosphorus as P



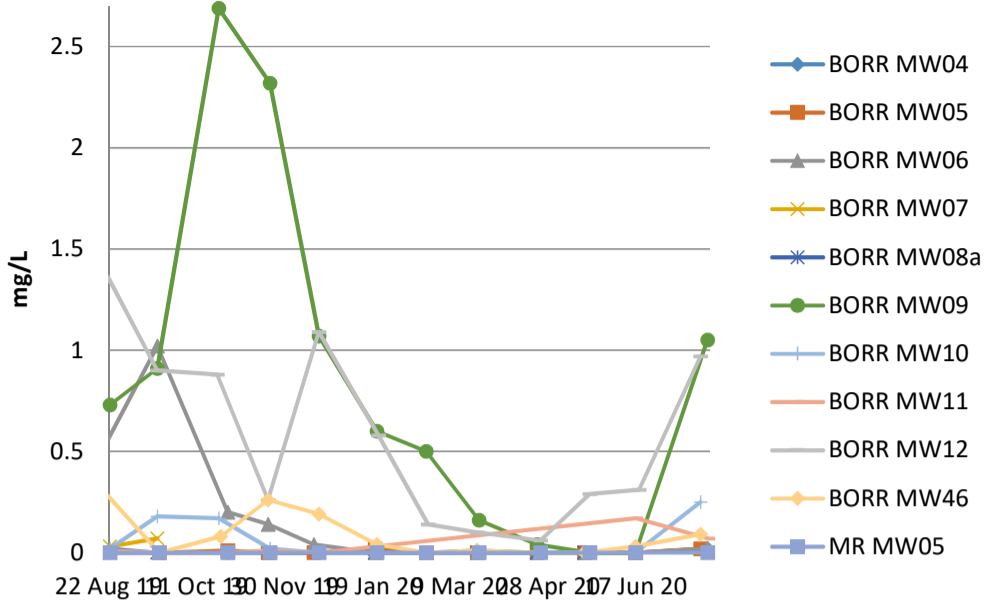
pH (Lab)



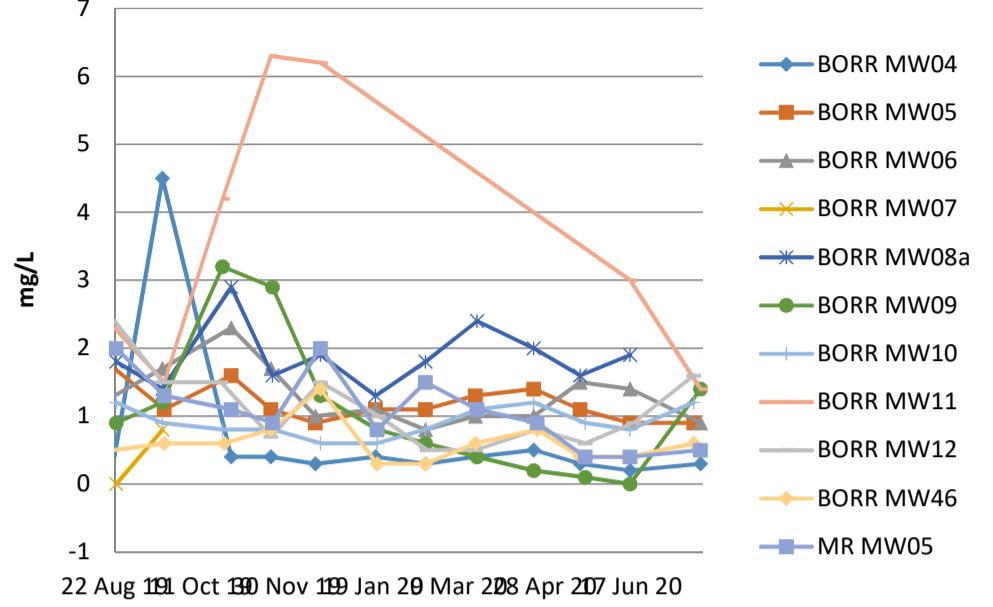
Phosphorus (Total)



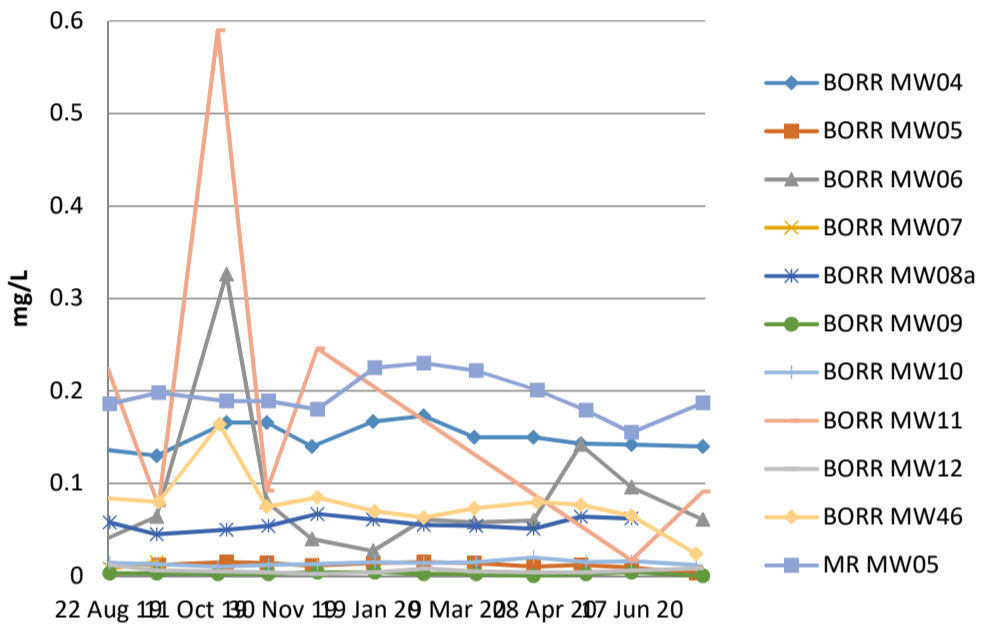
Nitrogen (Total Oxidised) (as N)



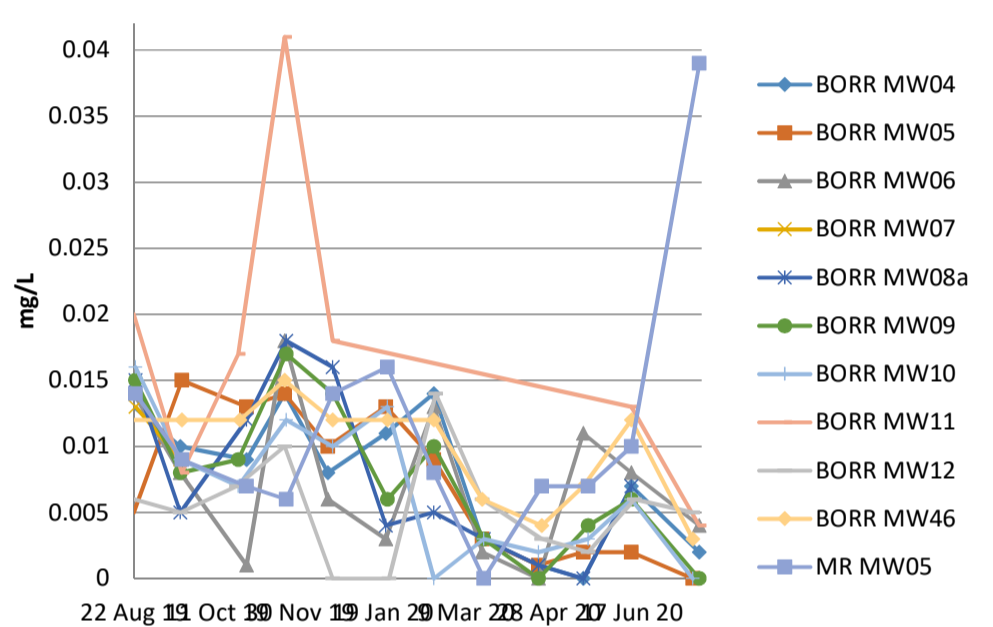
Nitrogen (Total)



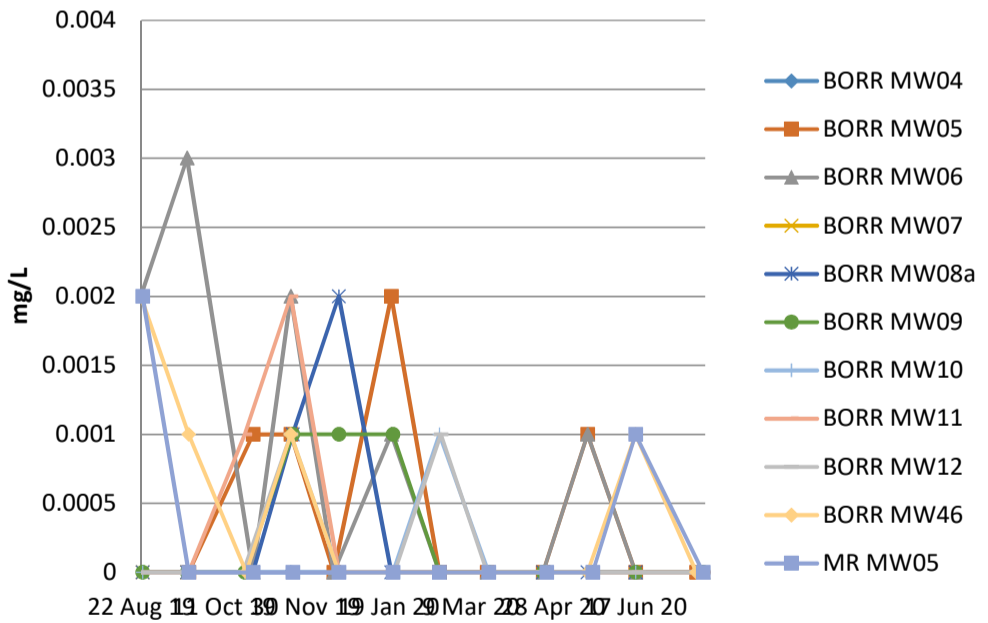
Manganese



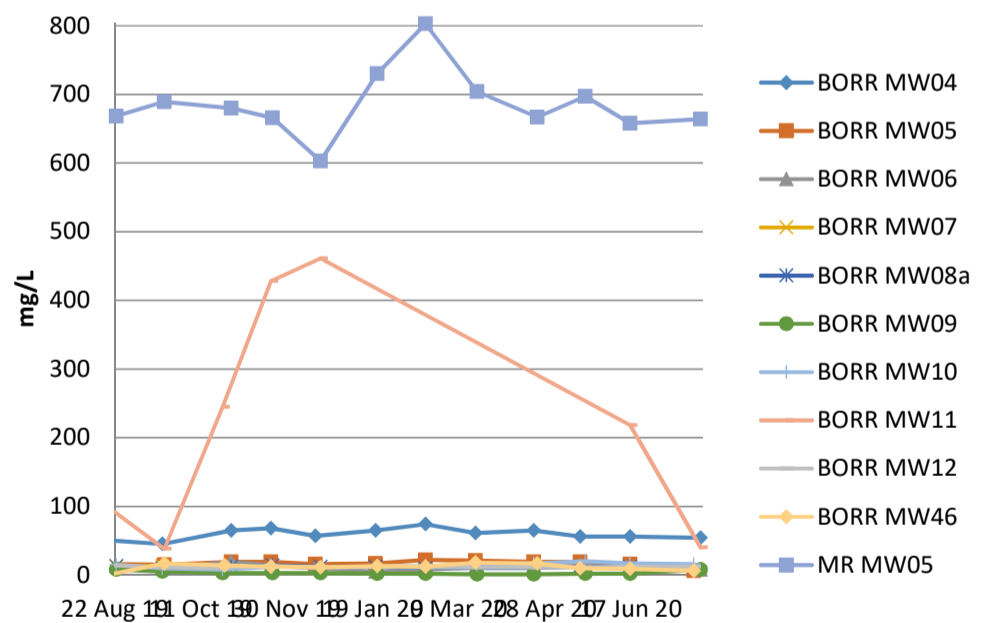
Nickel

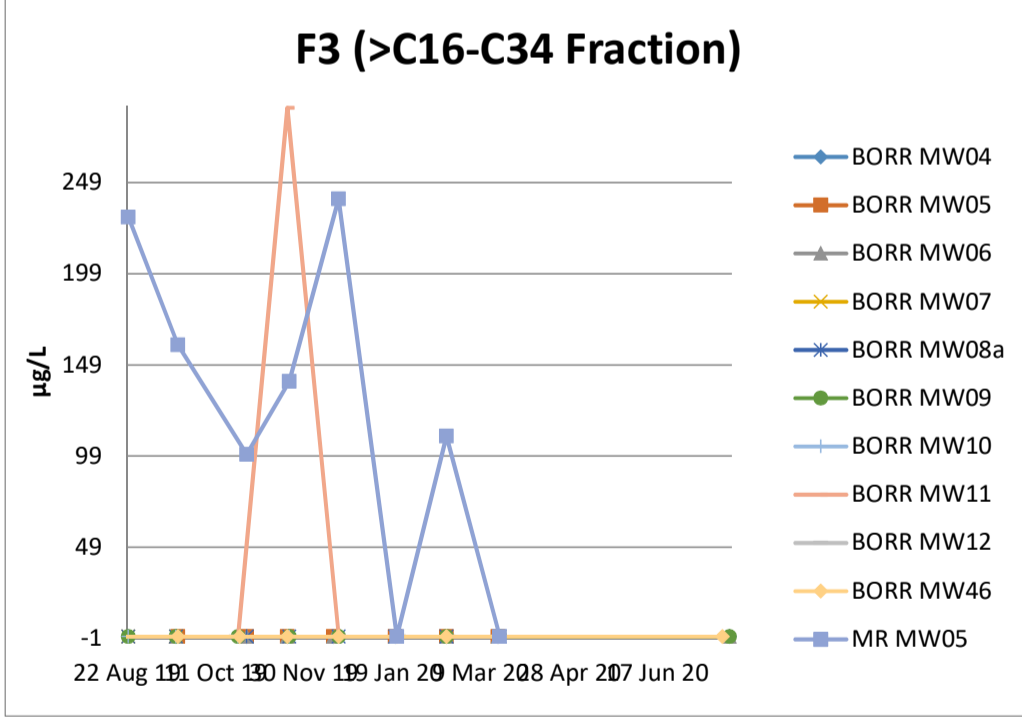
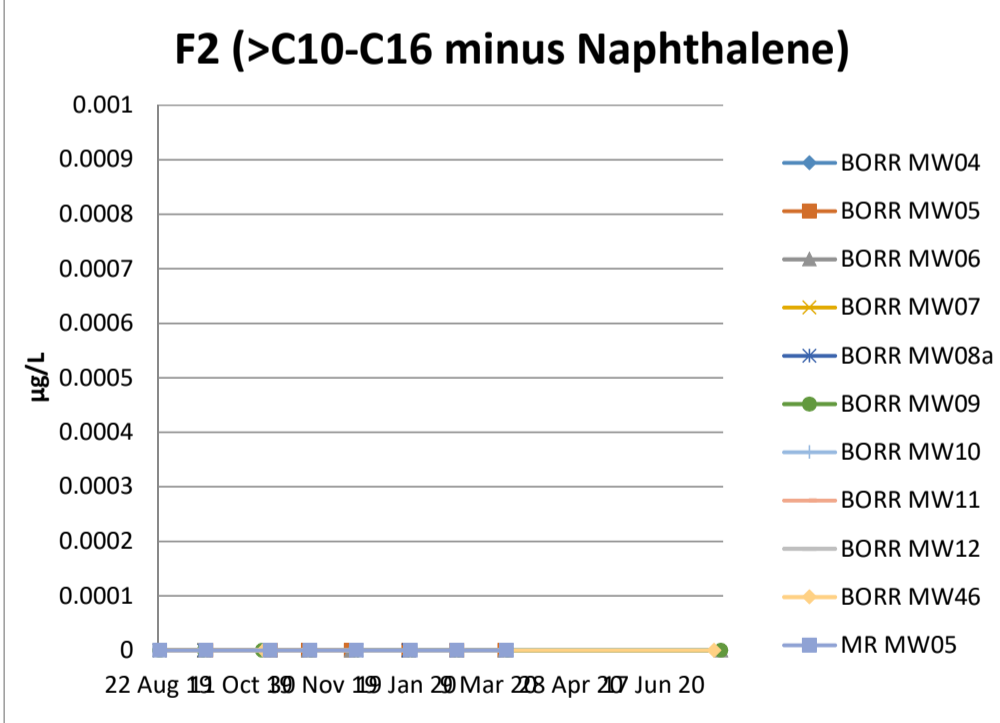
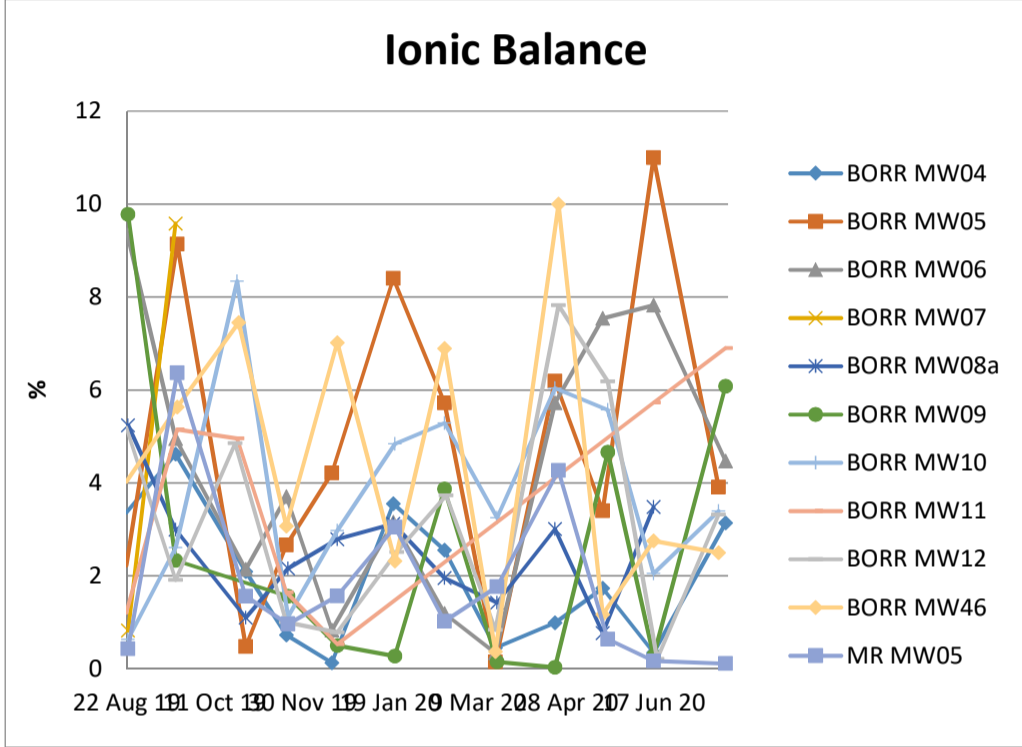
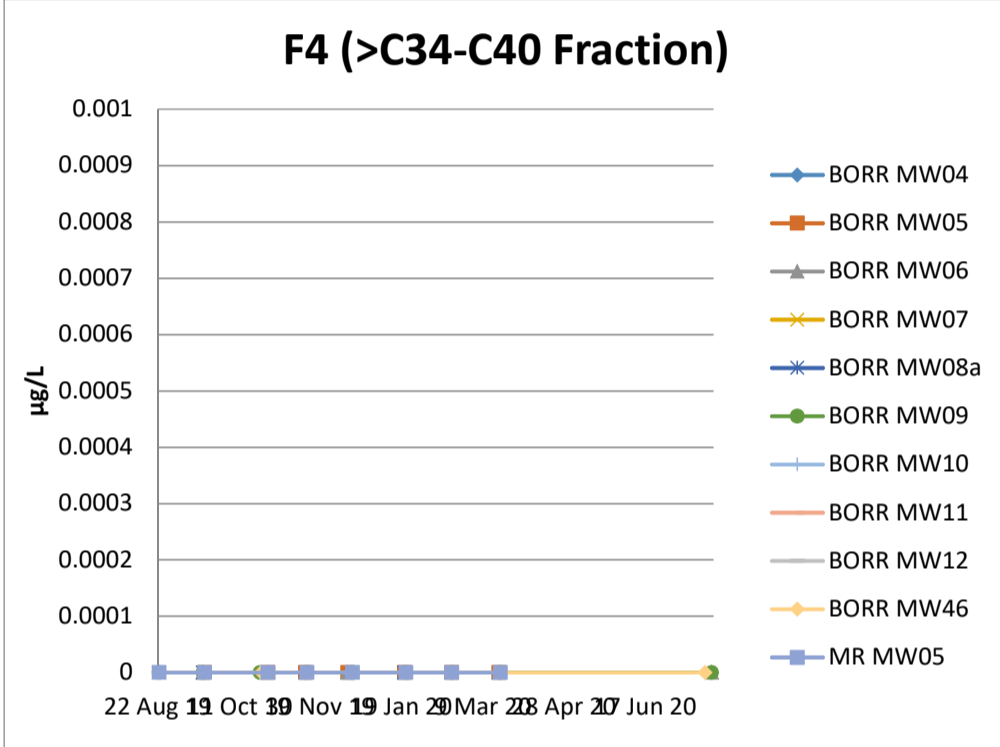
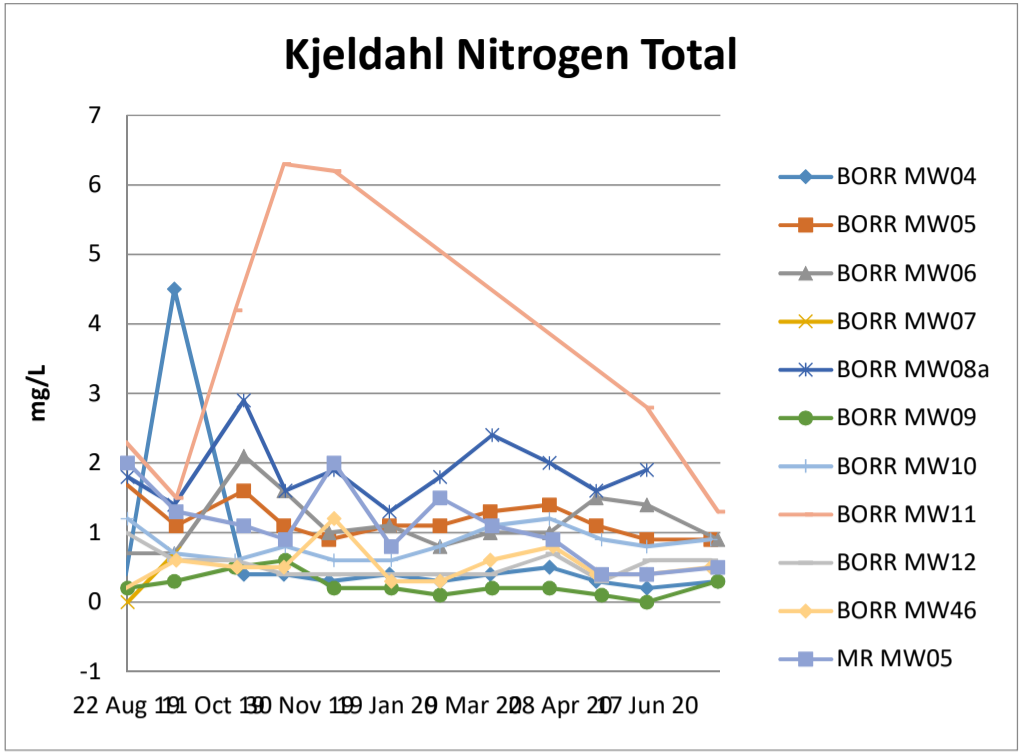
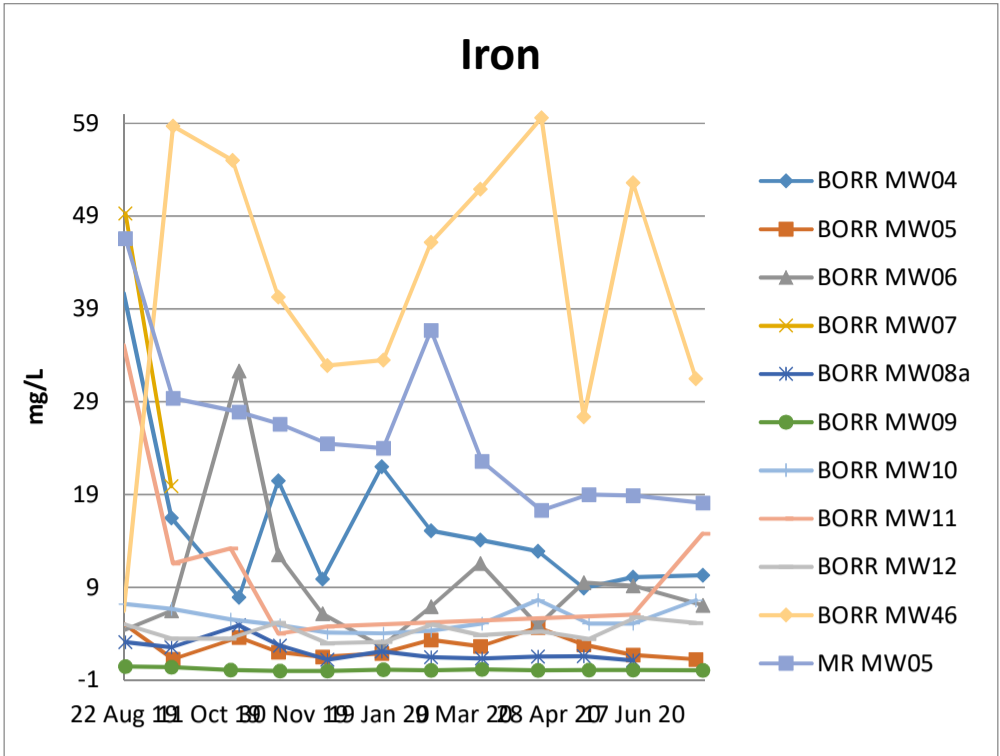


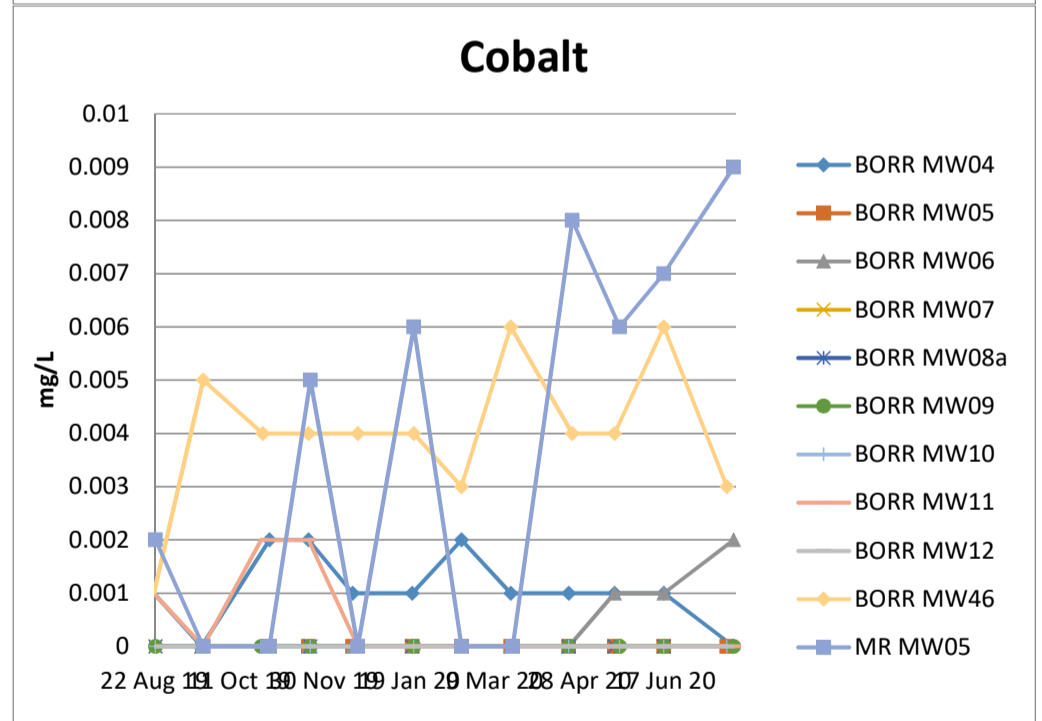
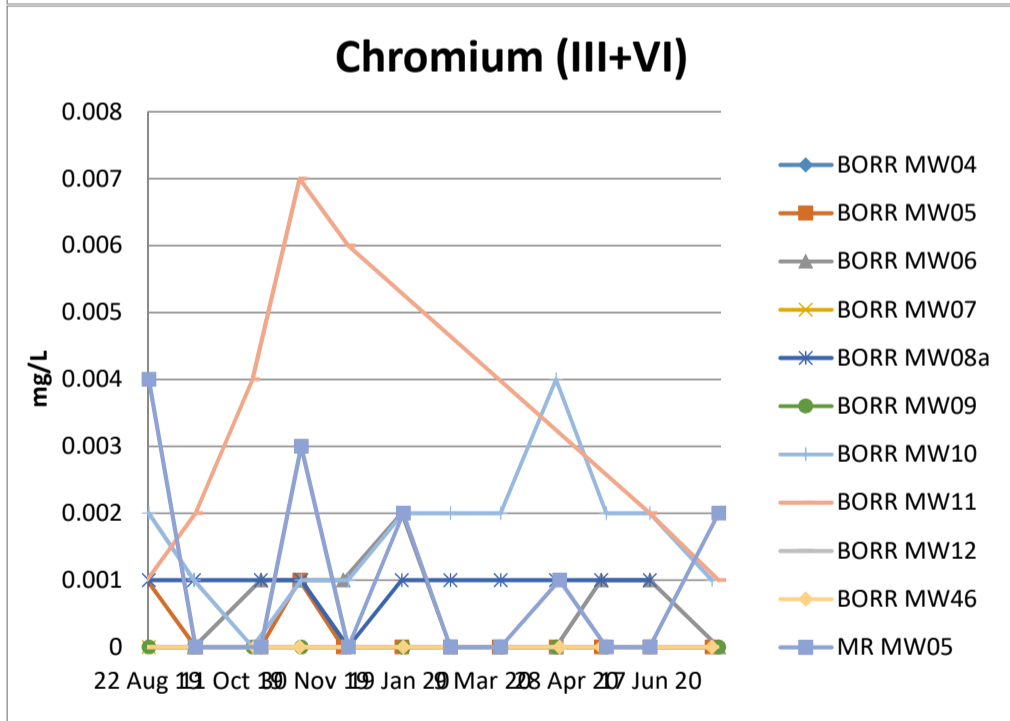
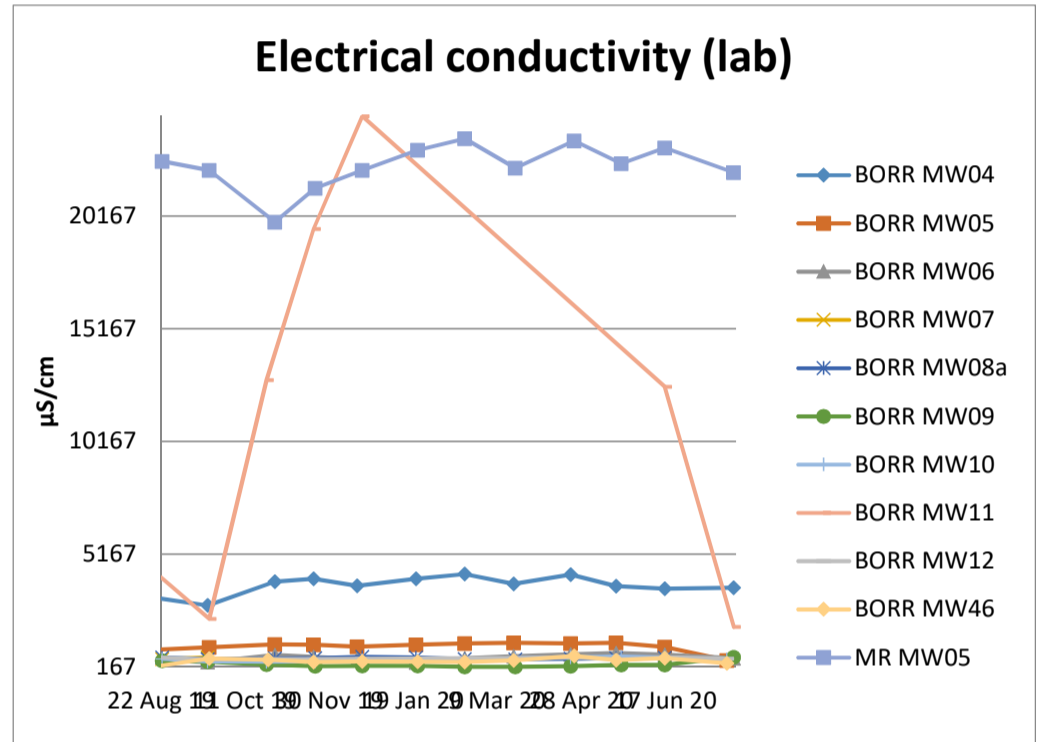
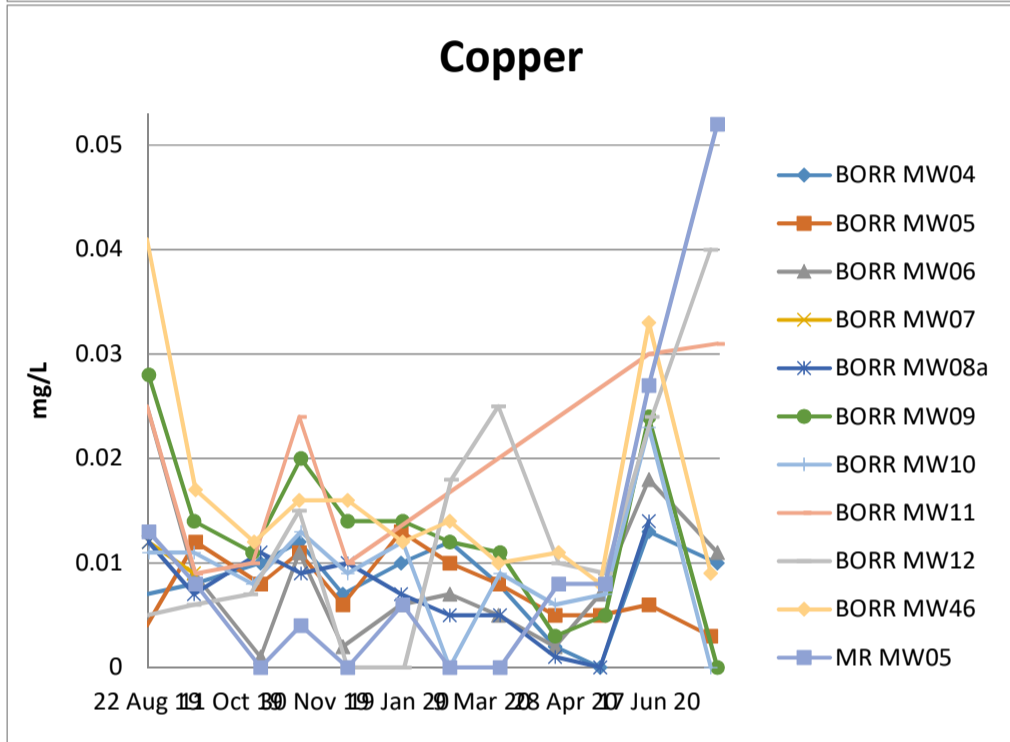
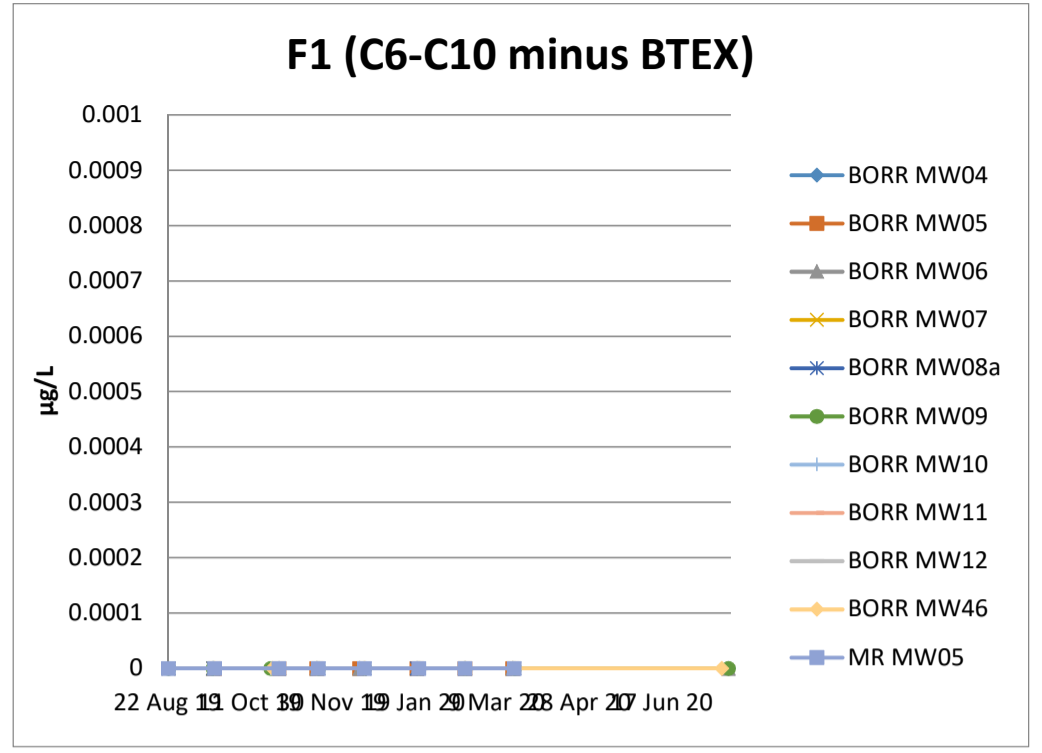
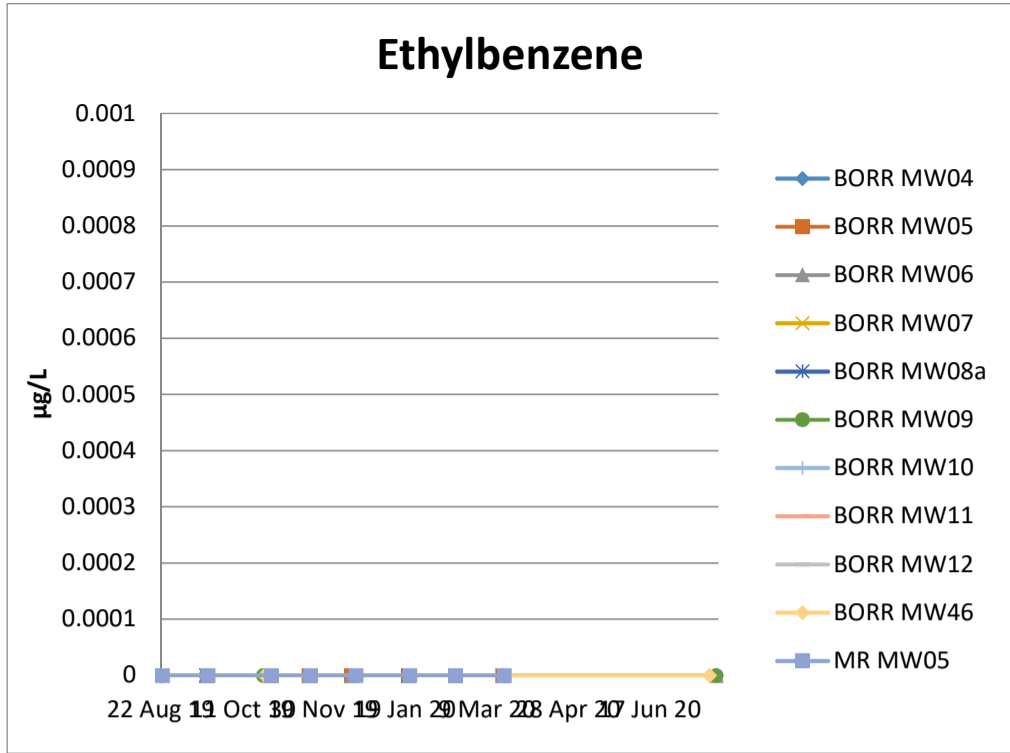
Lead

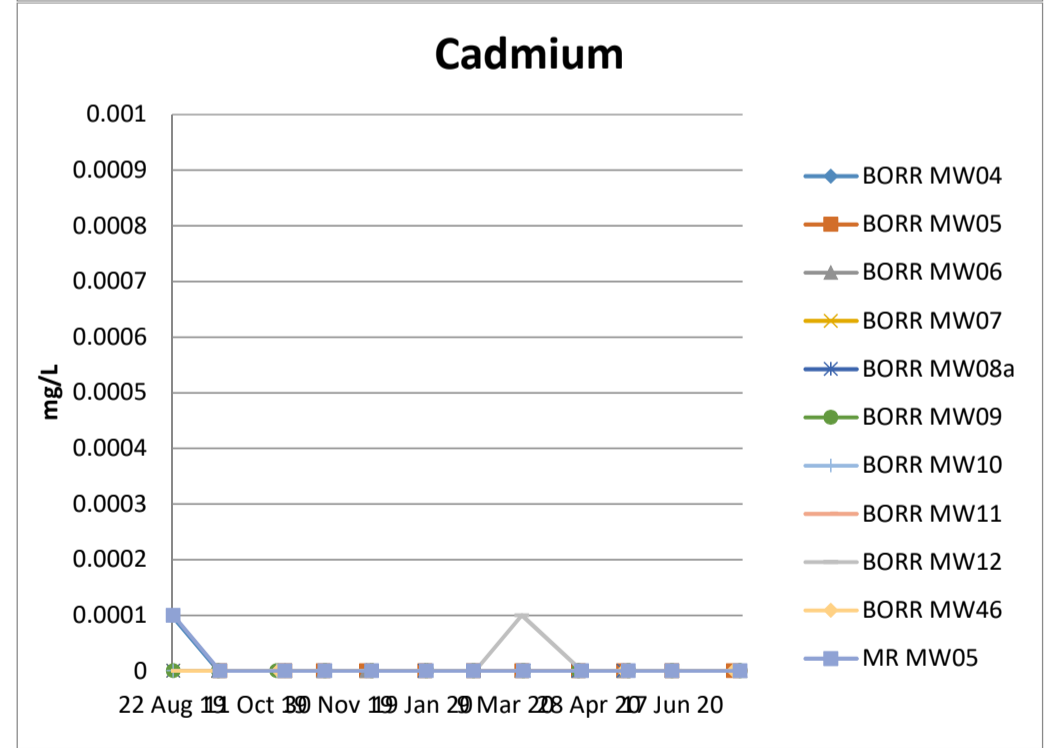
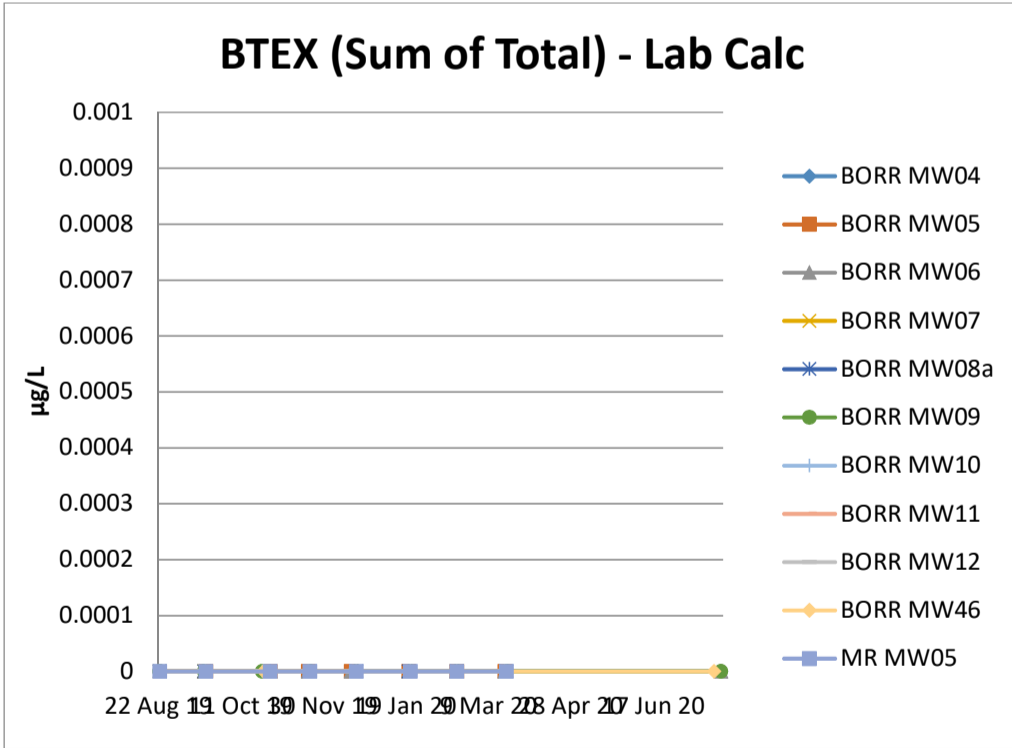
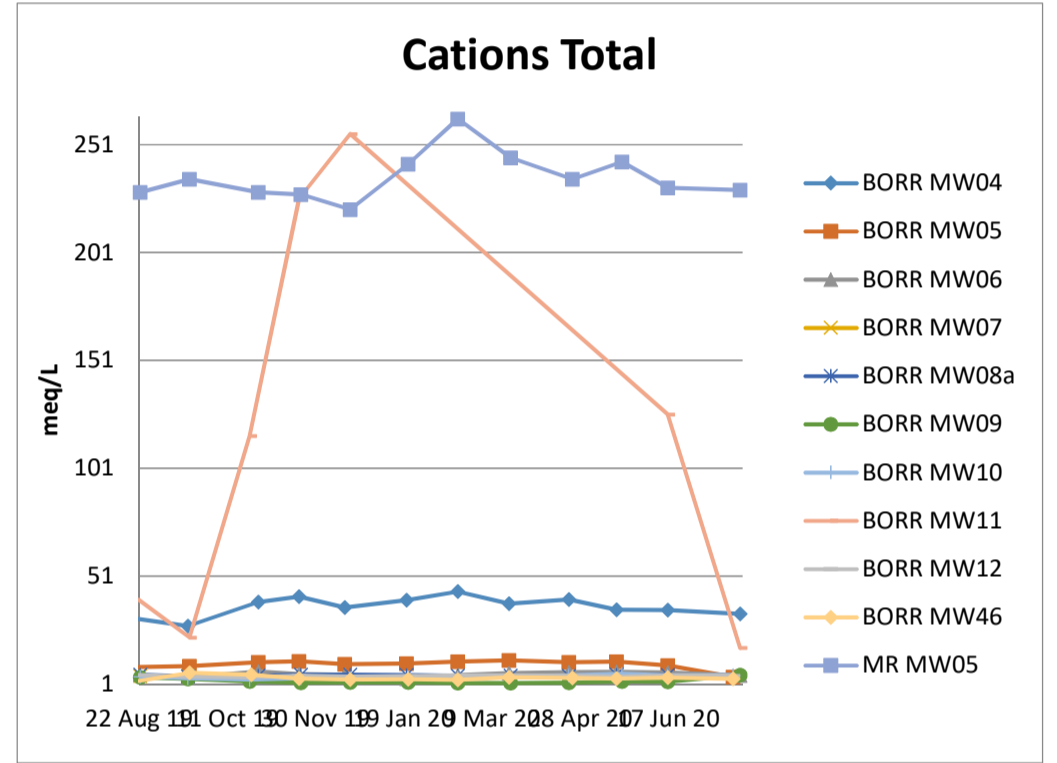
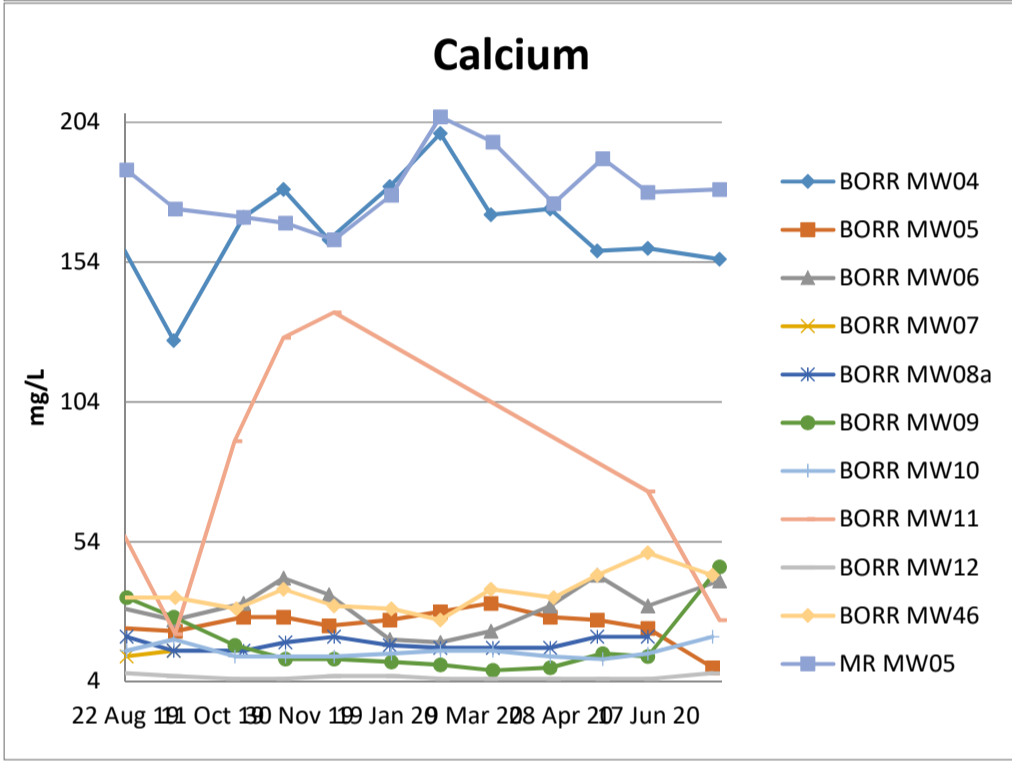
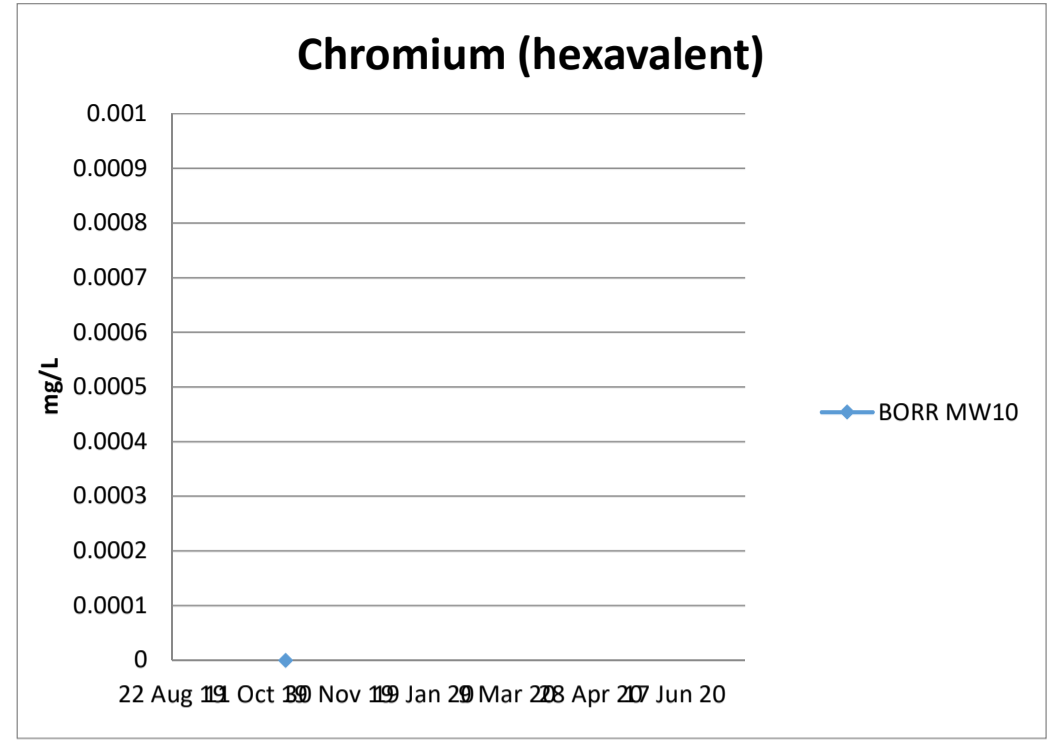
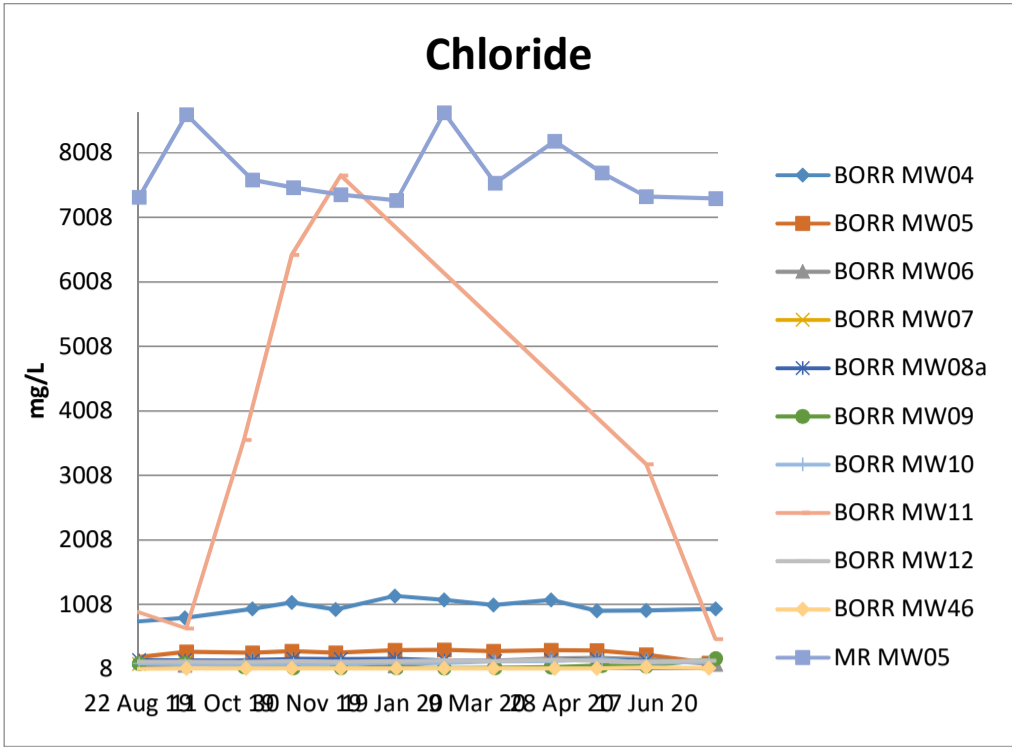


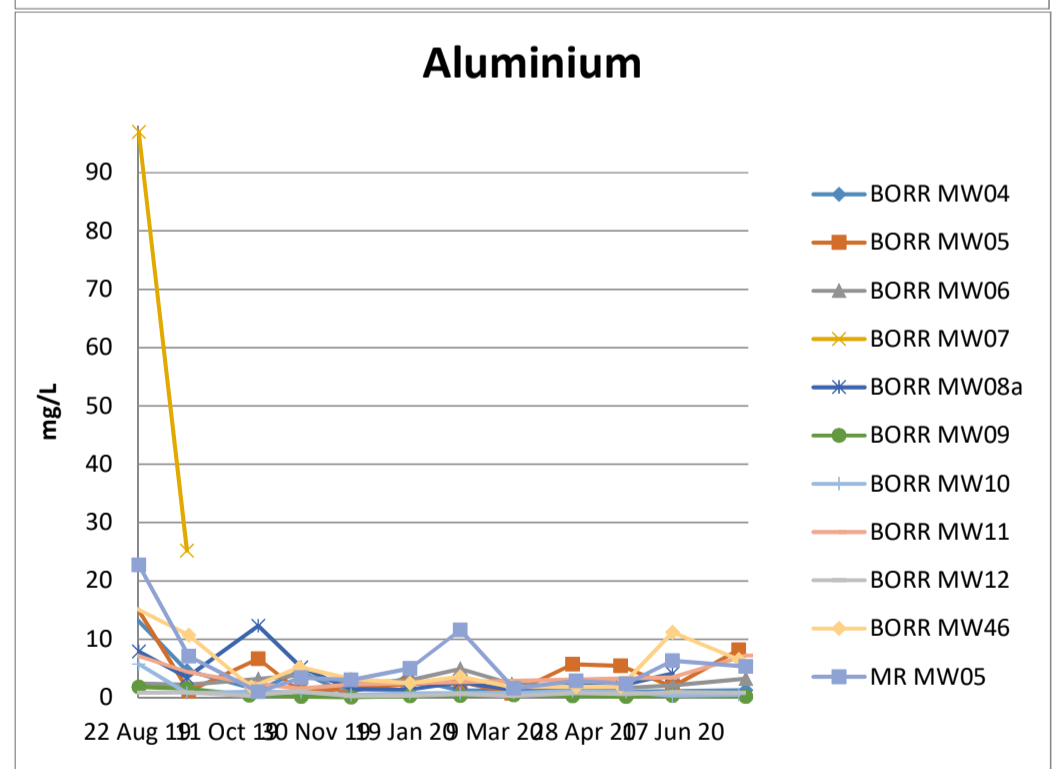
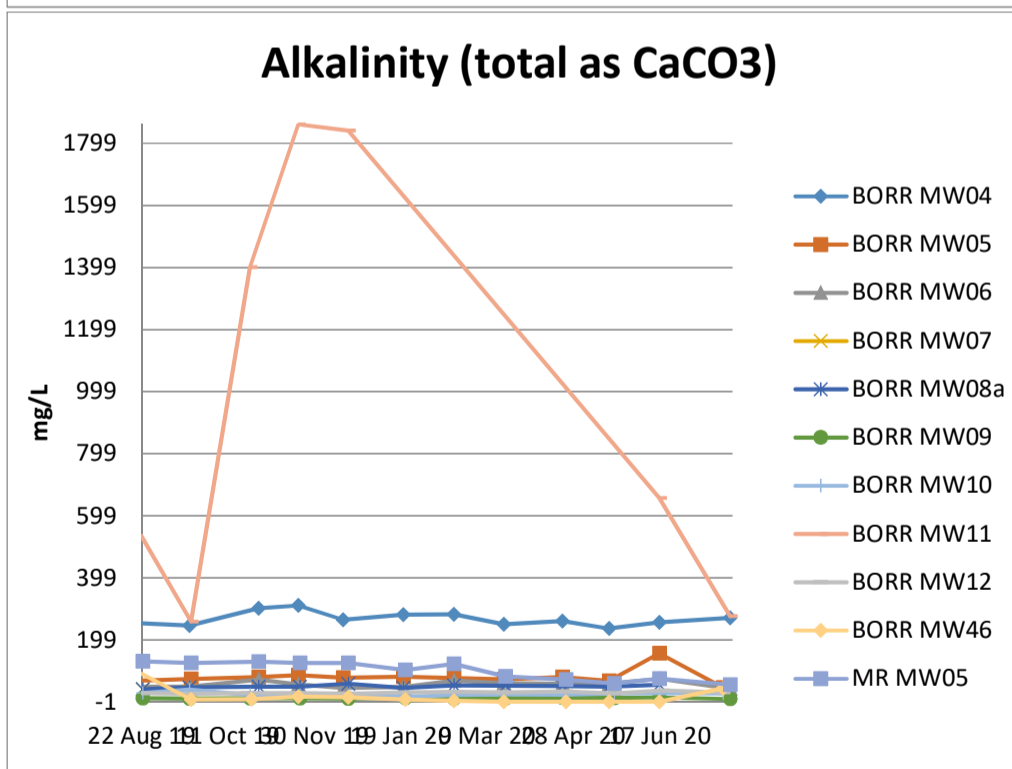
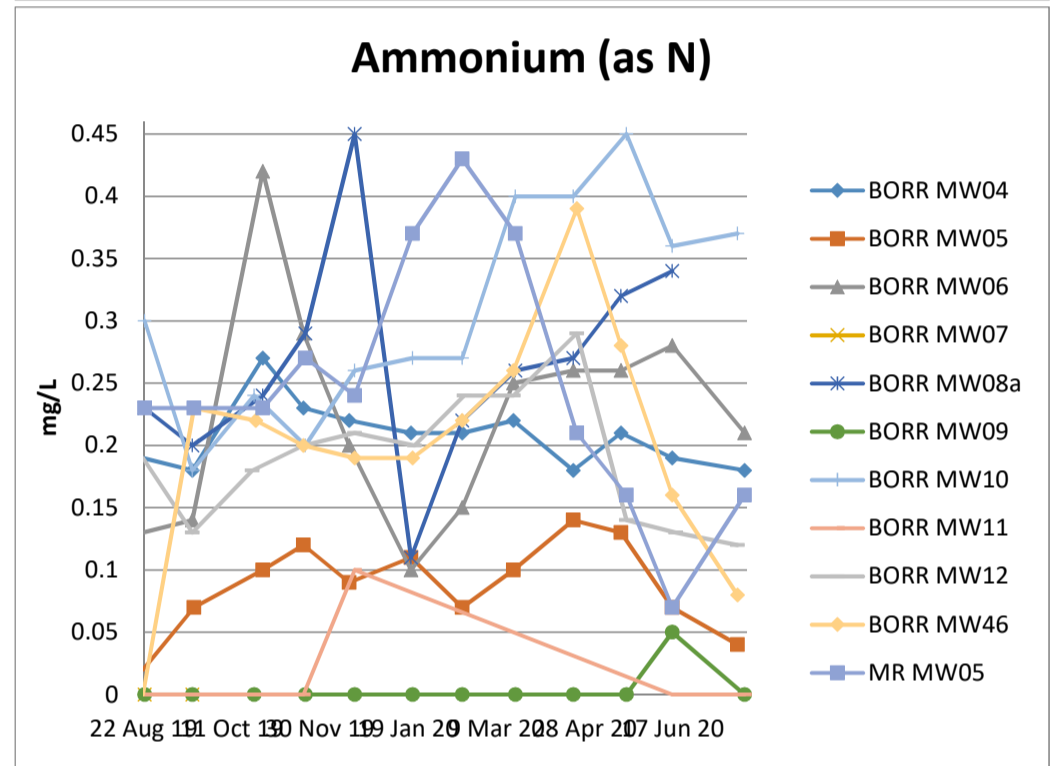
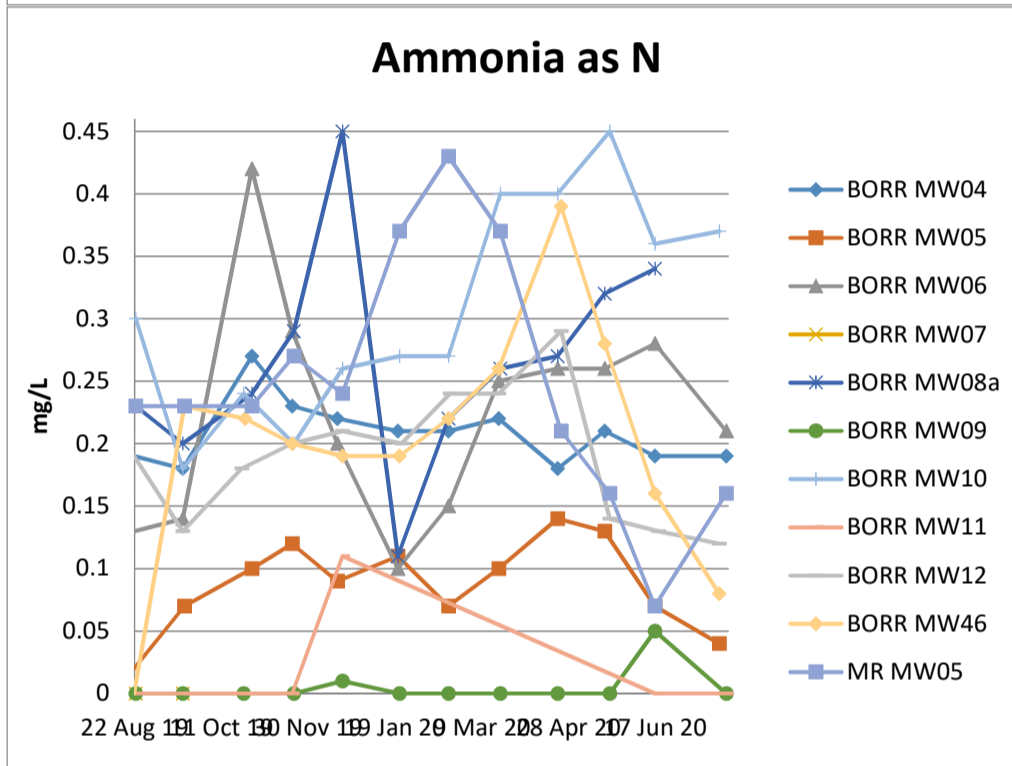
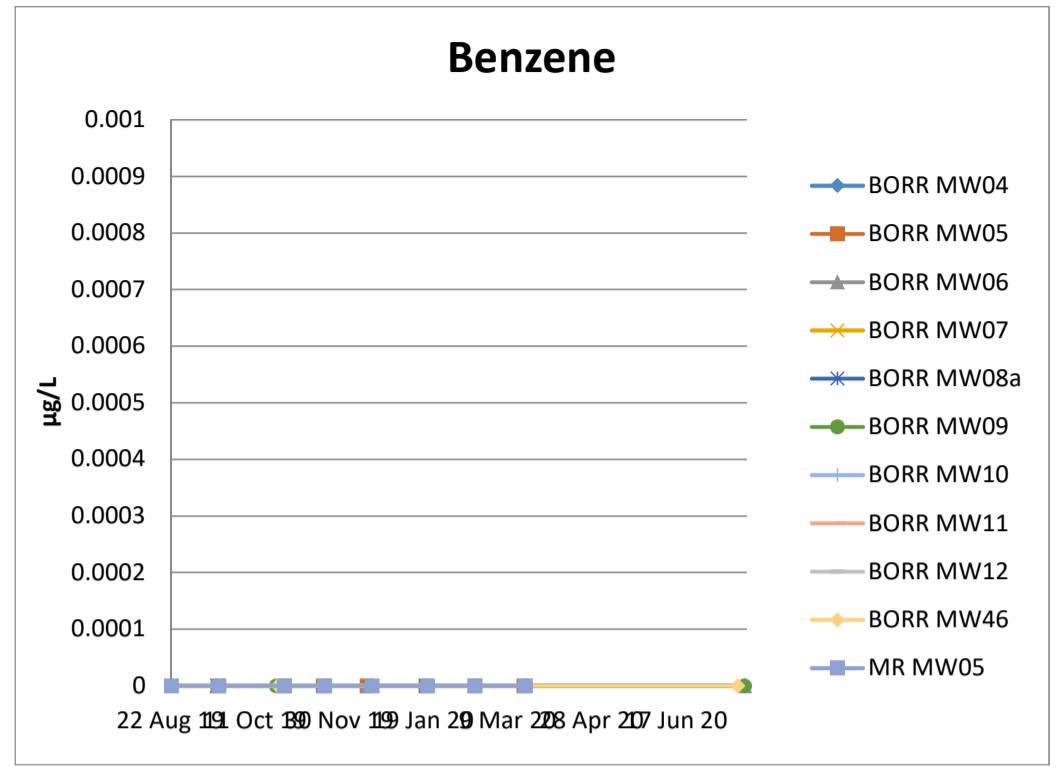
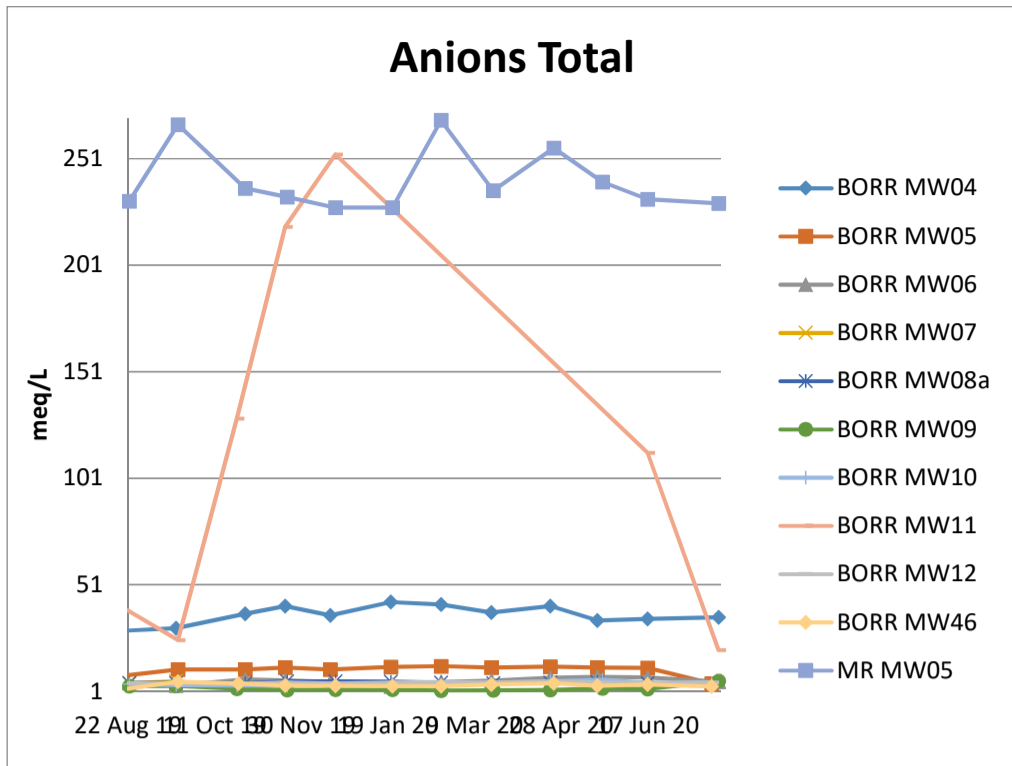
Magnesium



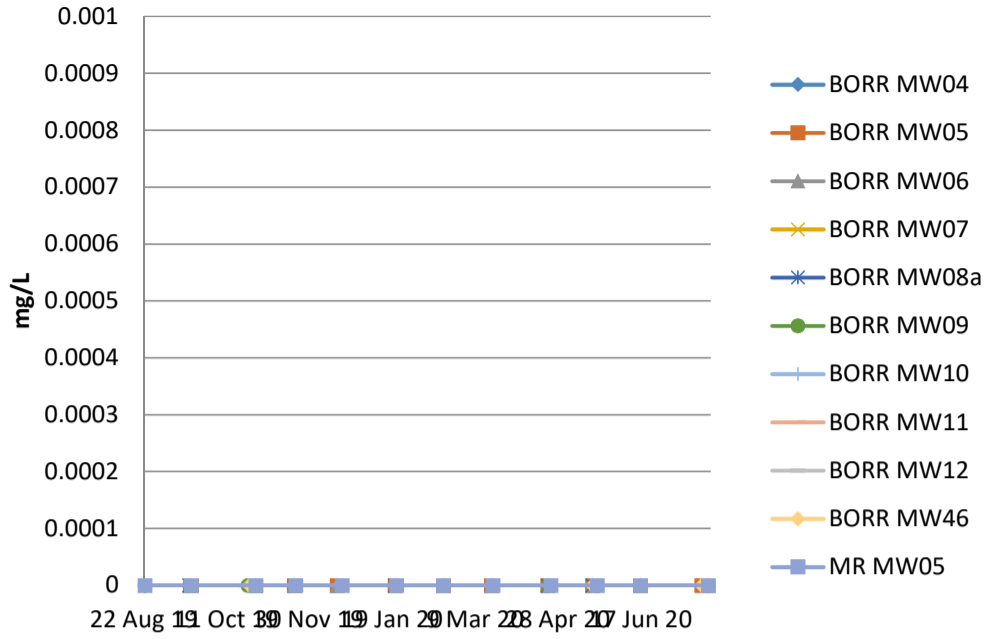




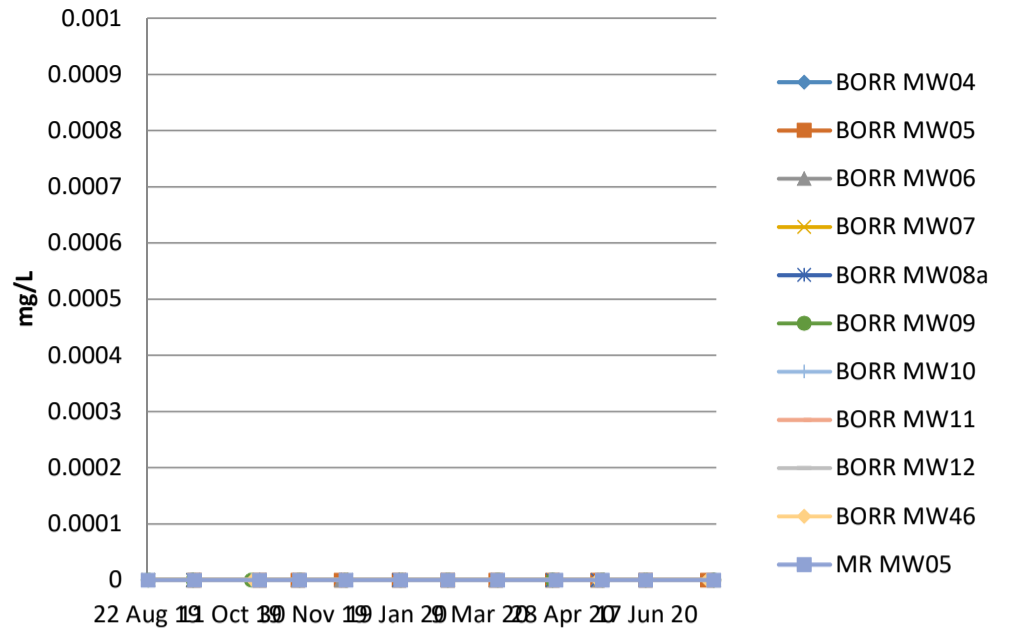




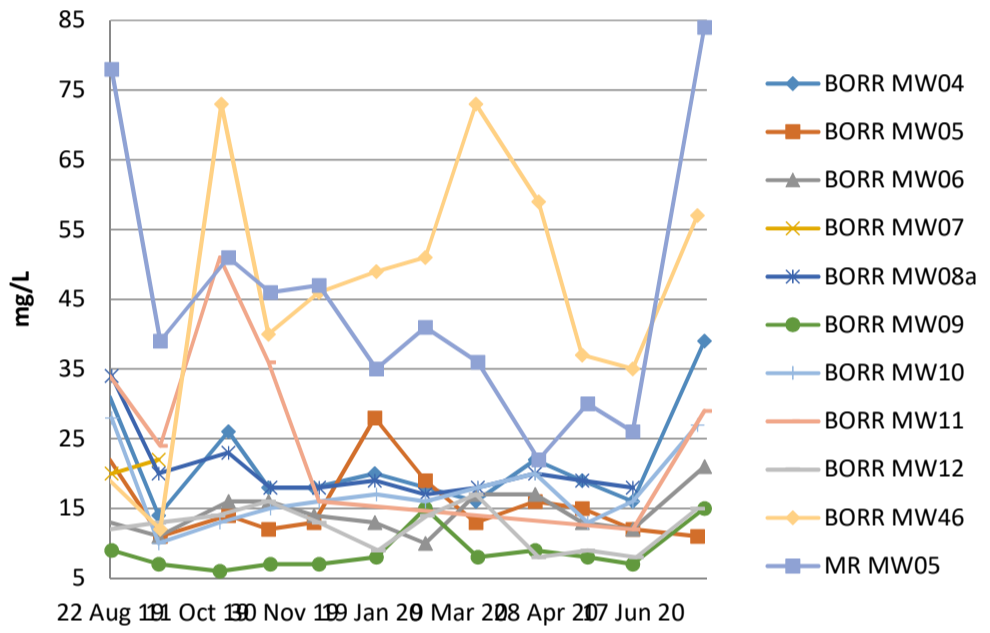
Alkalinity (Carbonate as CaCO3)



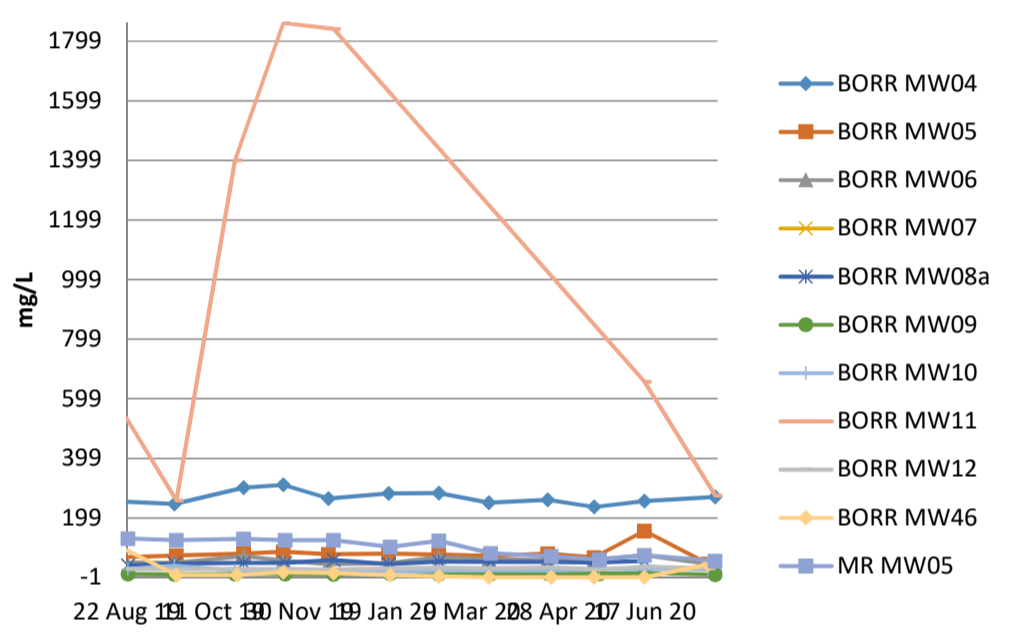
Alkalinity (Hydroxide as CaCO3)



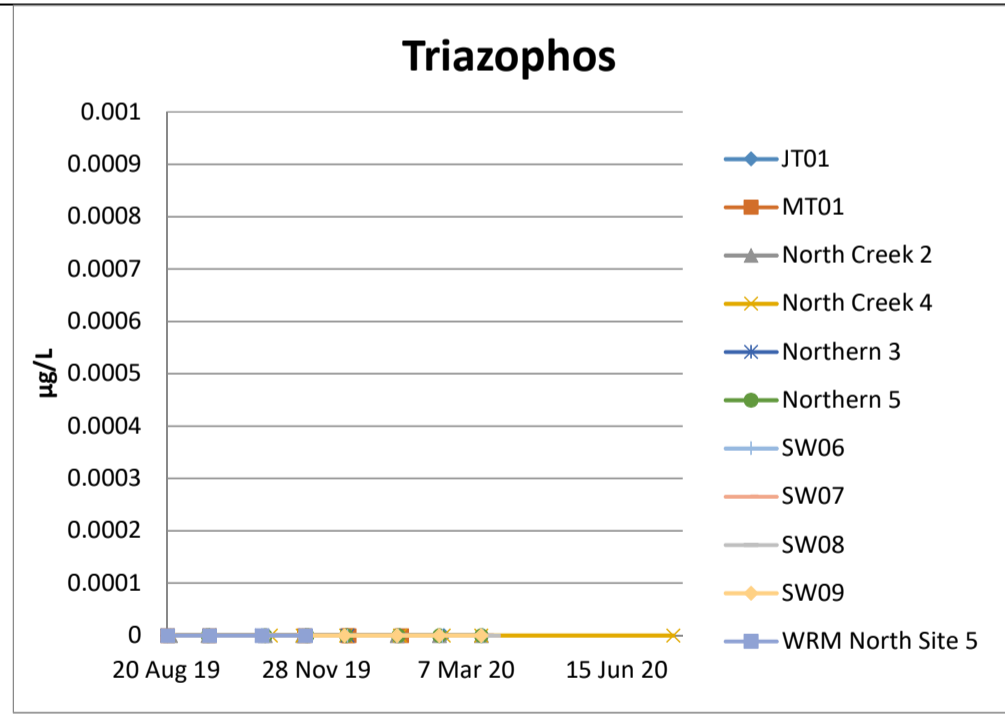
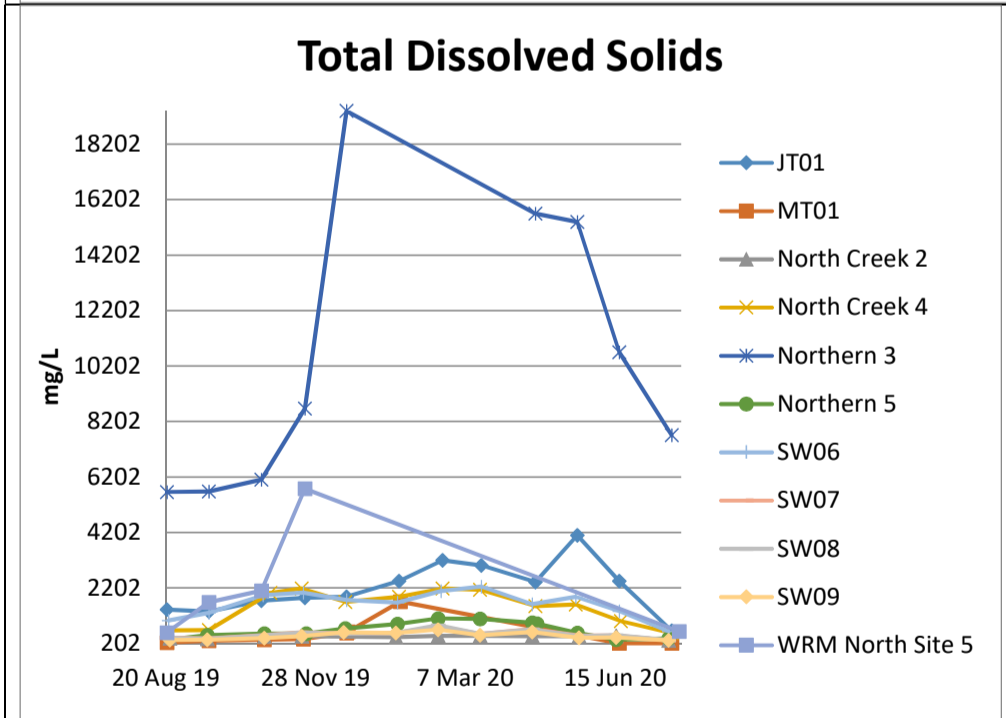
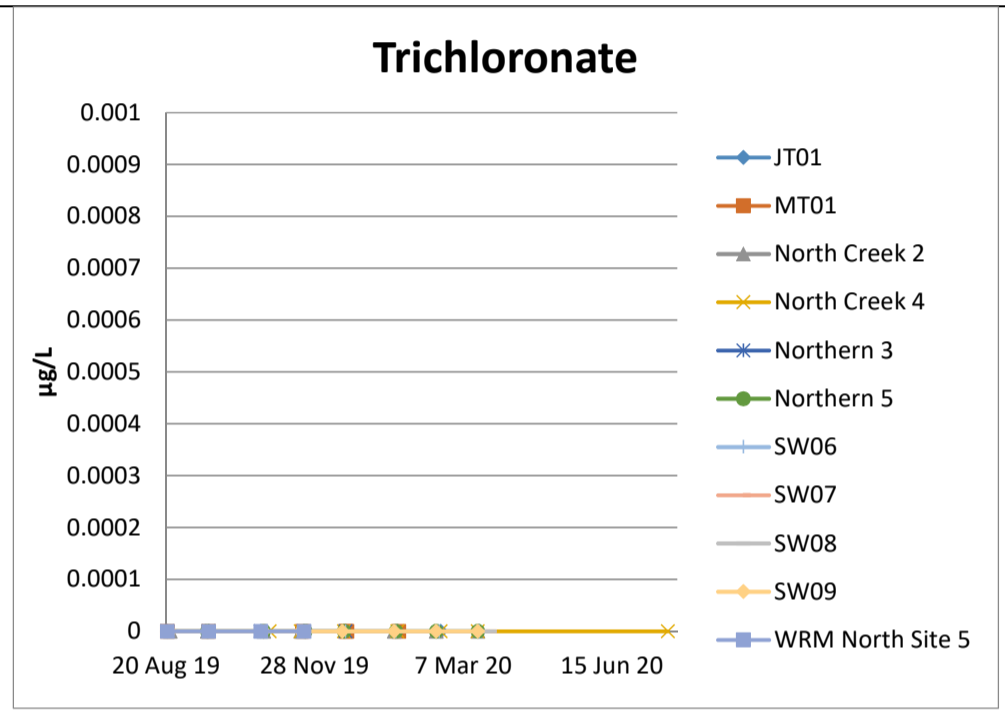
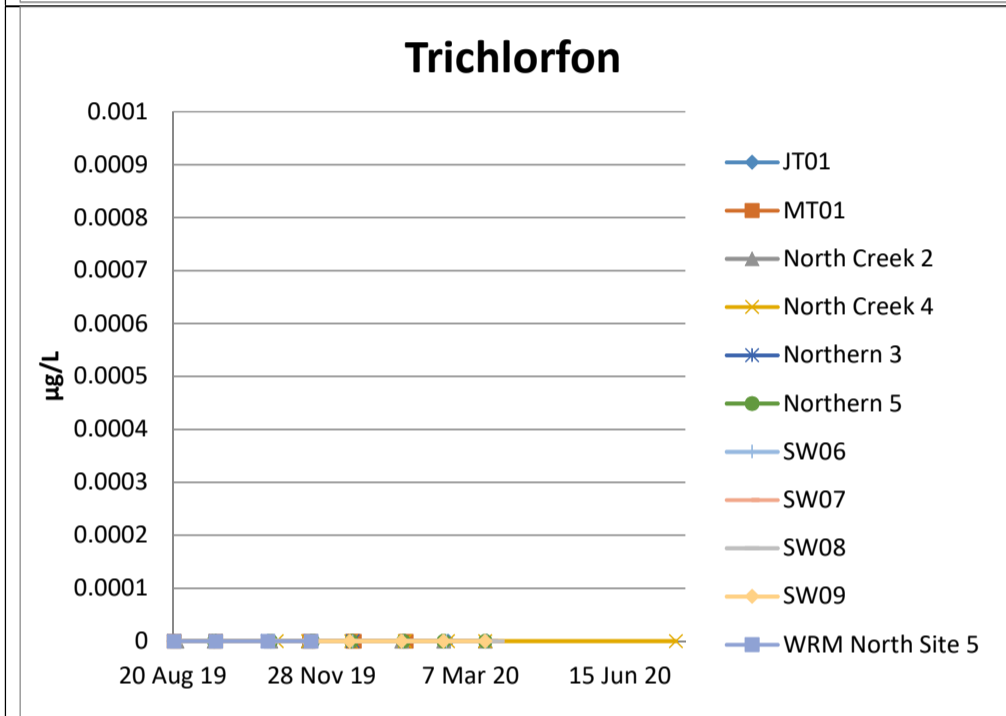
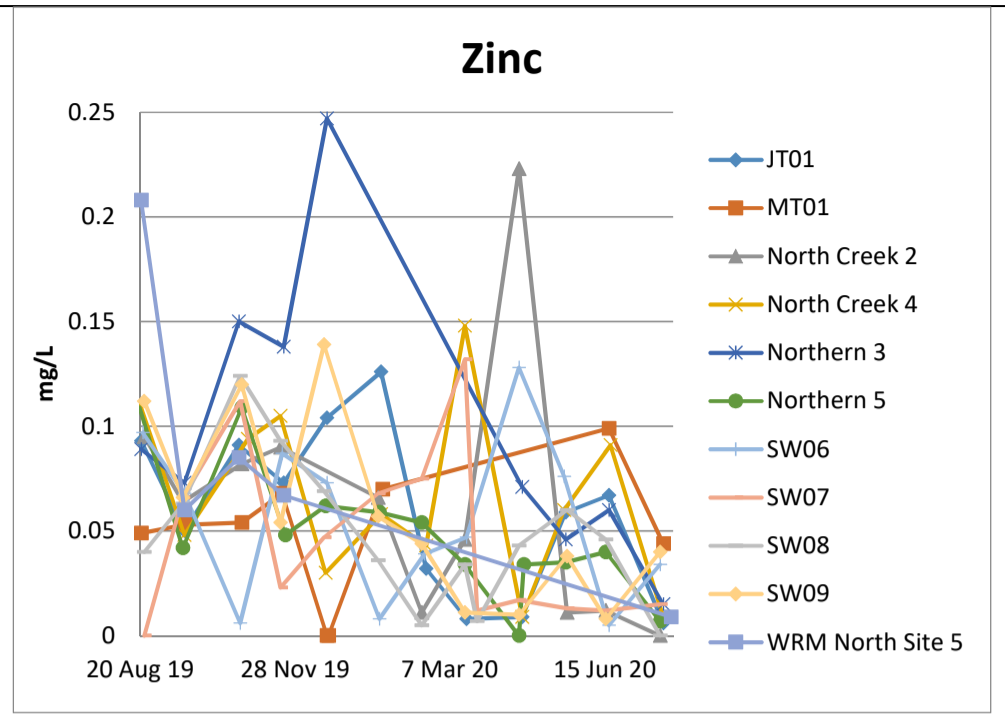
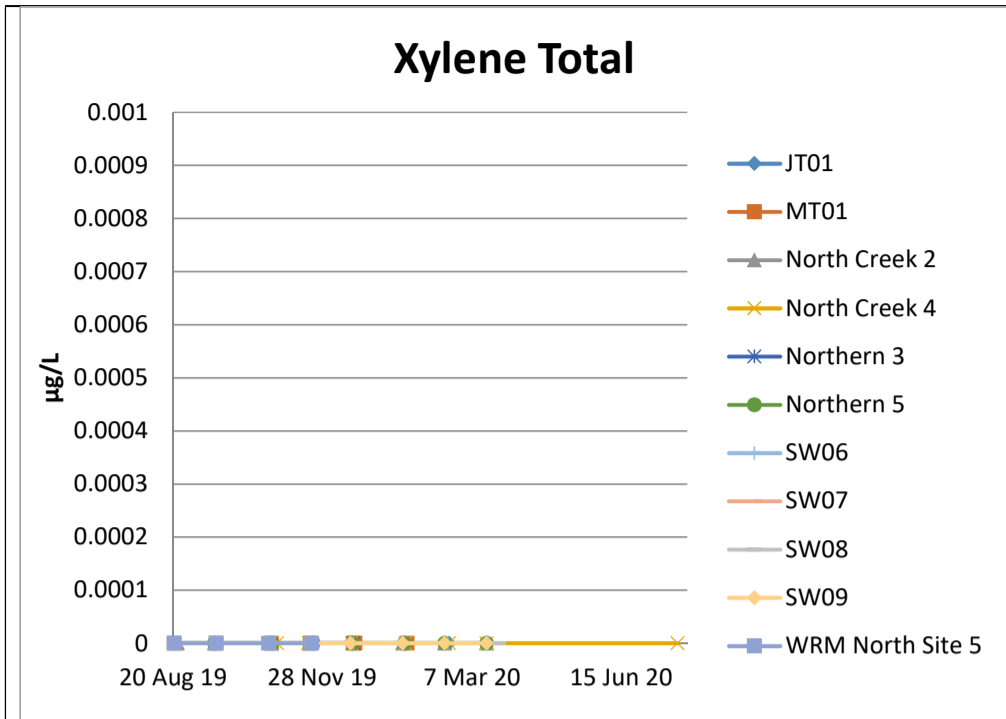
Acidity (as CaCO3)

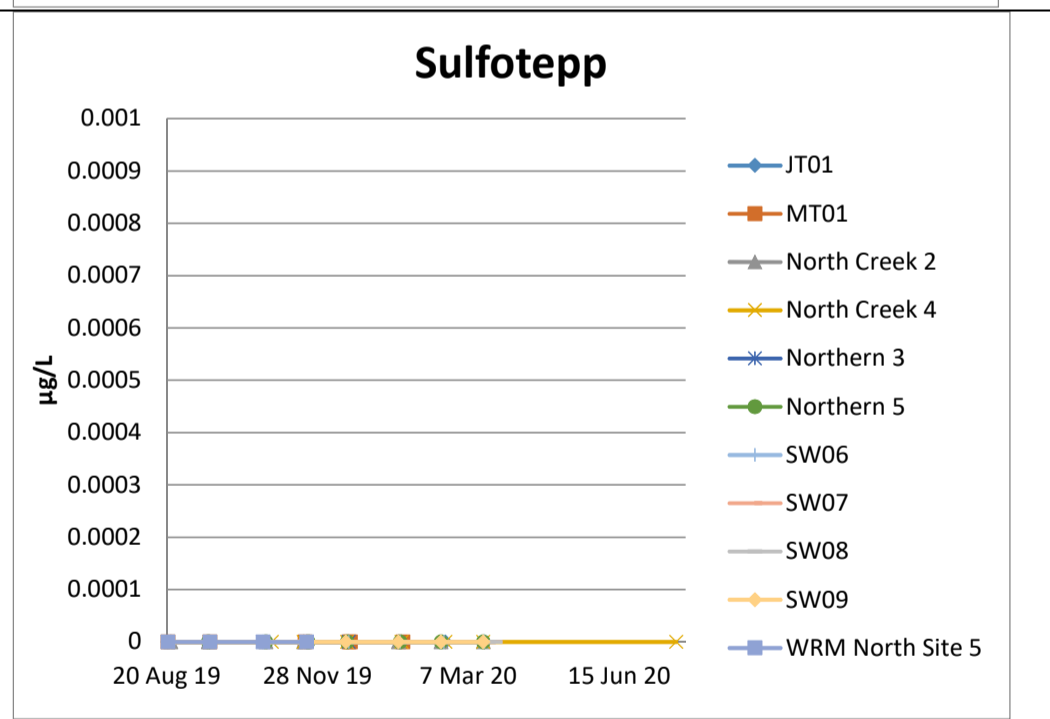
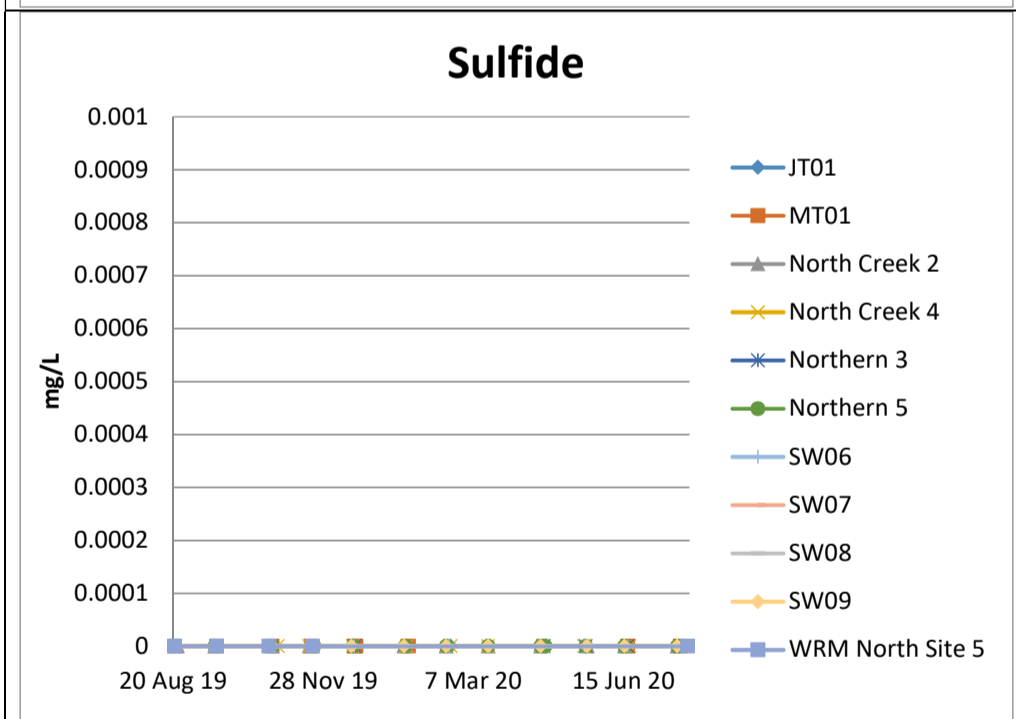
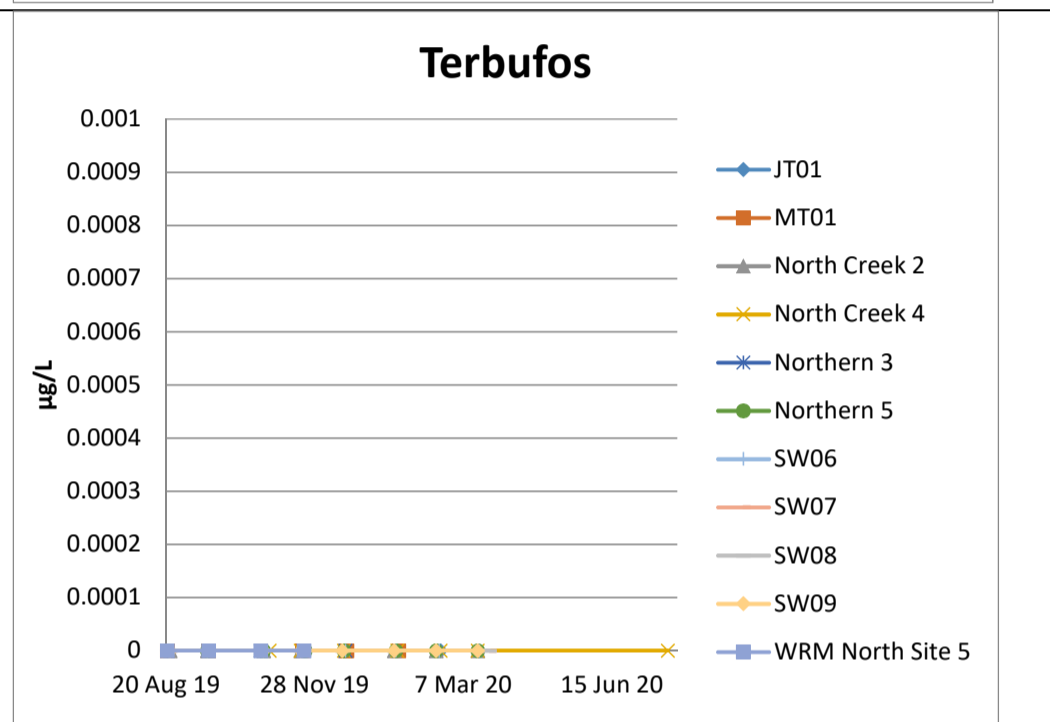
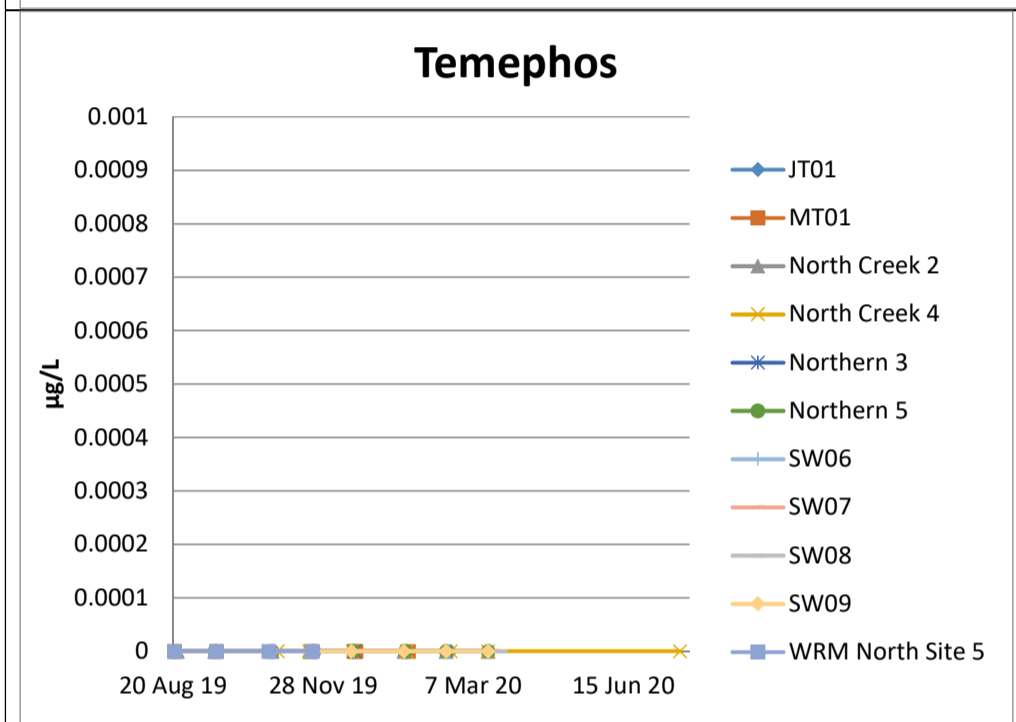
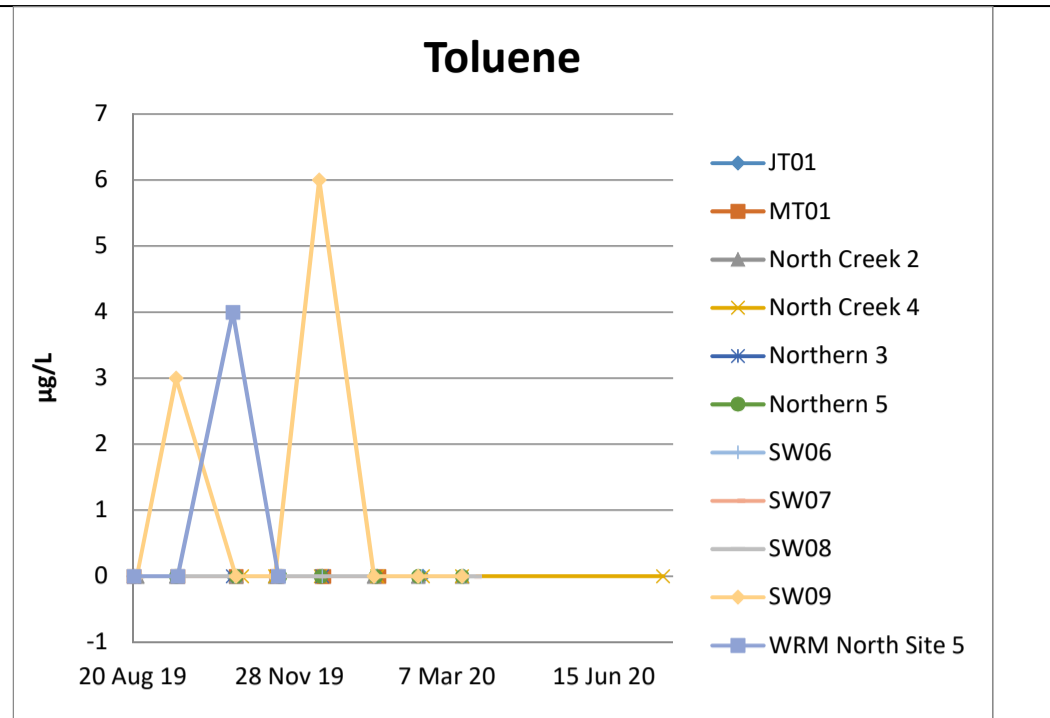
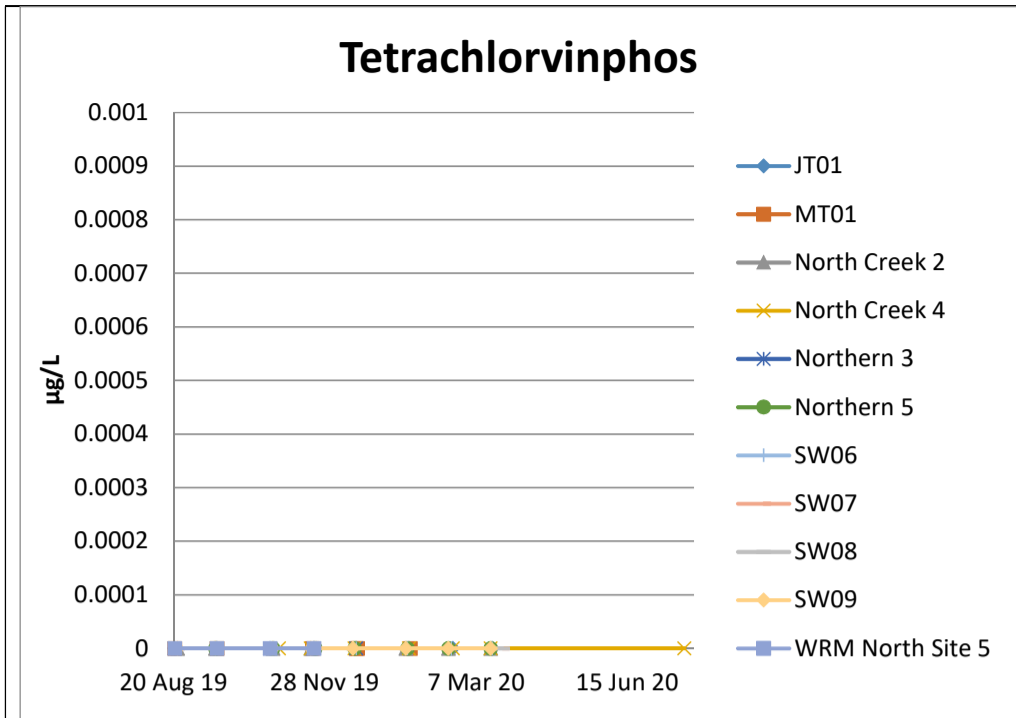


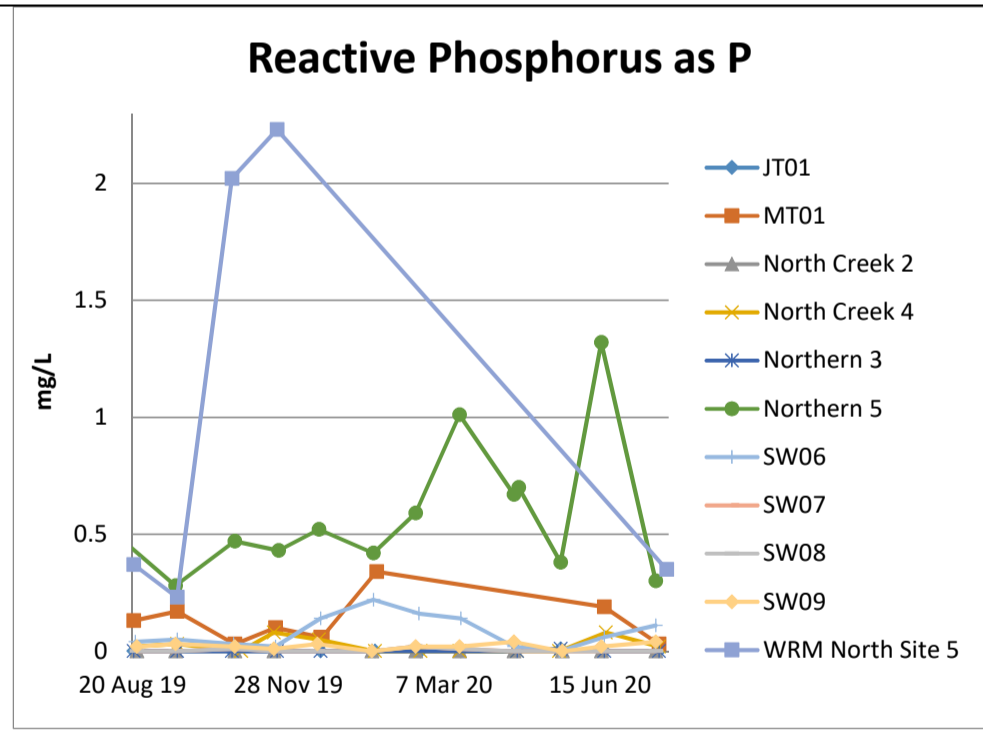
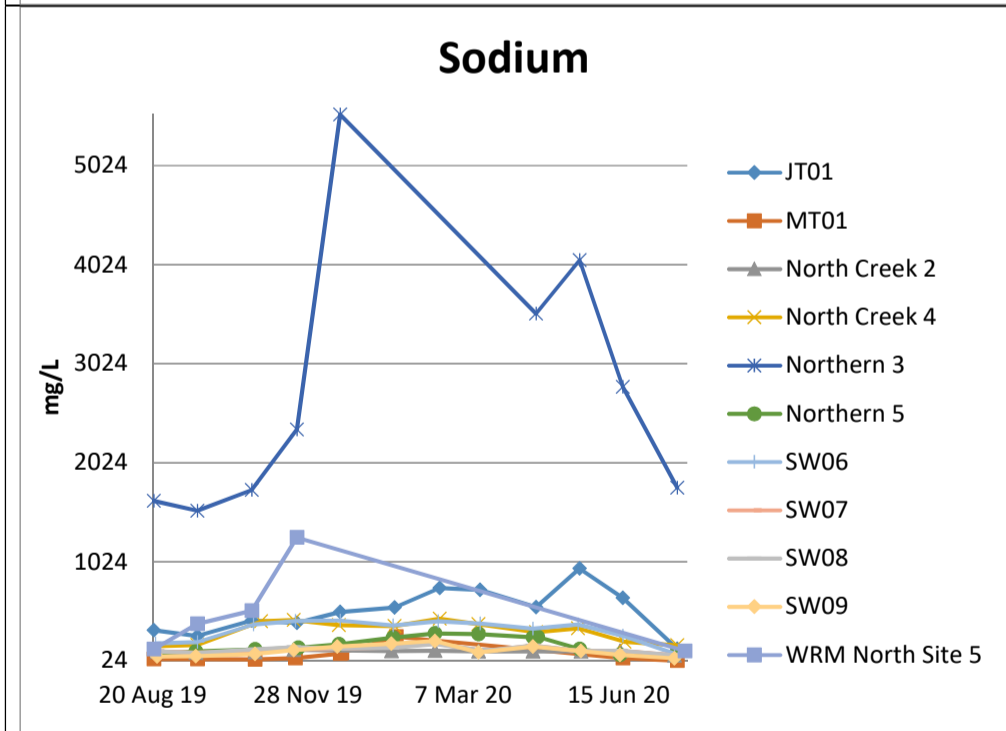
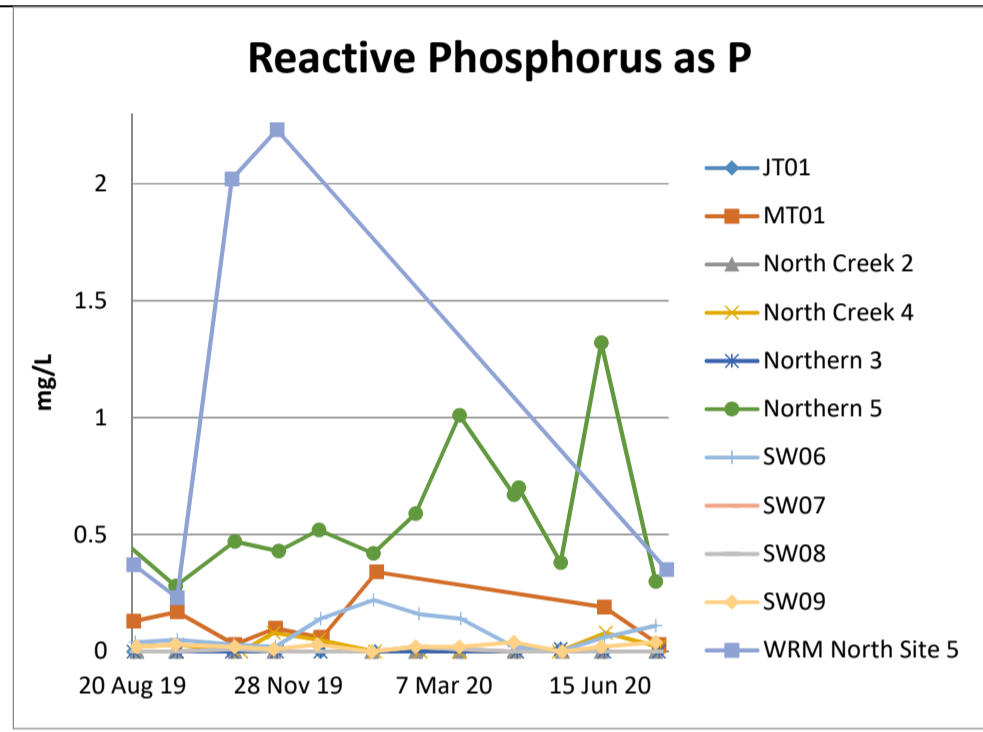
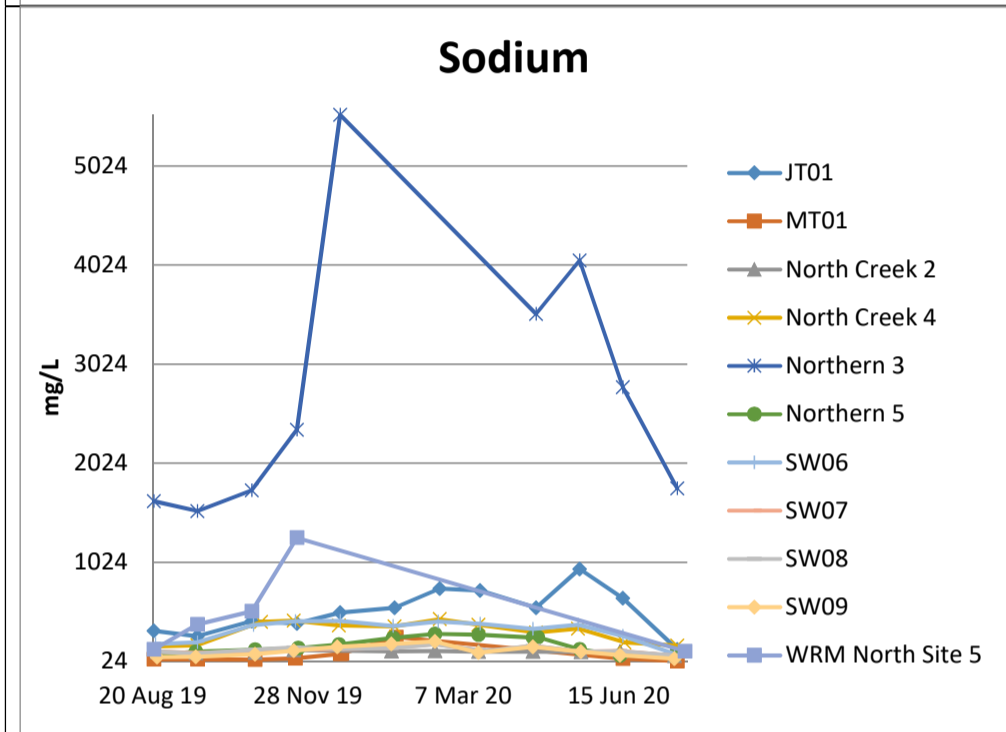
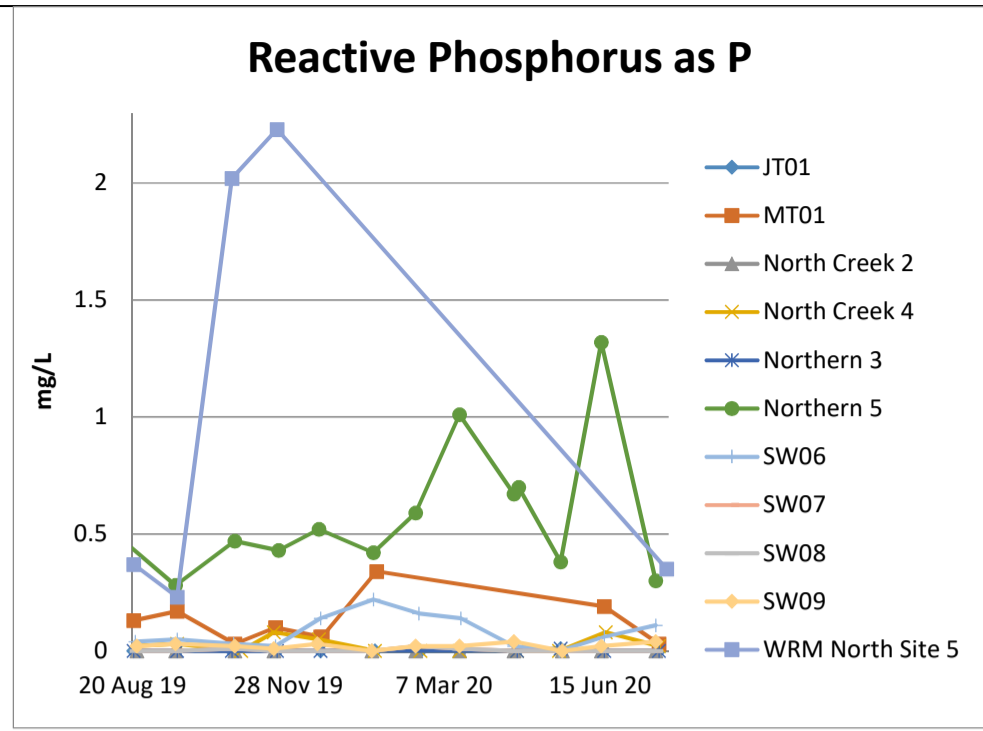
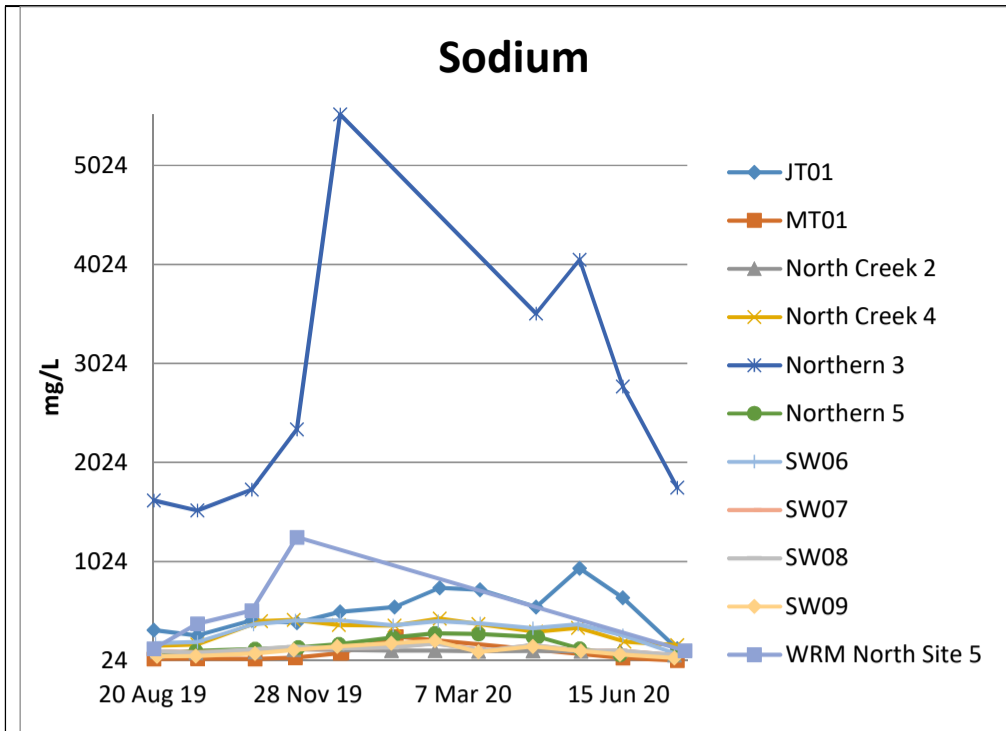
Alkalinity (Bicarbonate as CaCO3)

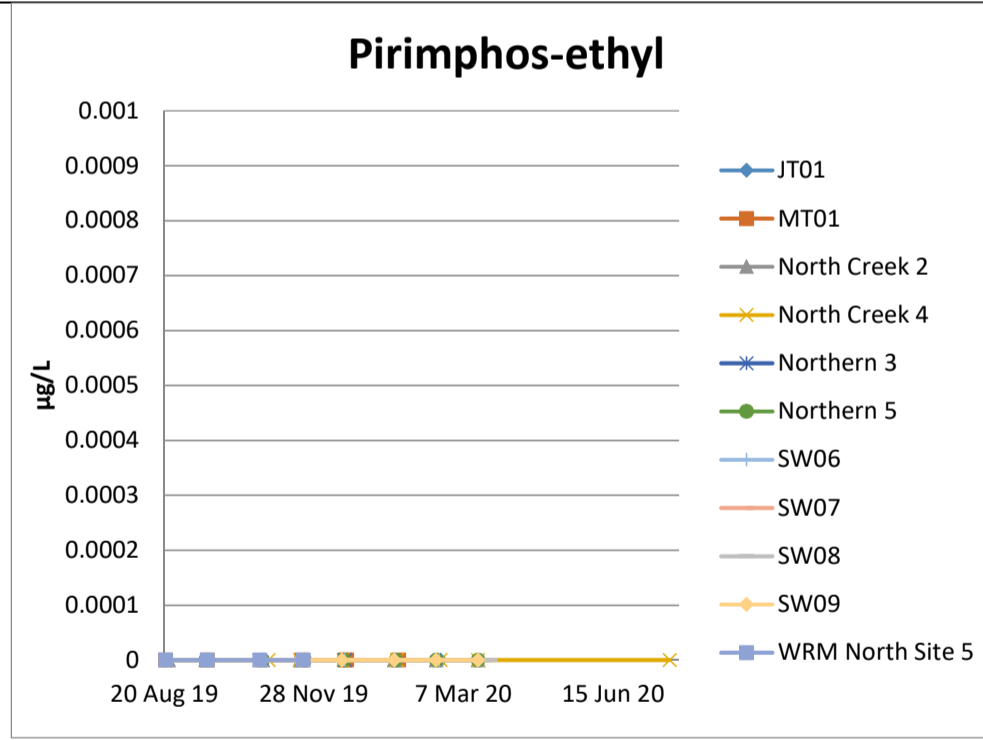
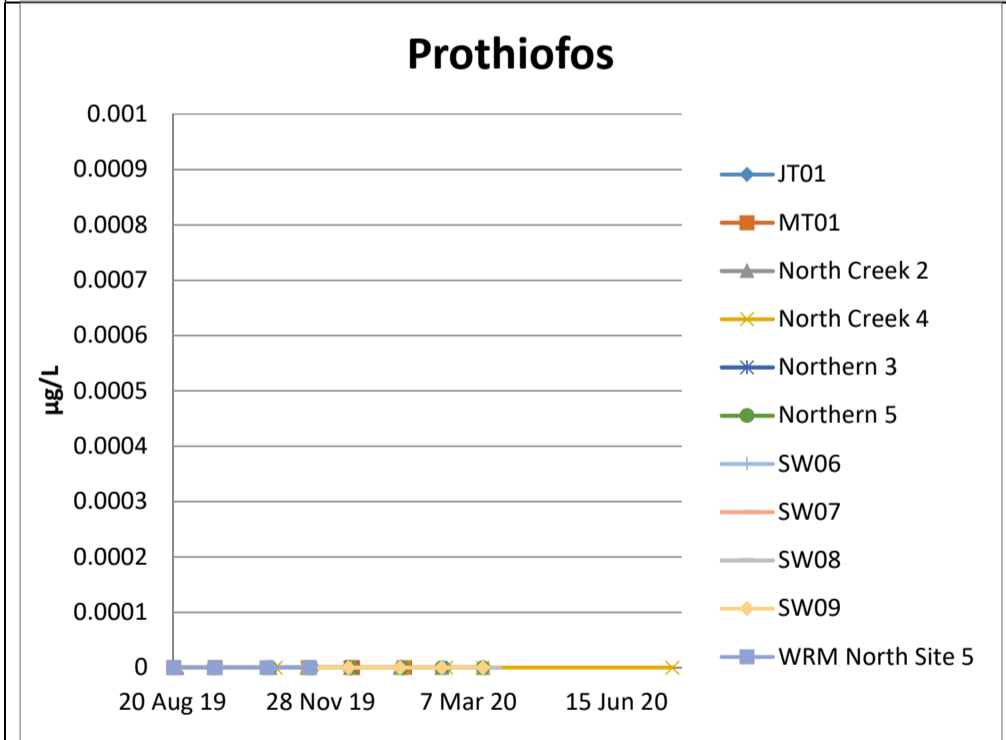
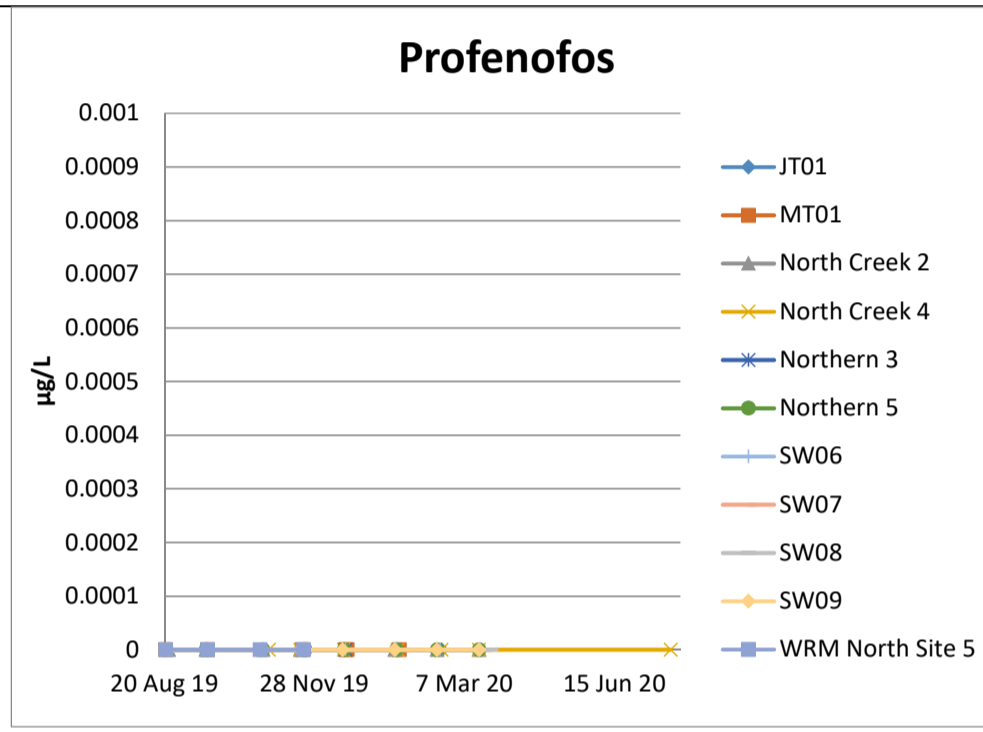
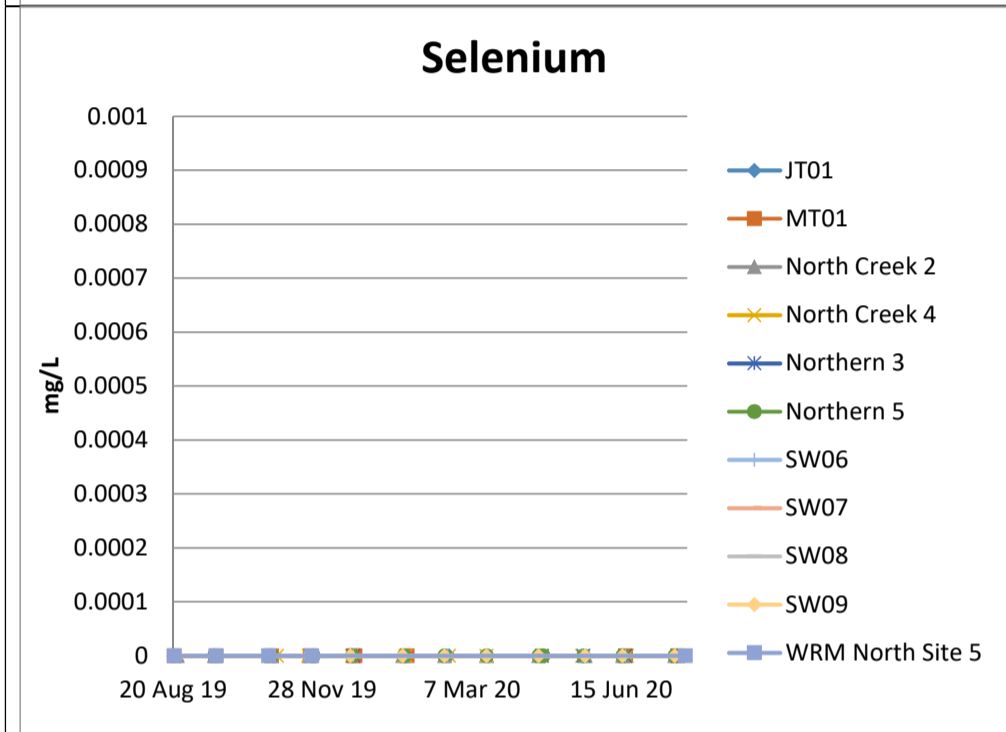
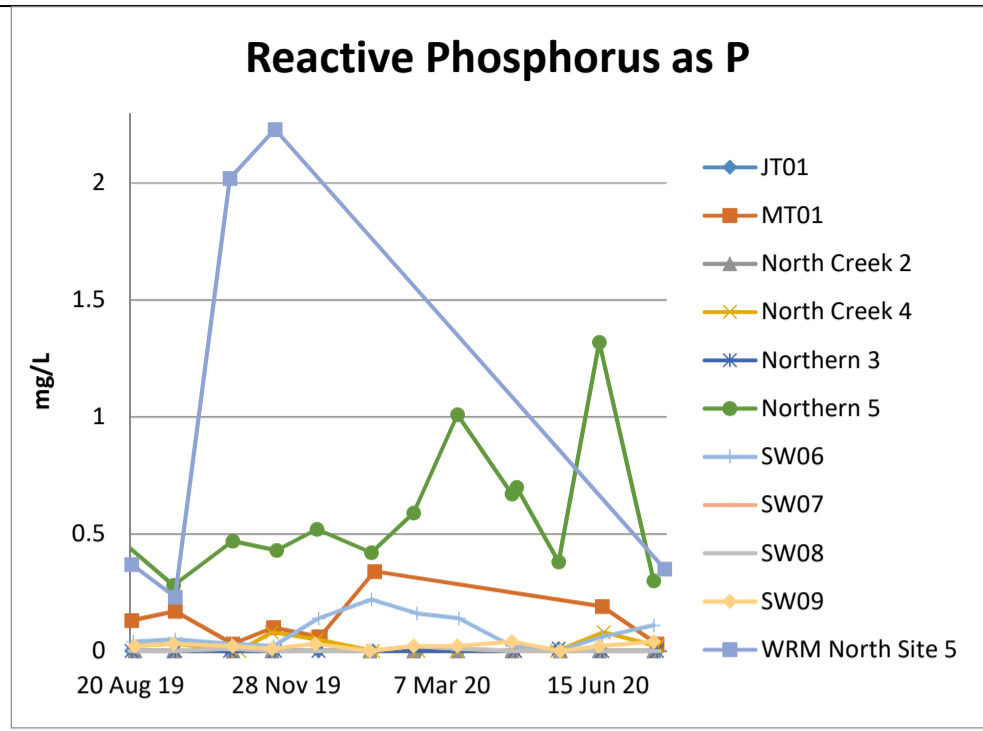
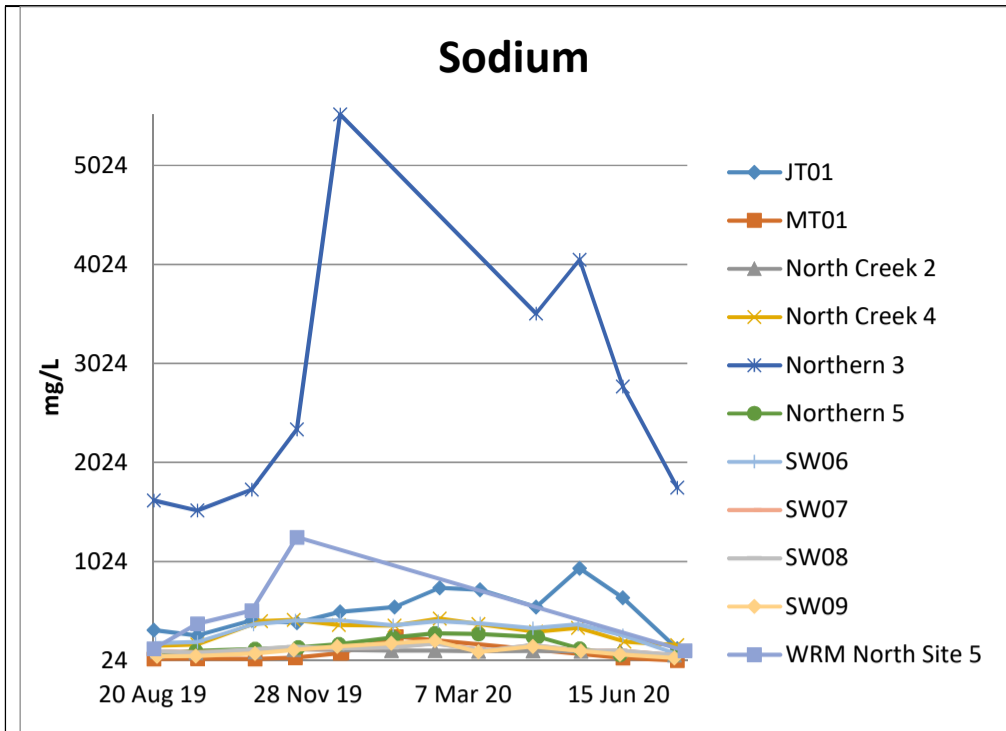


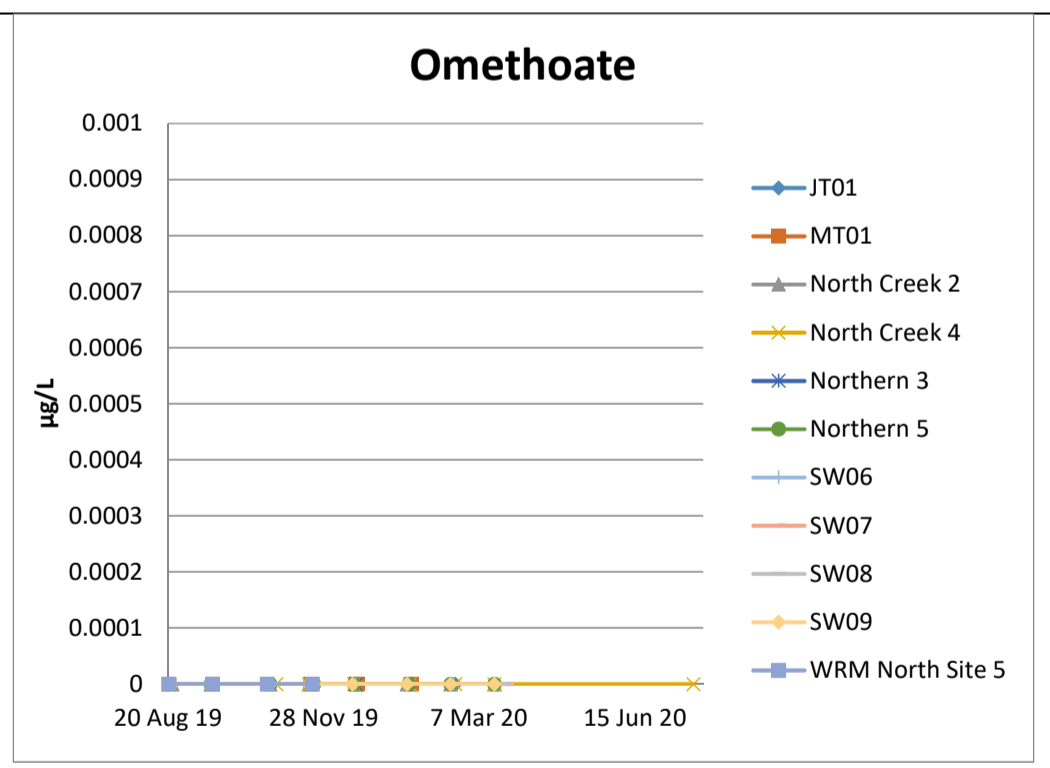
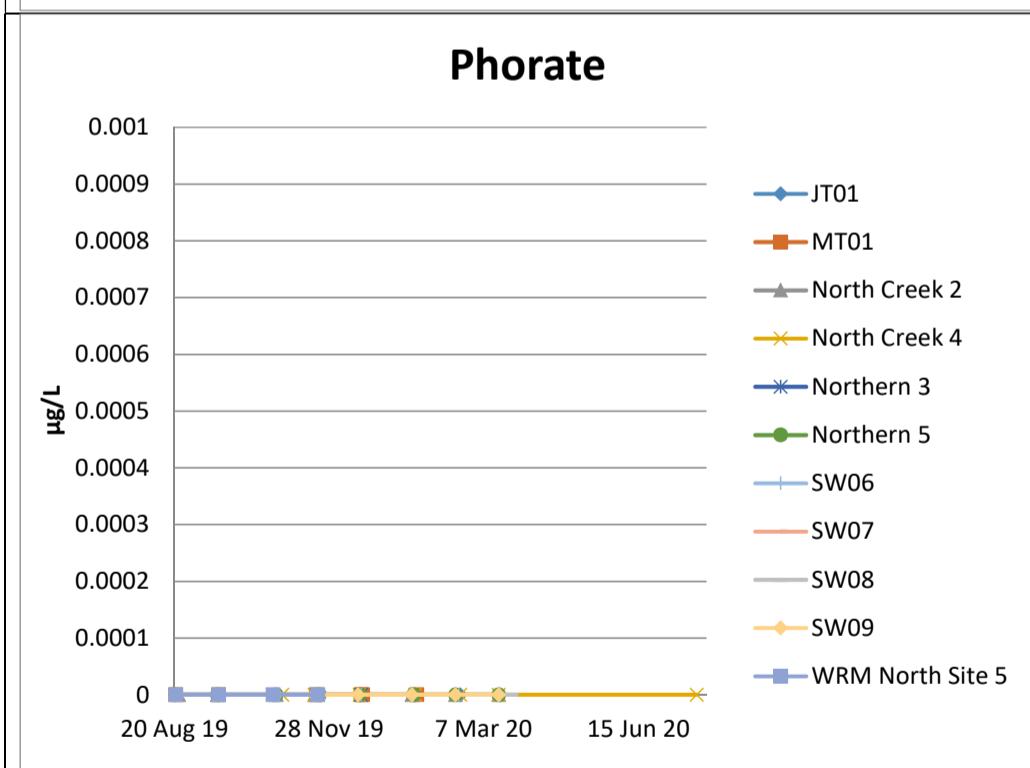
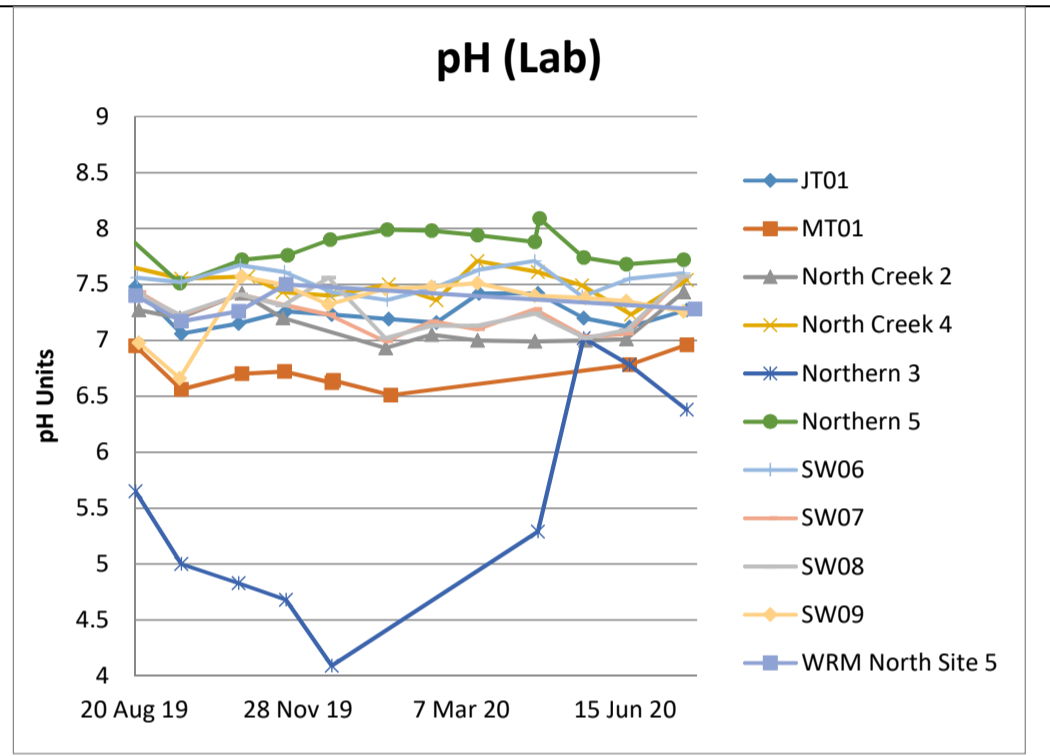
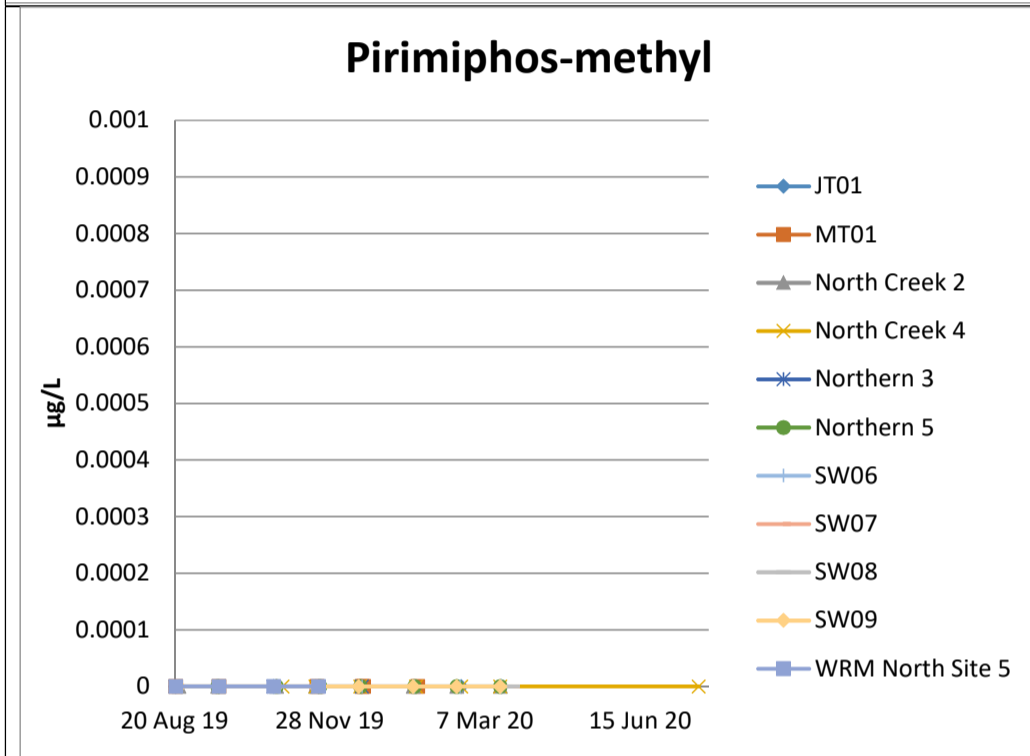
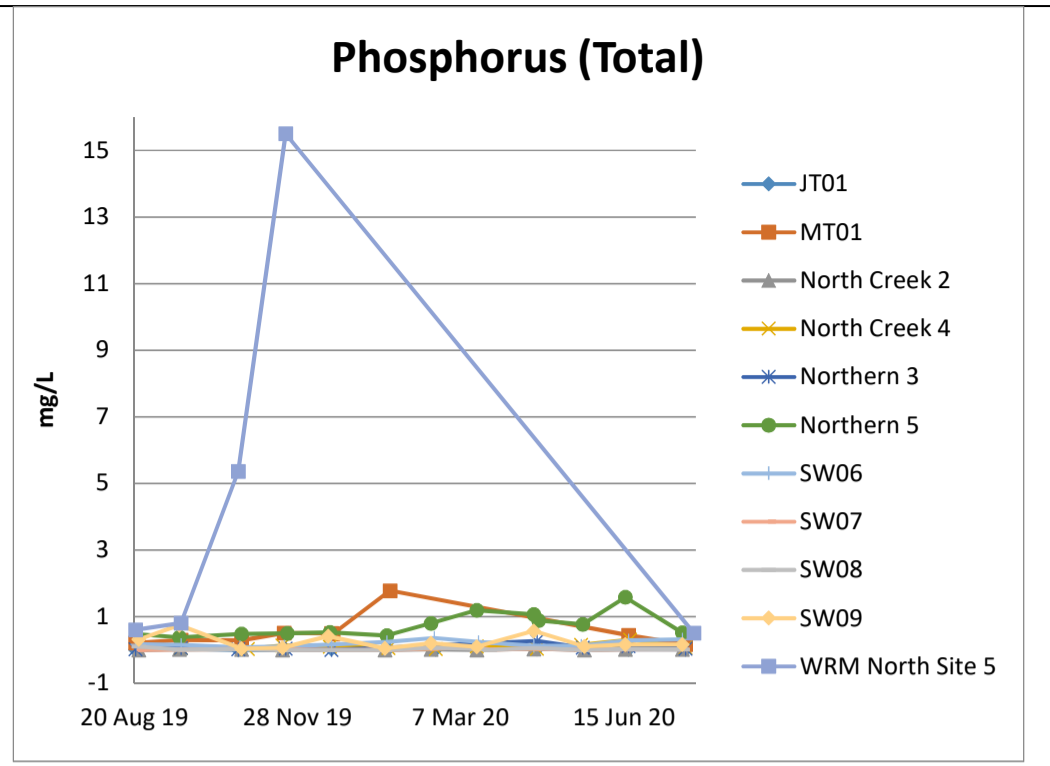
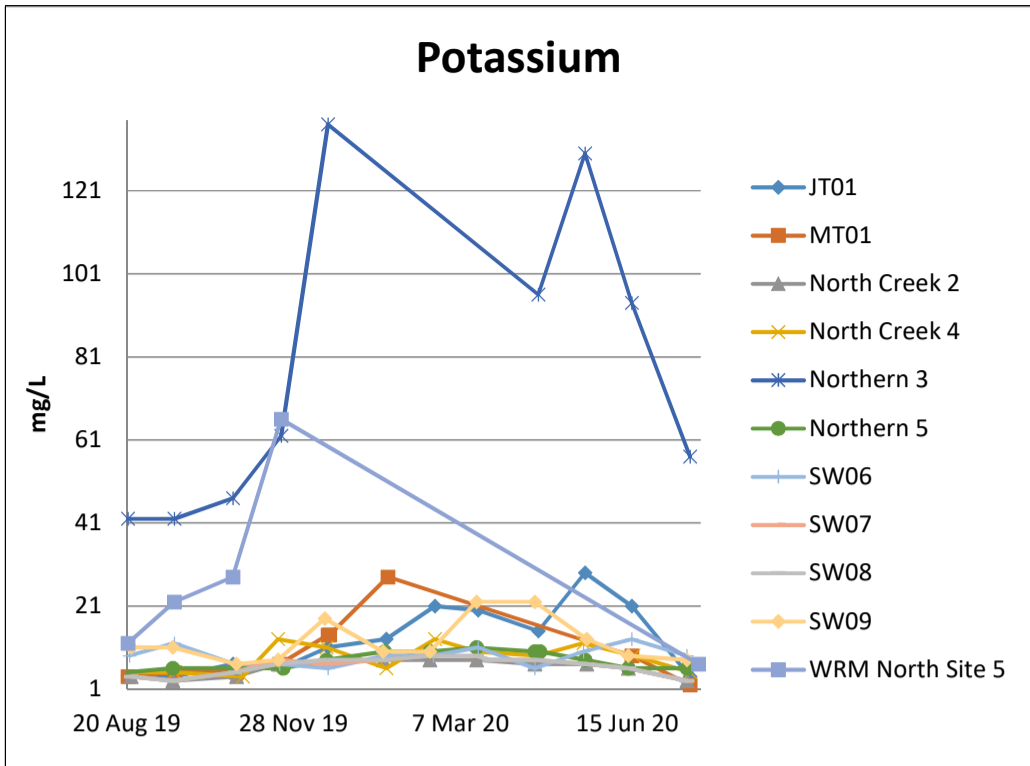
North and Central Surface water Graphs

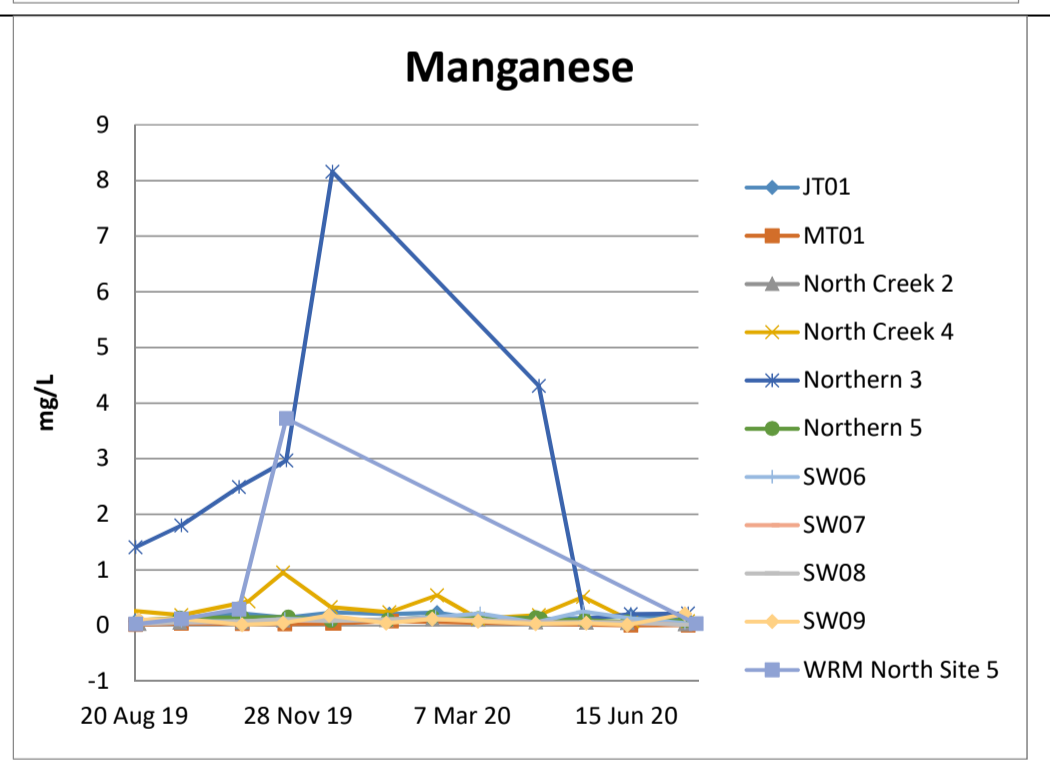
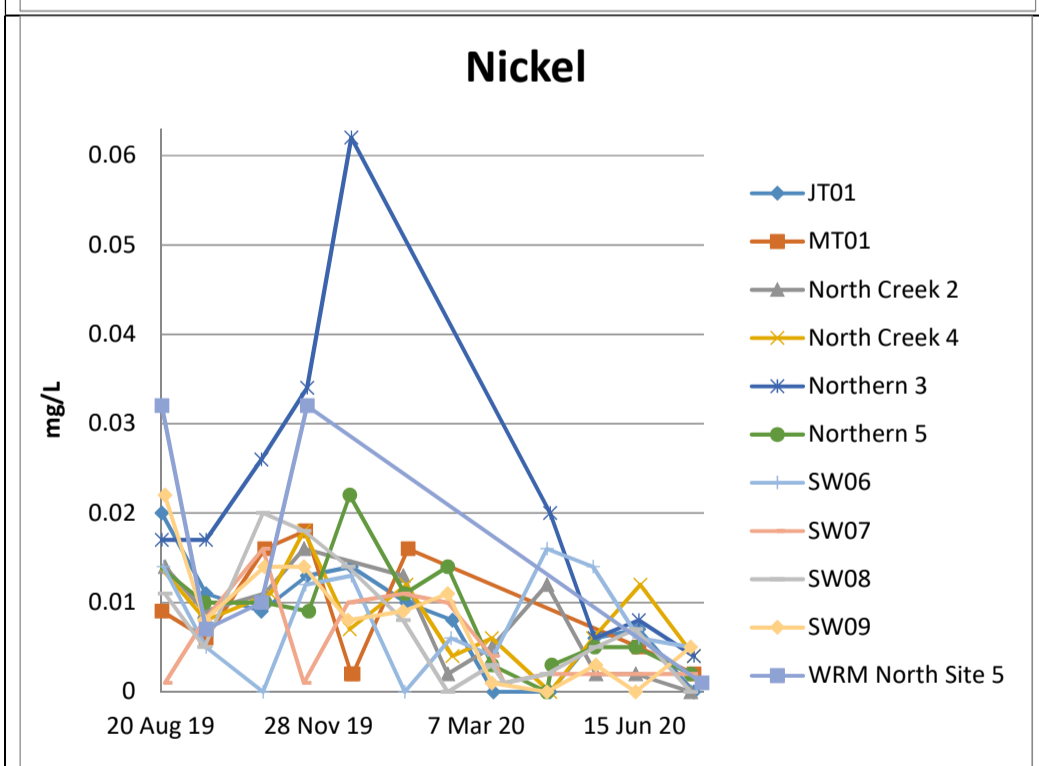
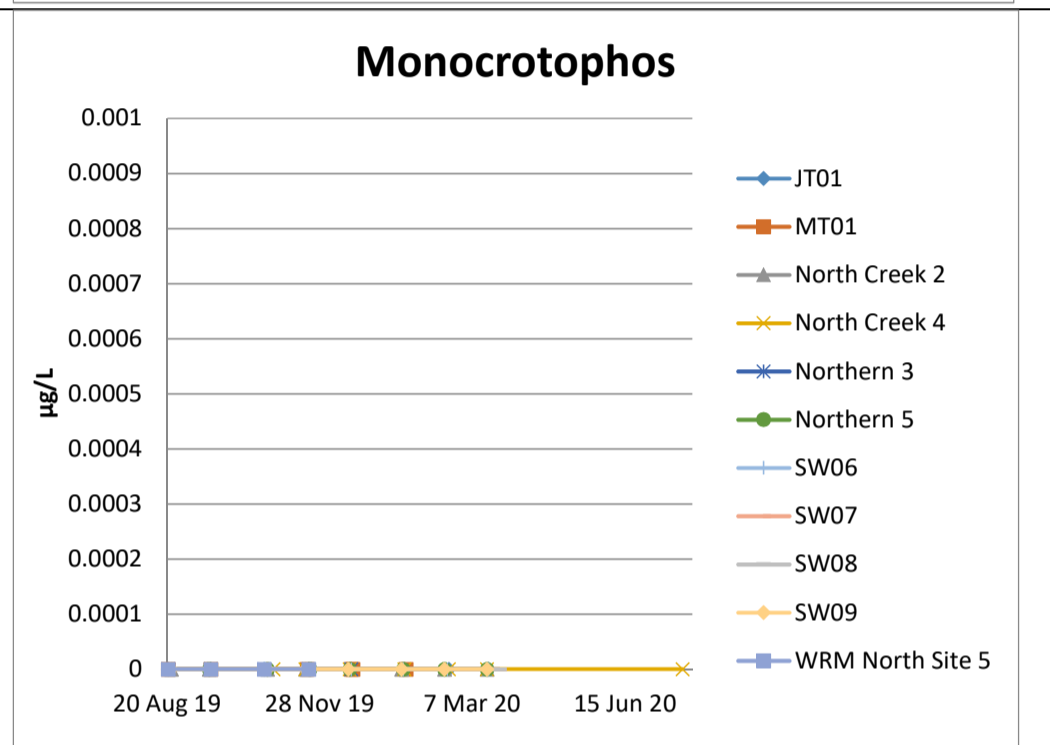
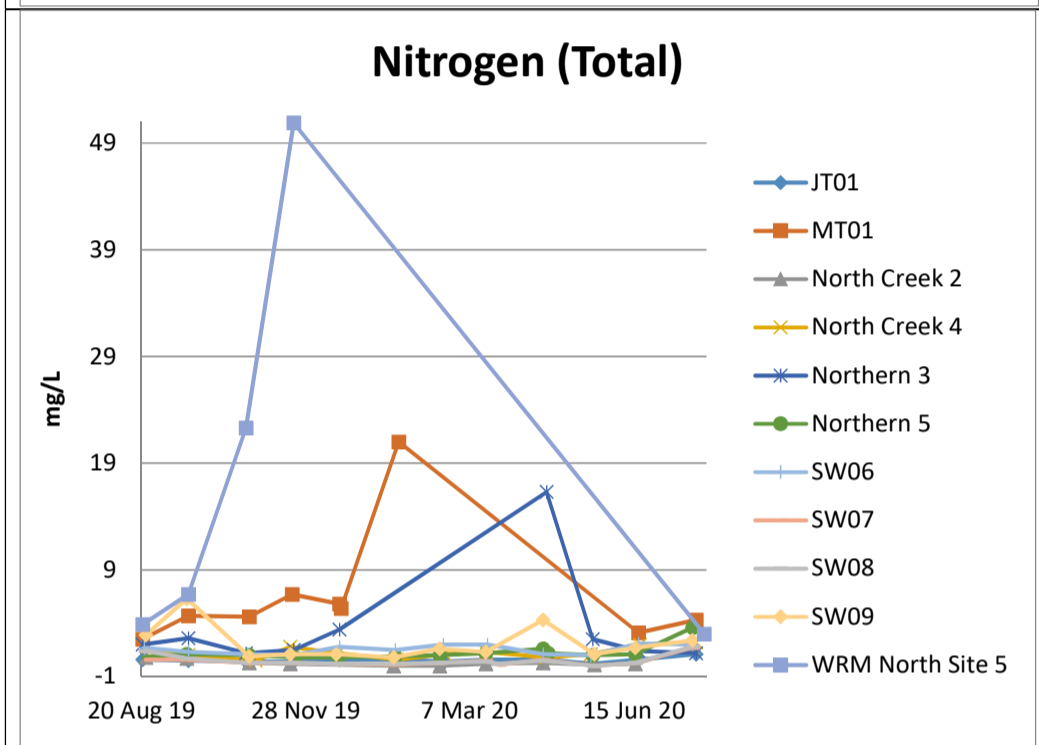
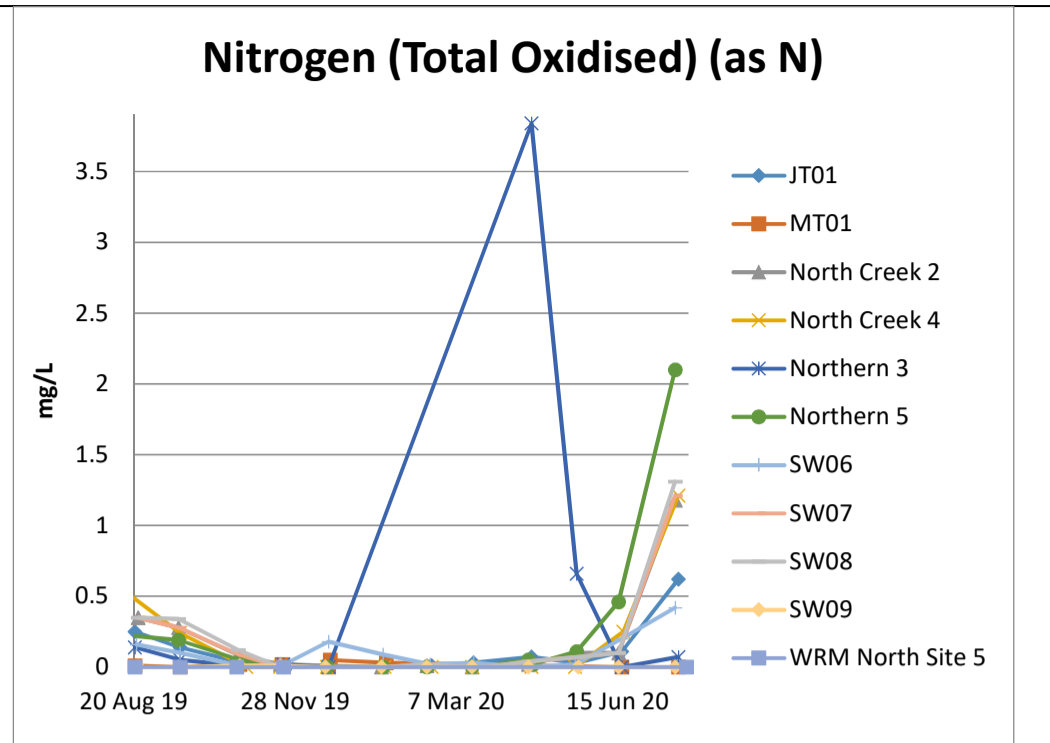
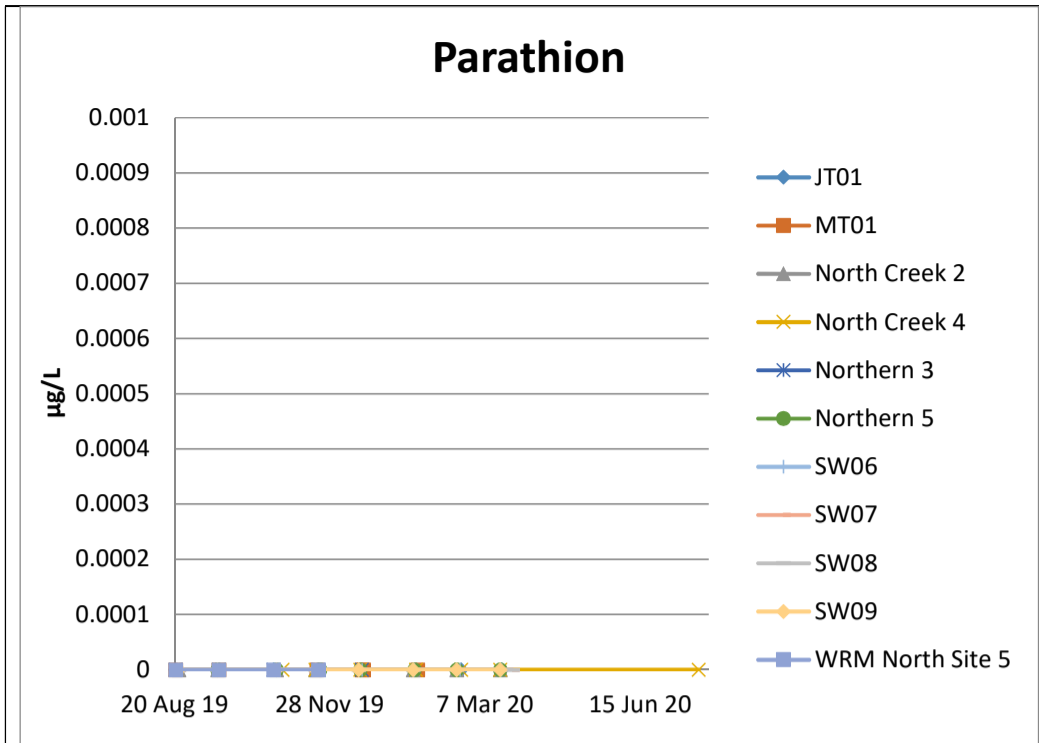




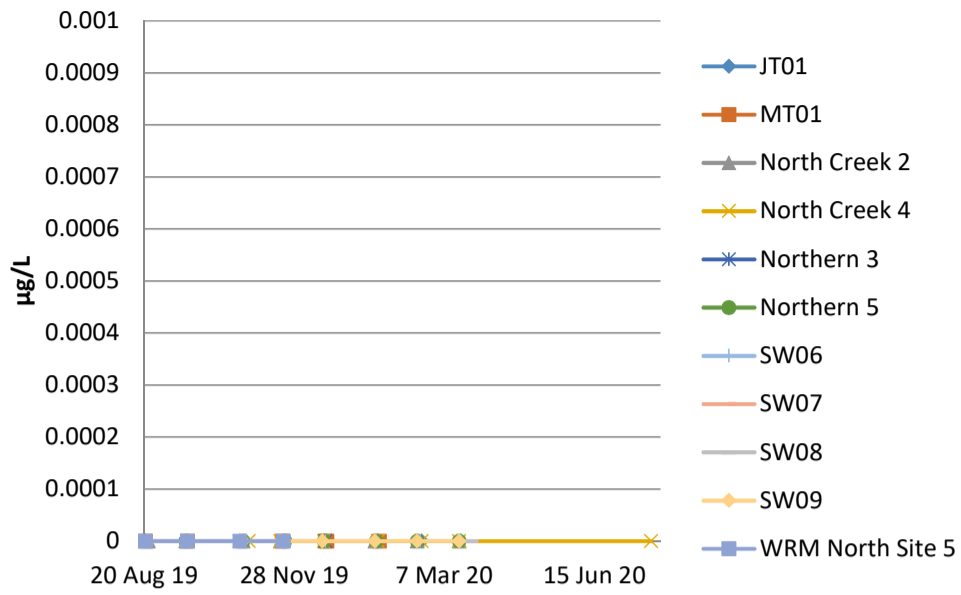




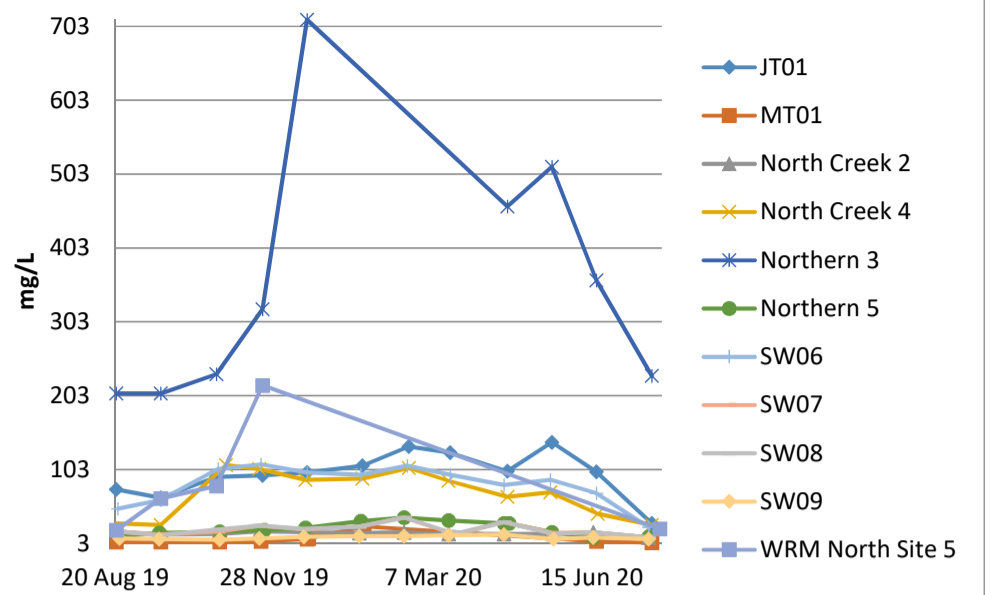




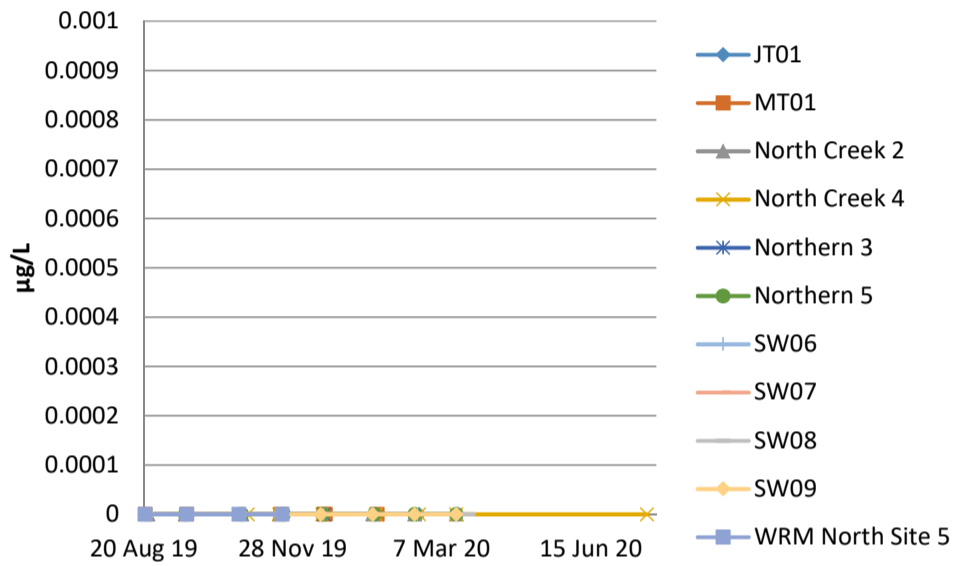
Mevinphos (Phosdrin)



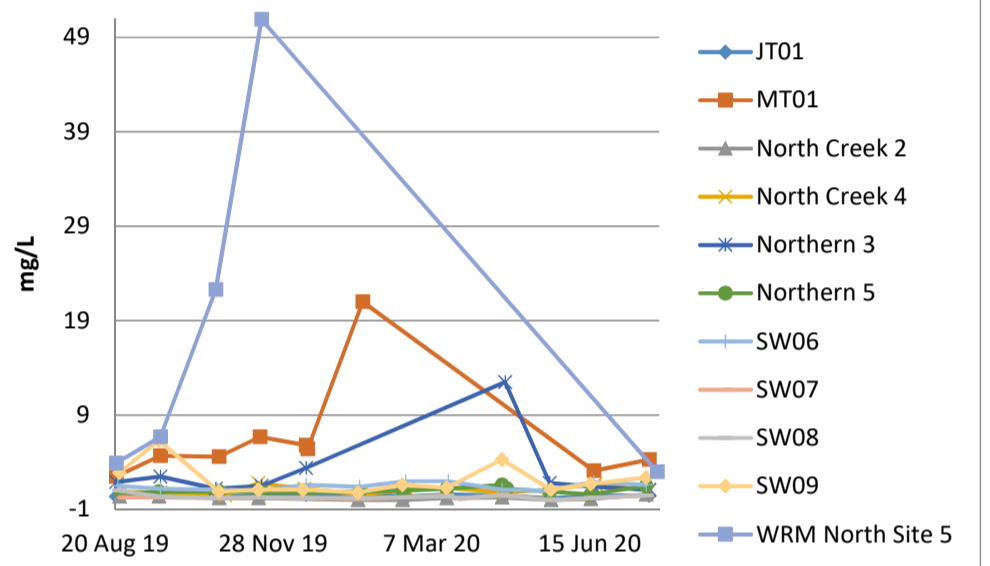
Magnesium



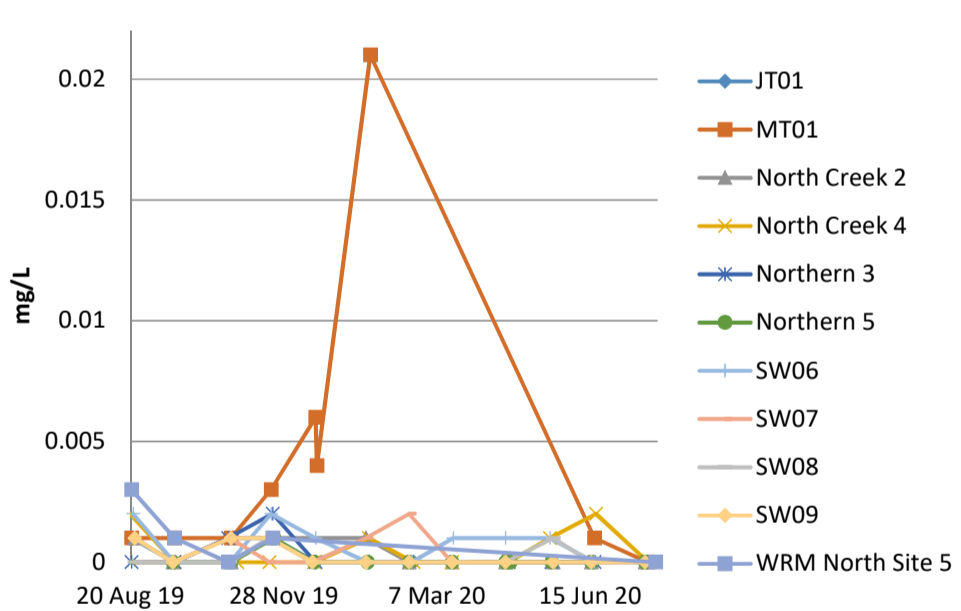
Malathion



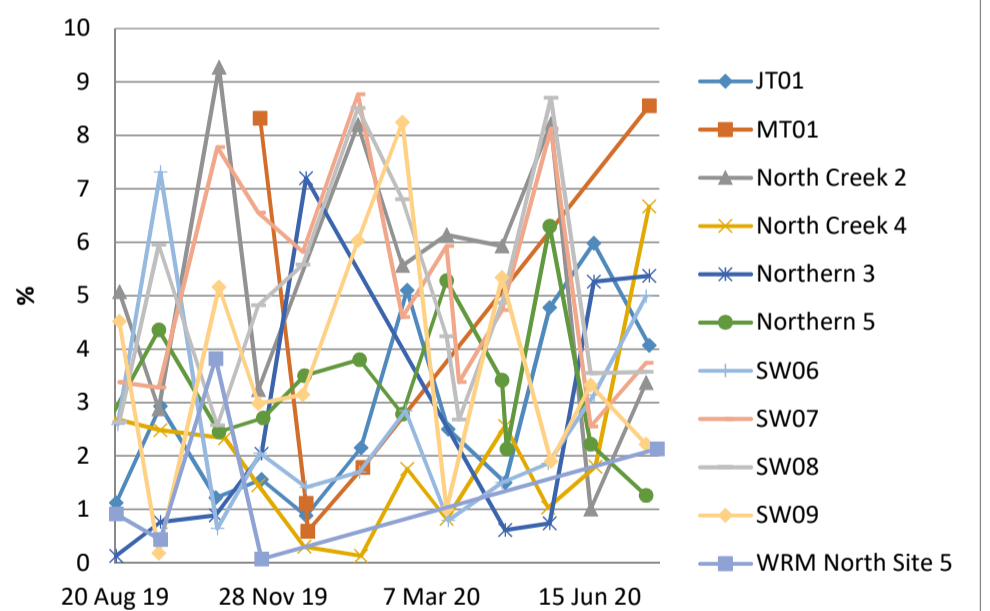
Kjeldahl Nitrogen Total

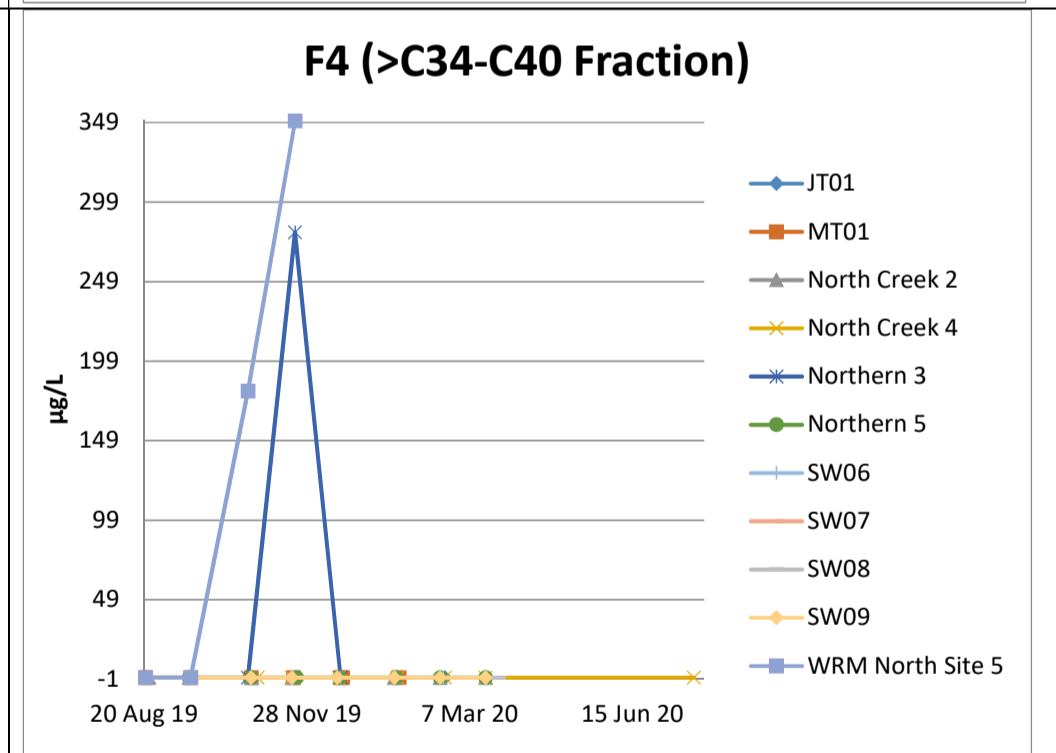
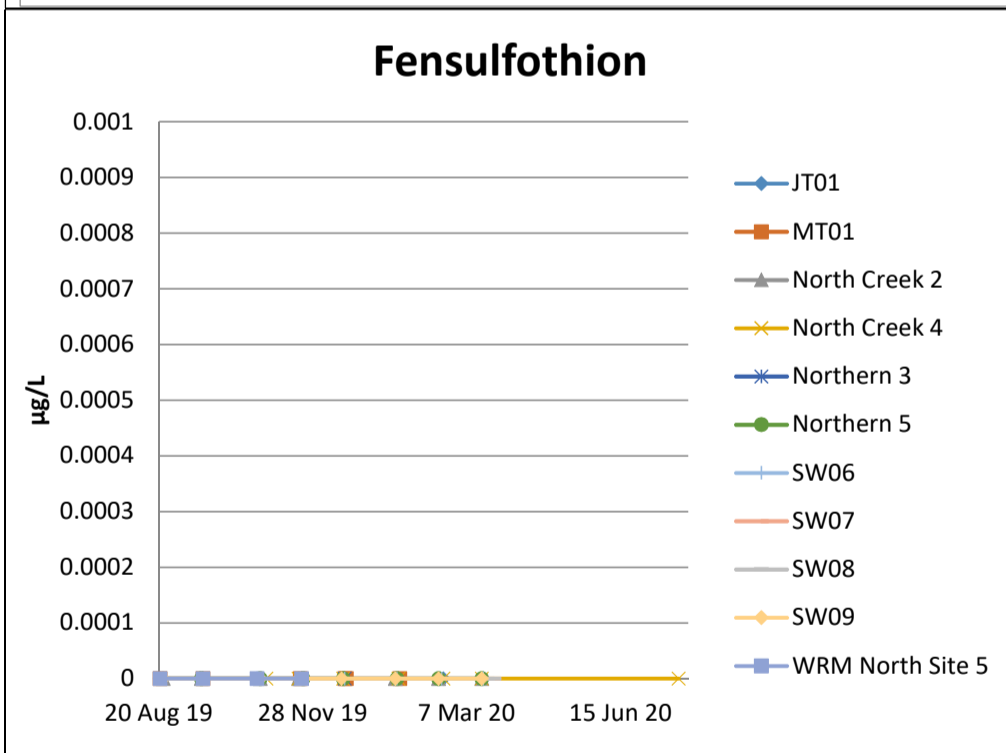
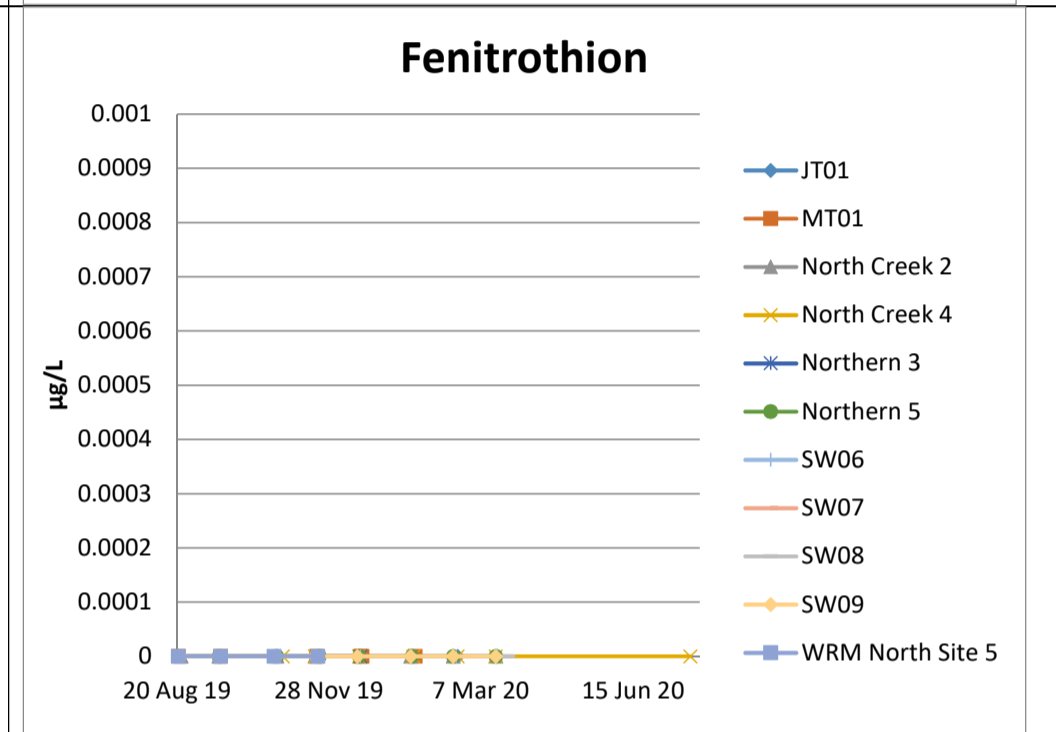
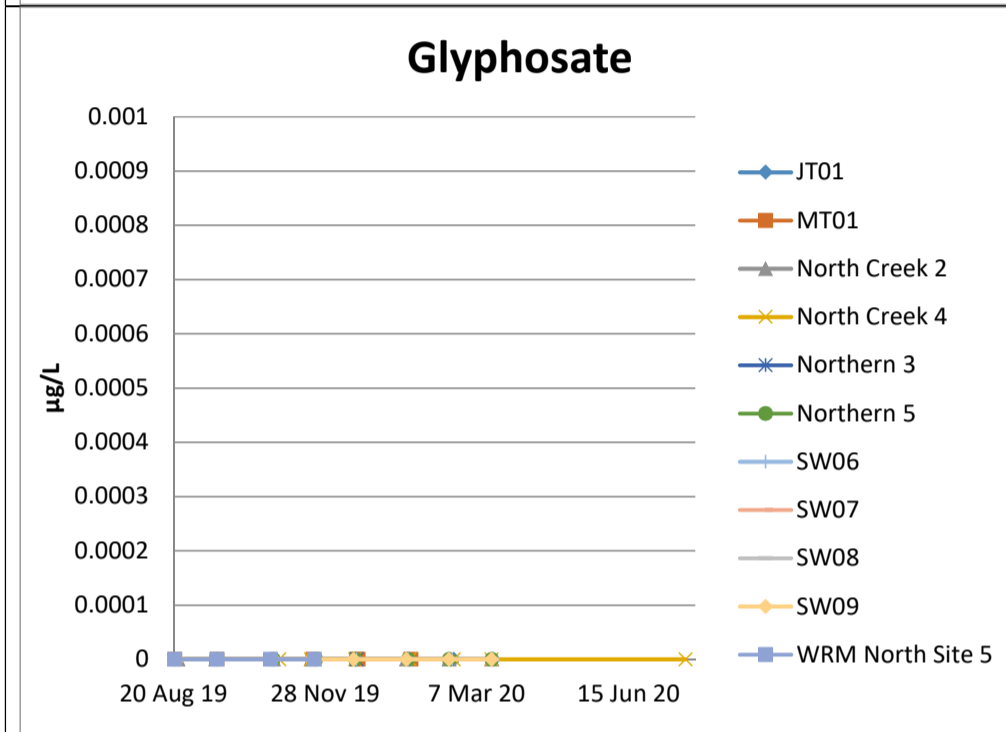
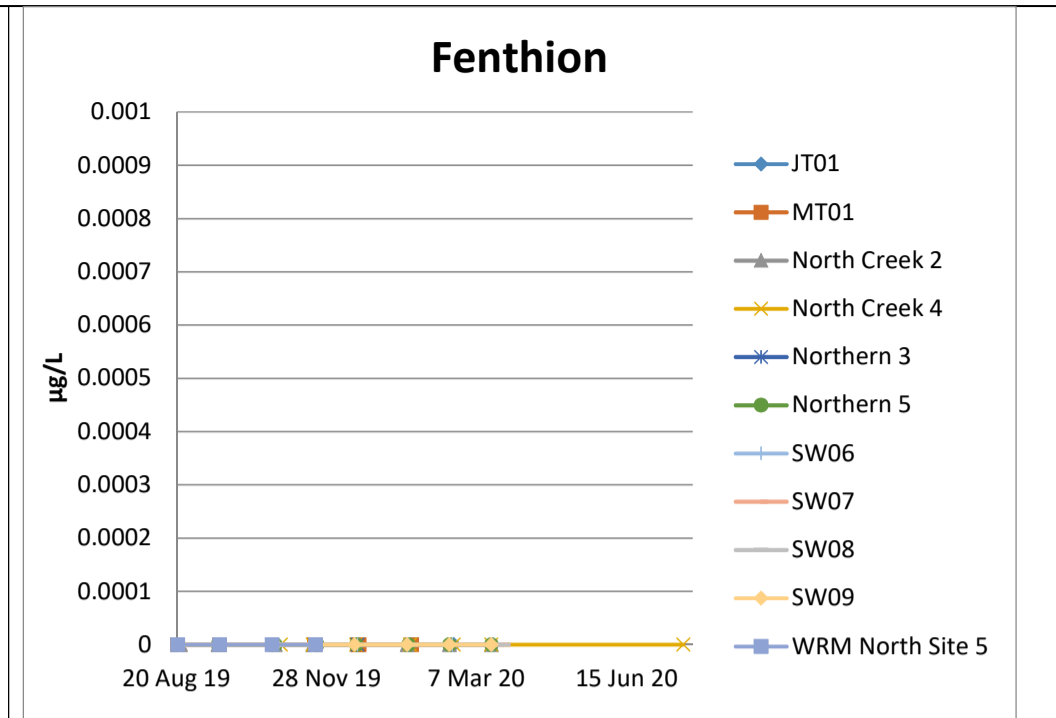
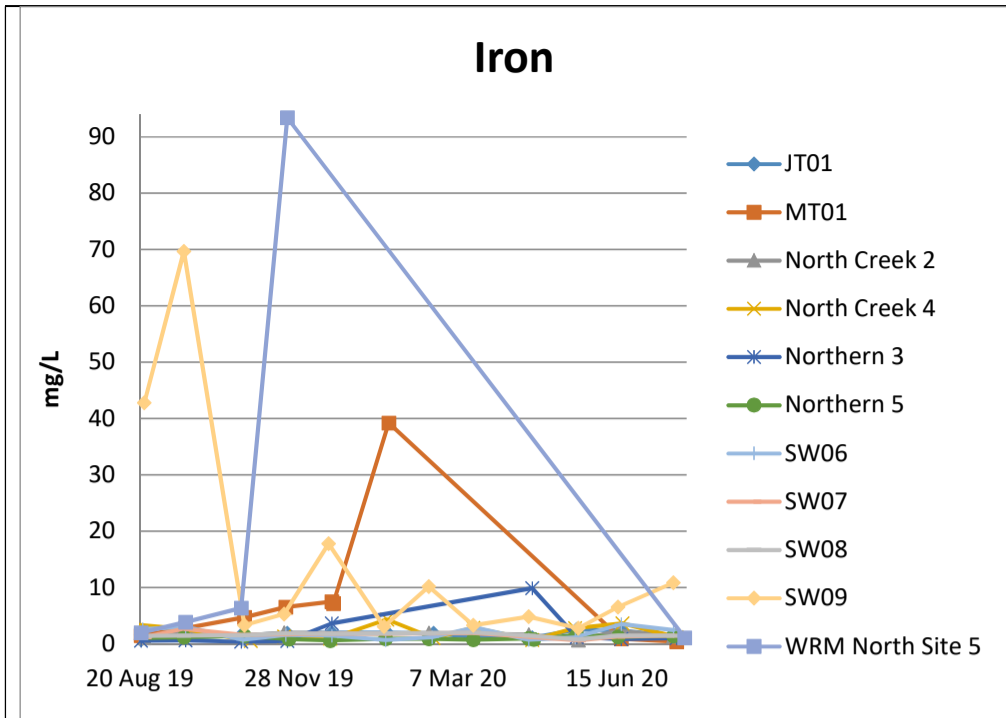


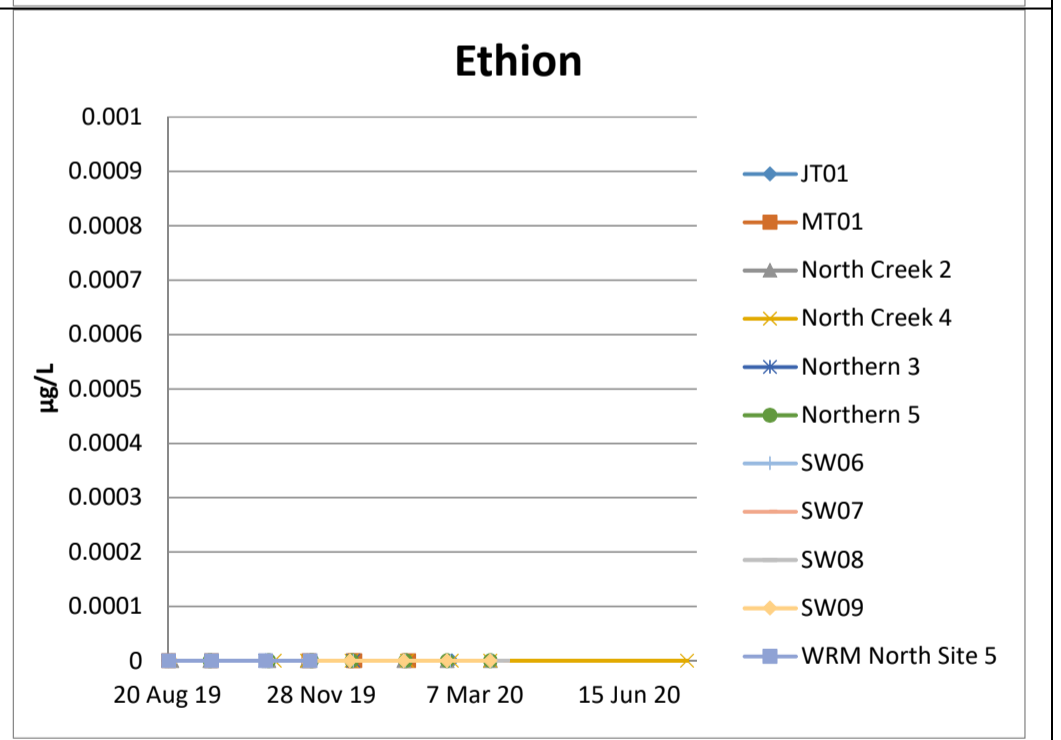
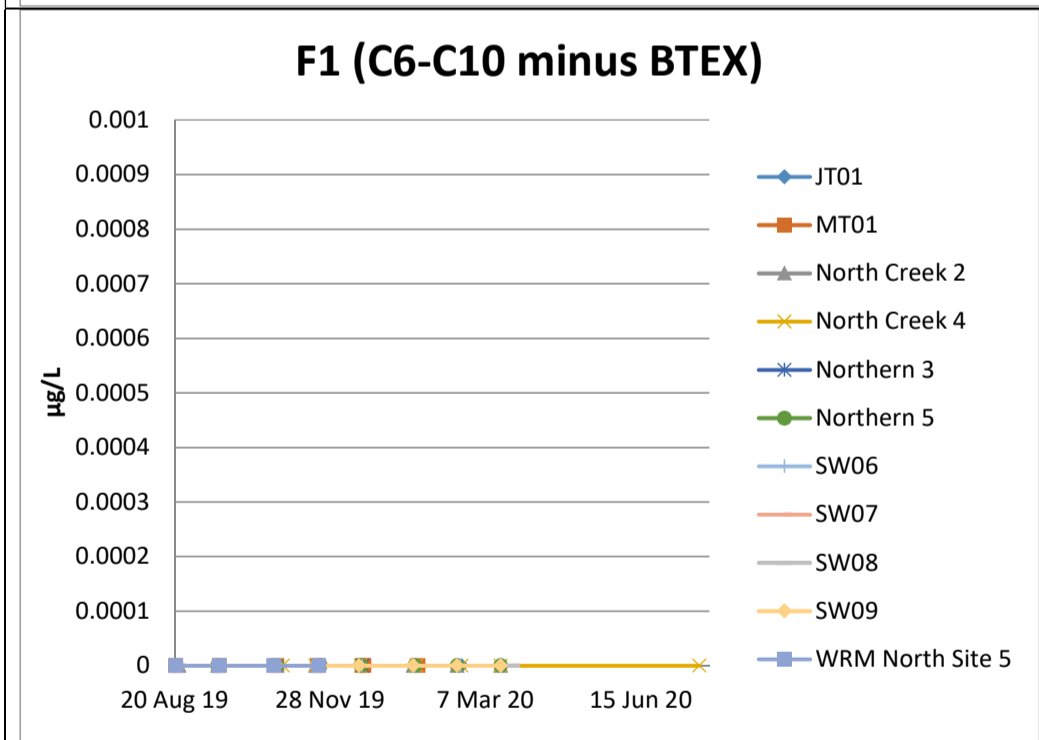
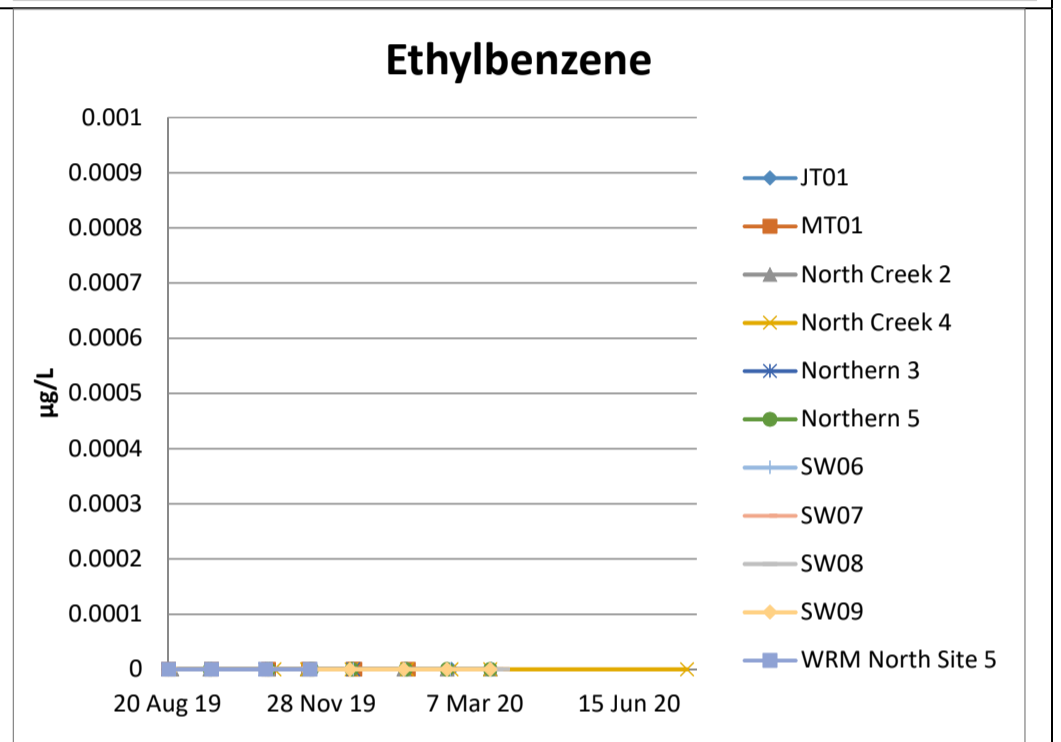
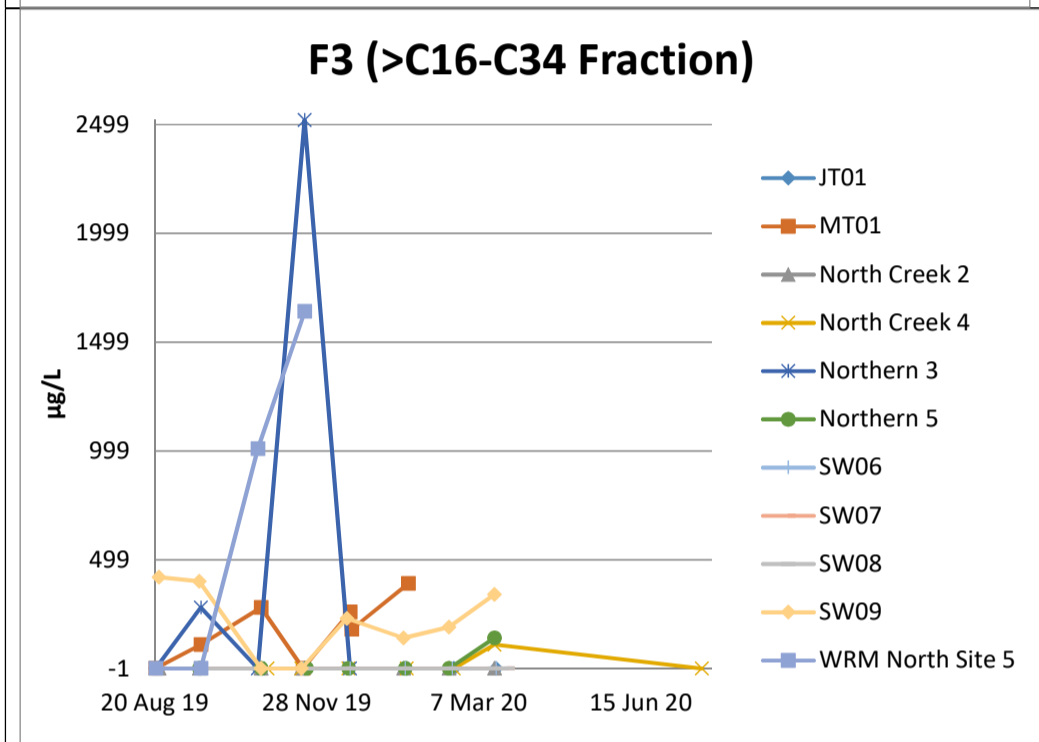
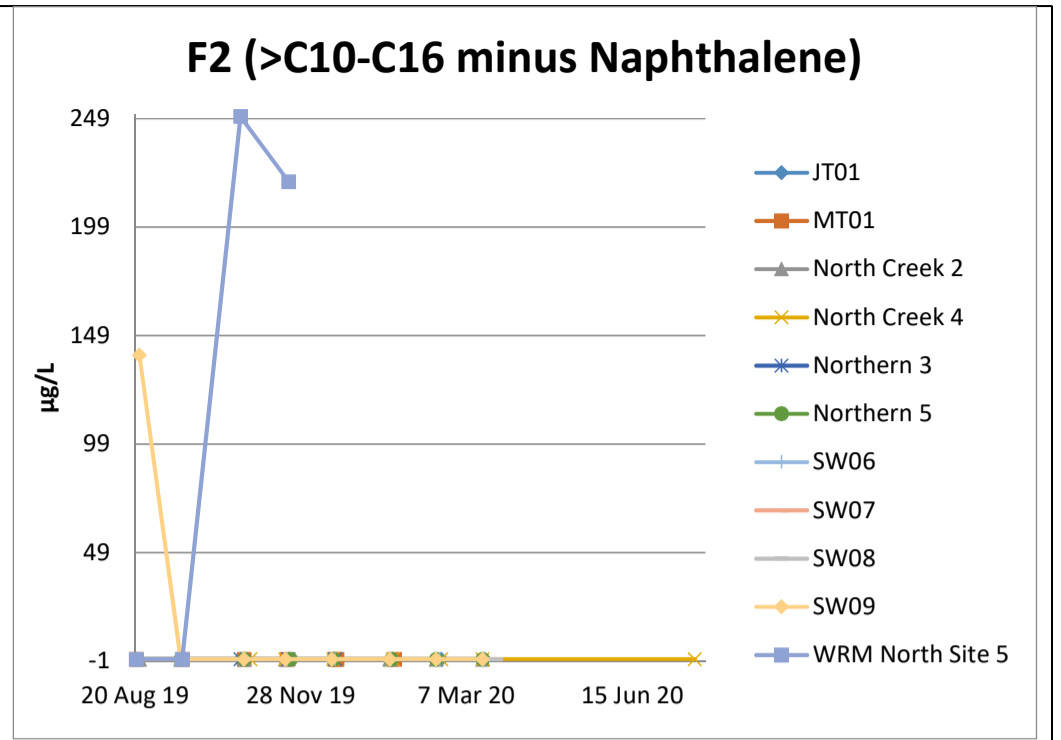
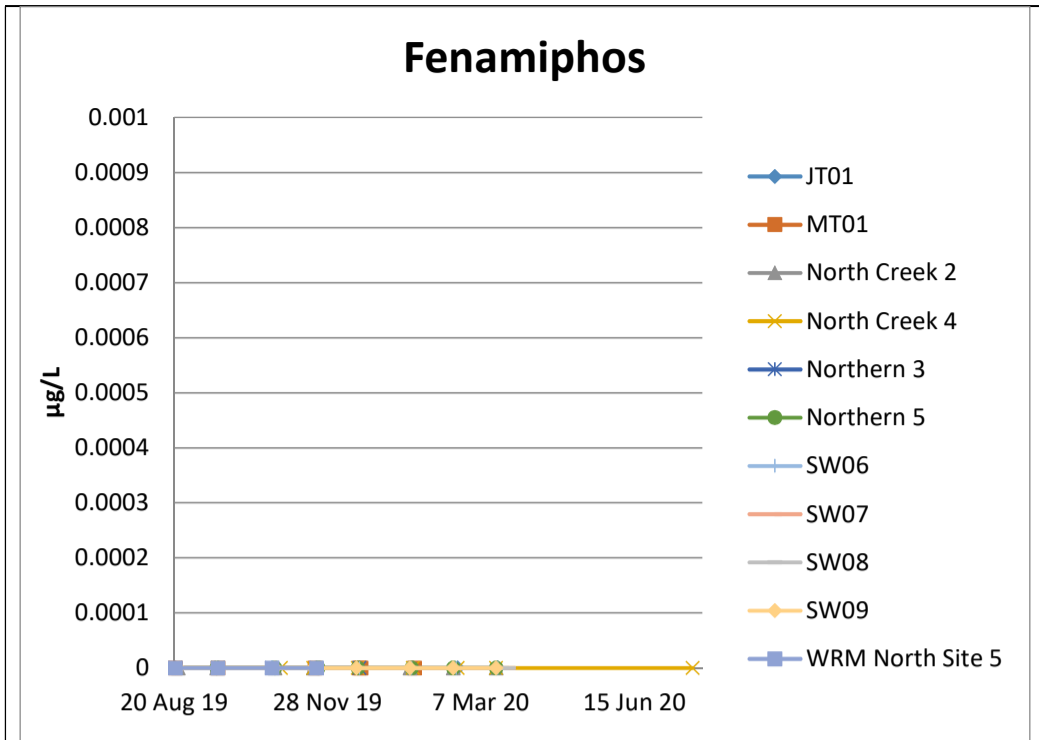
Lead

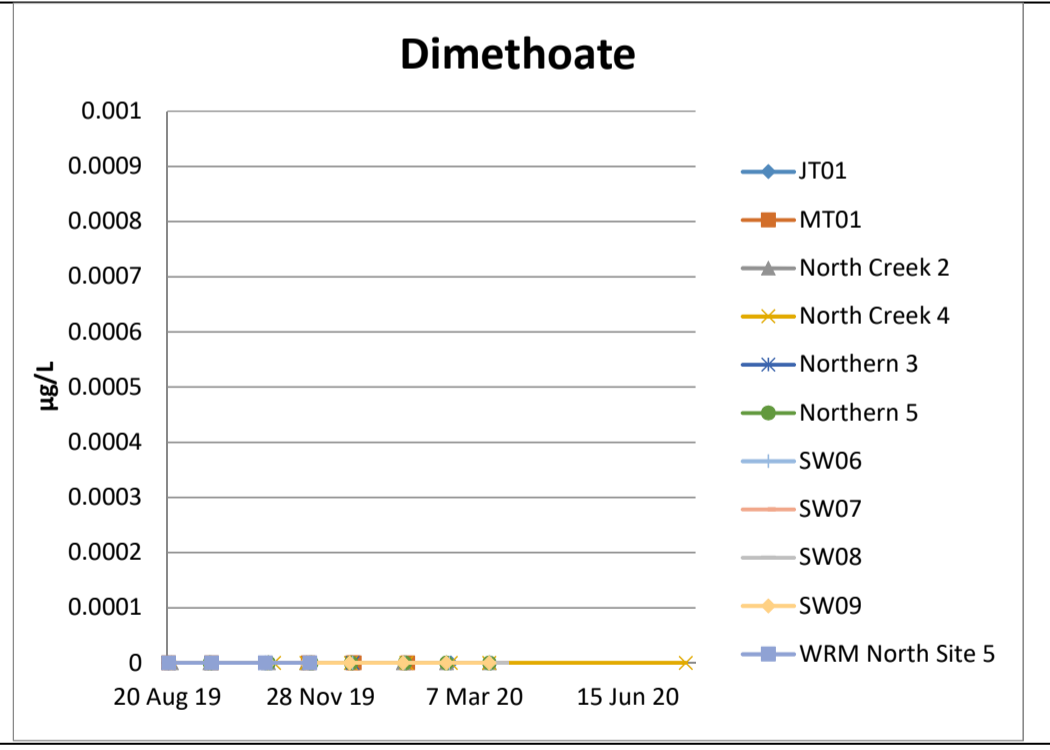
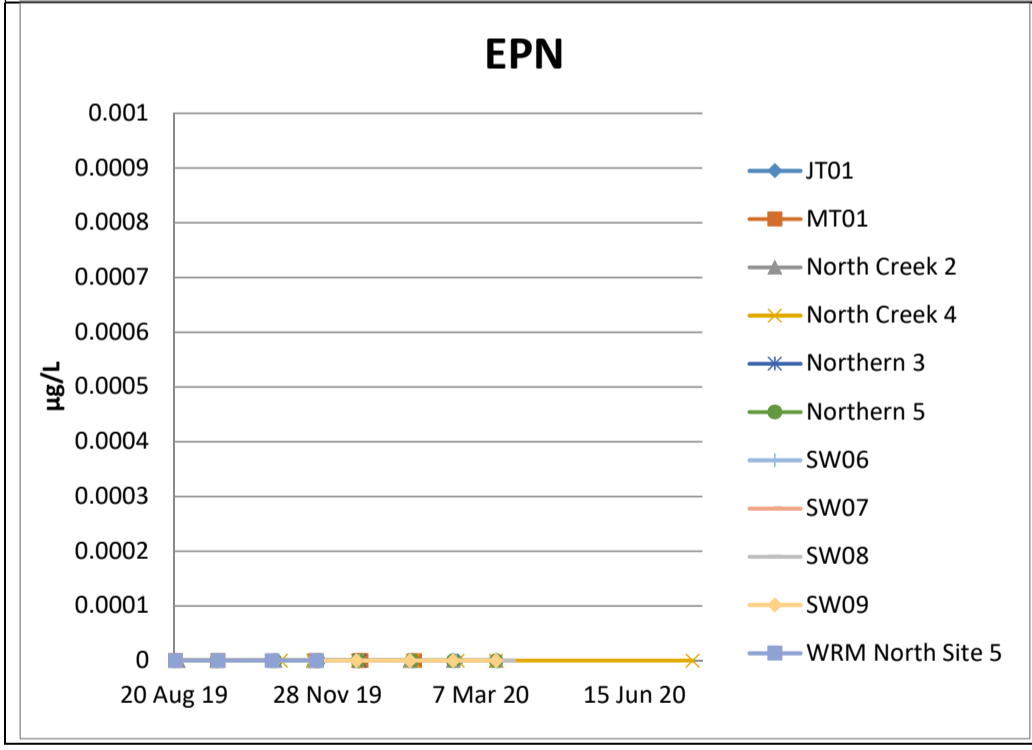
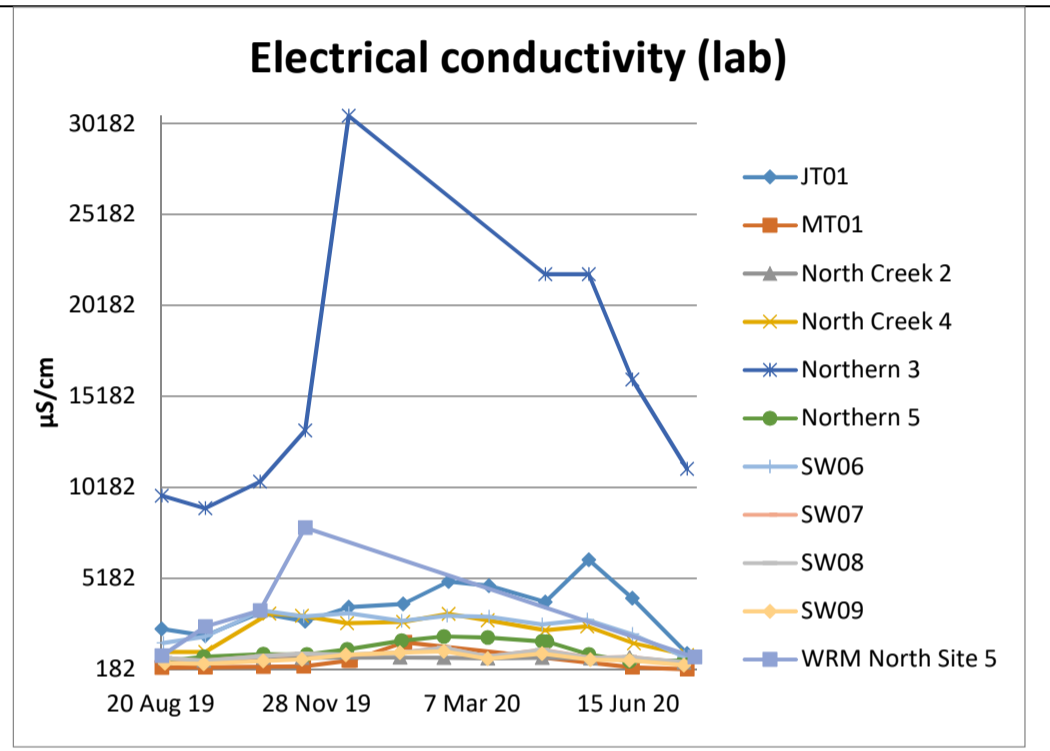
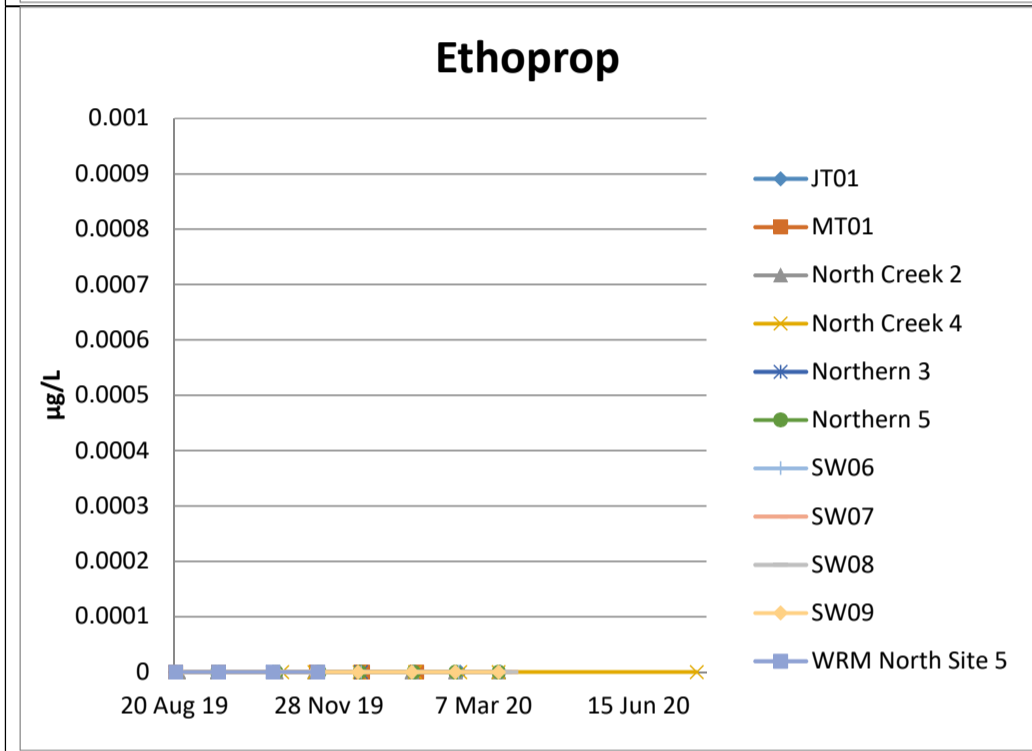
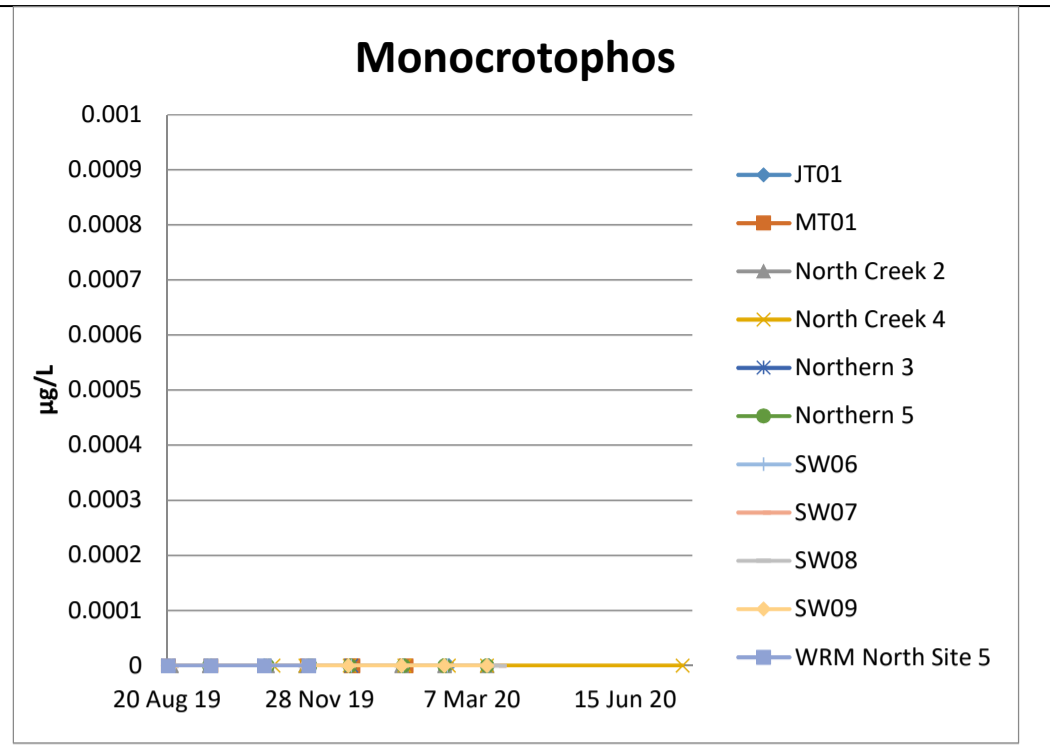
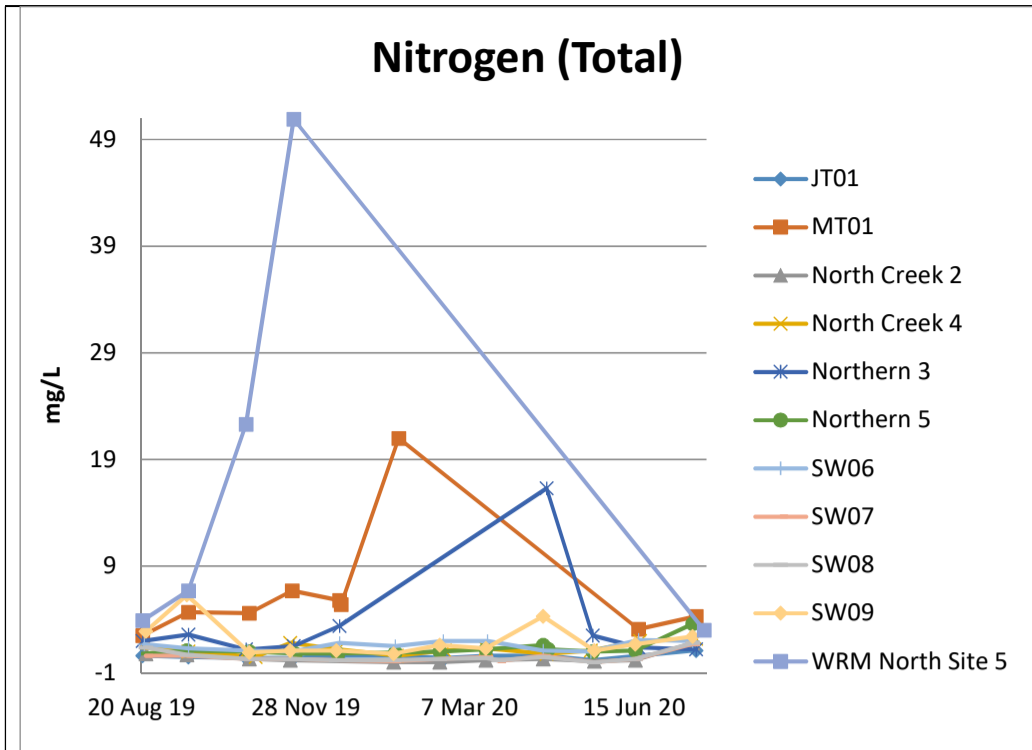


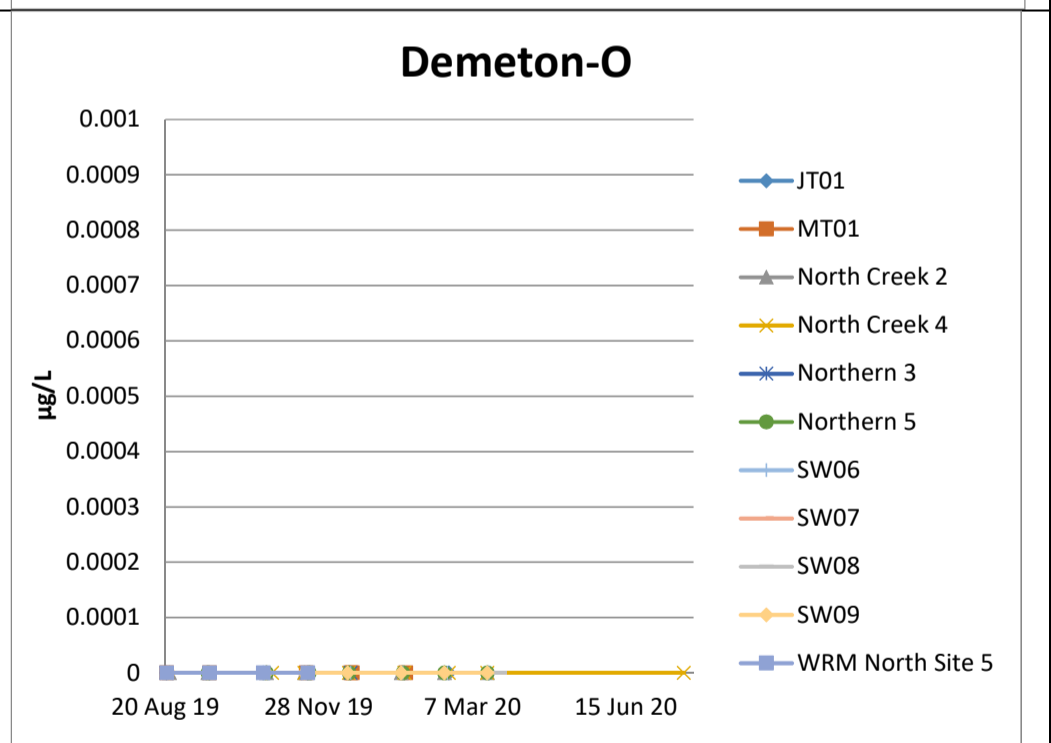
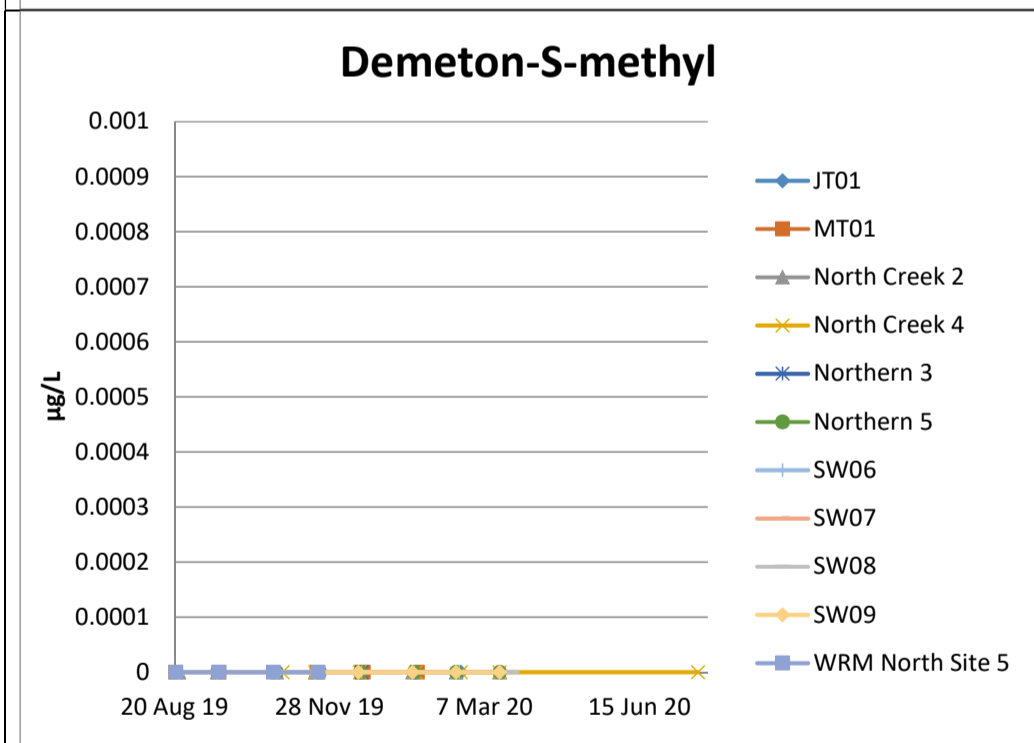
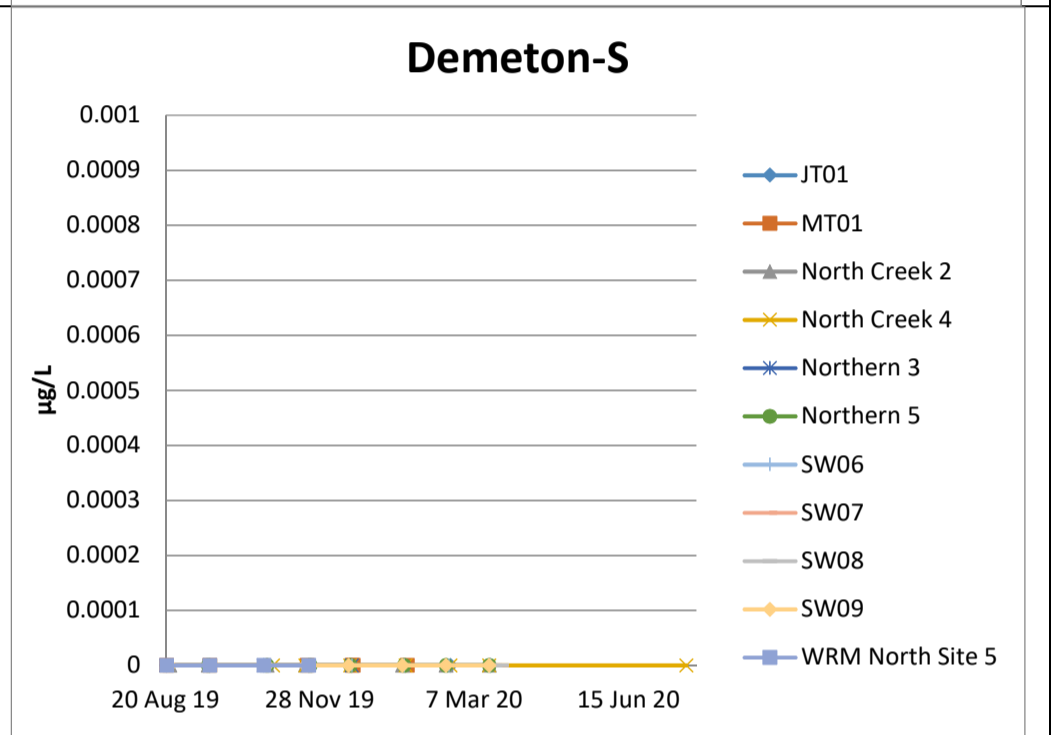
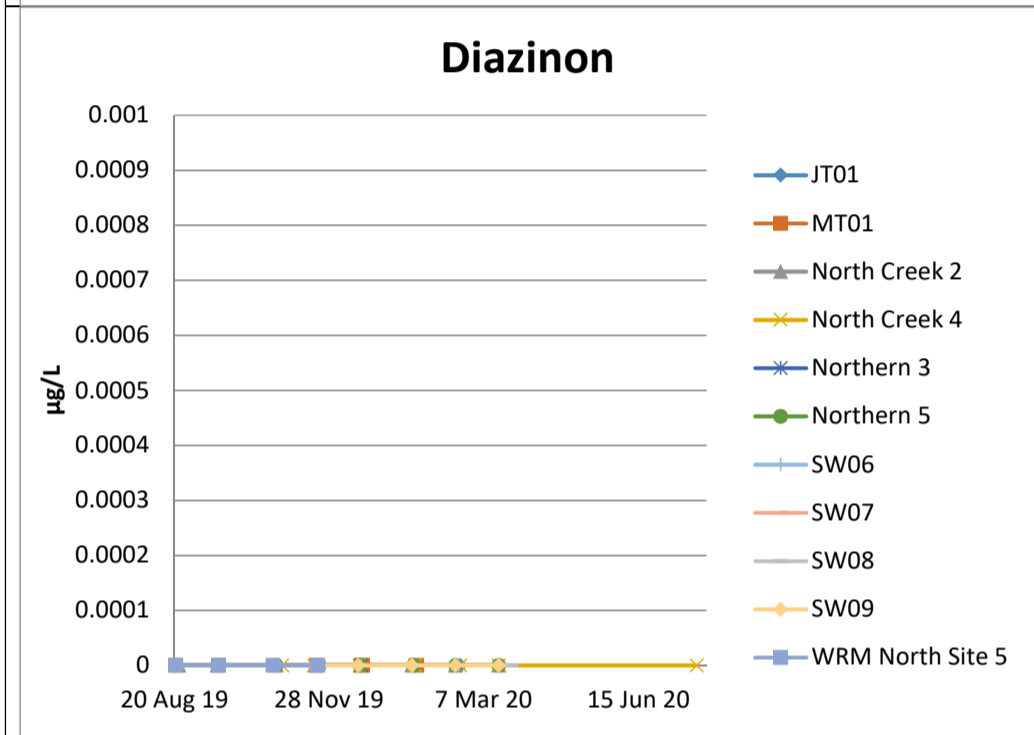
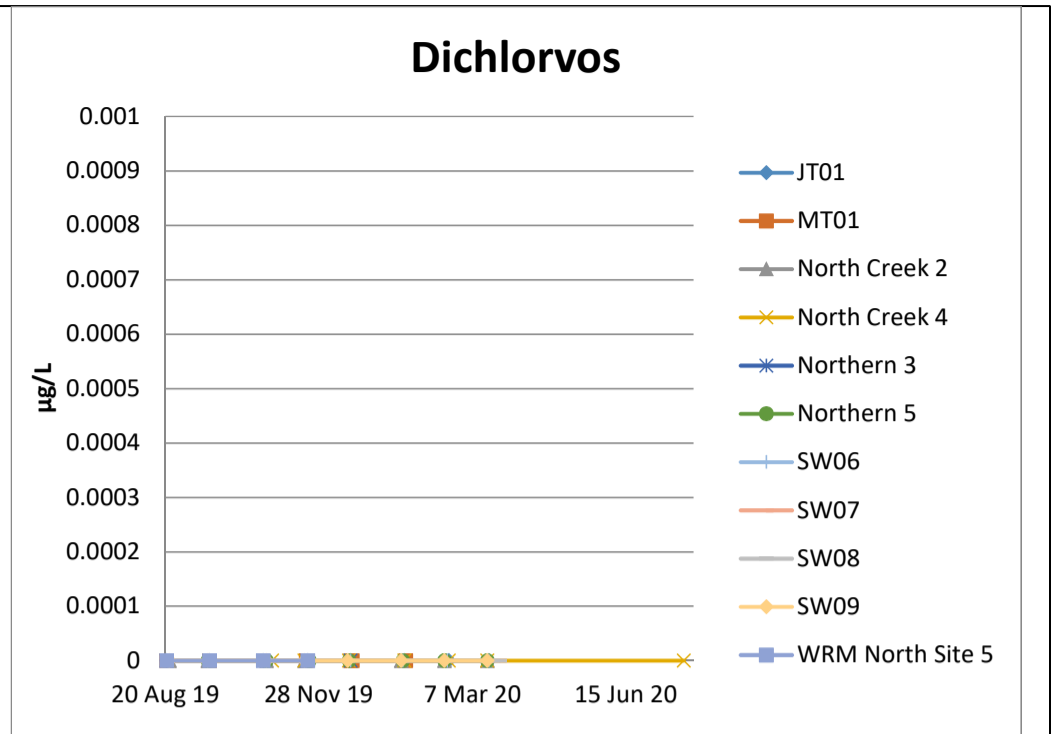
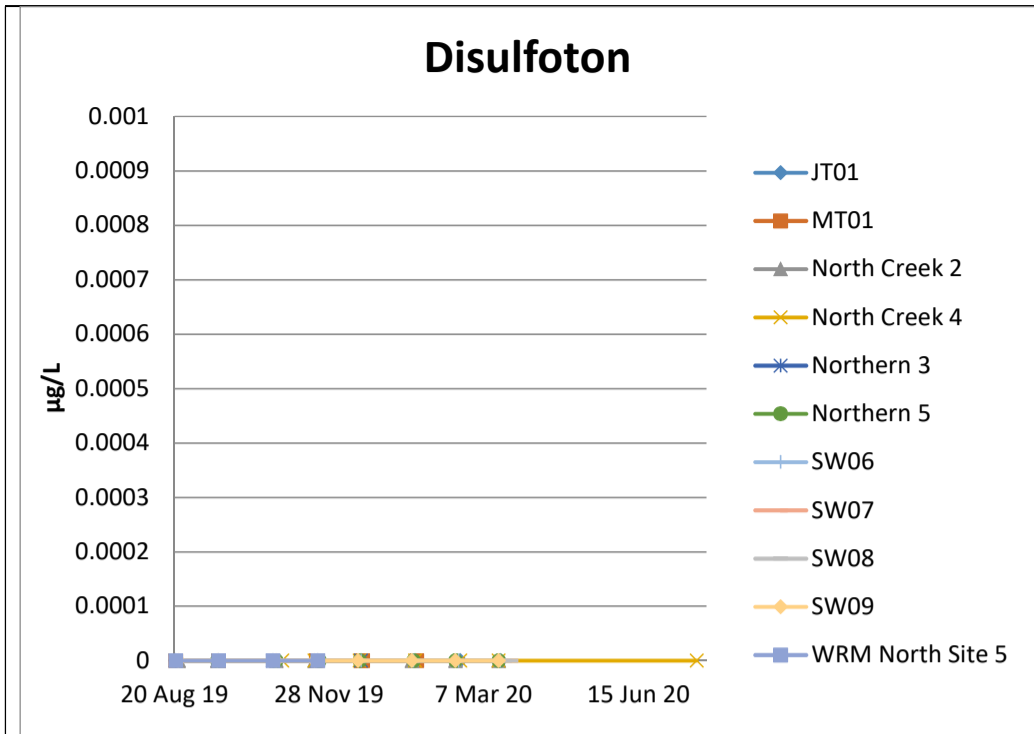
Ionic Balance

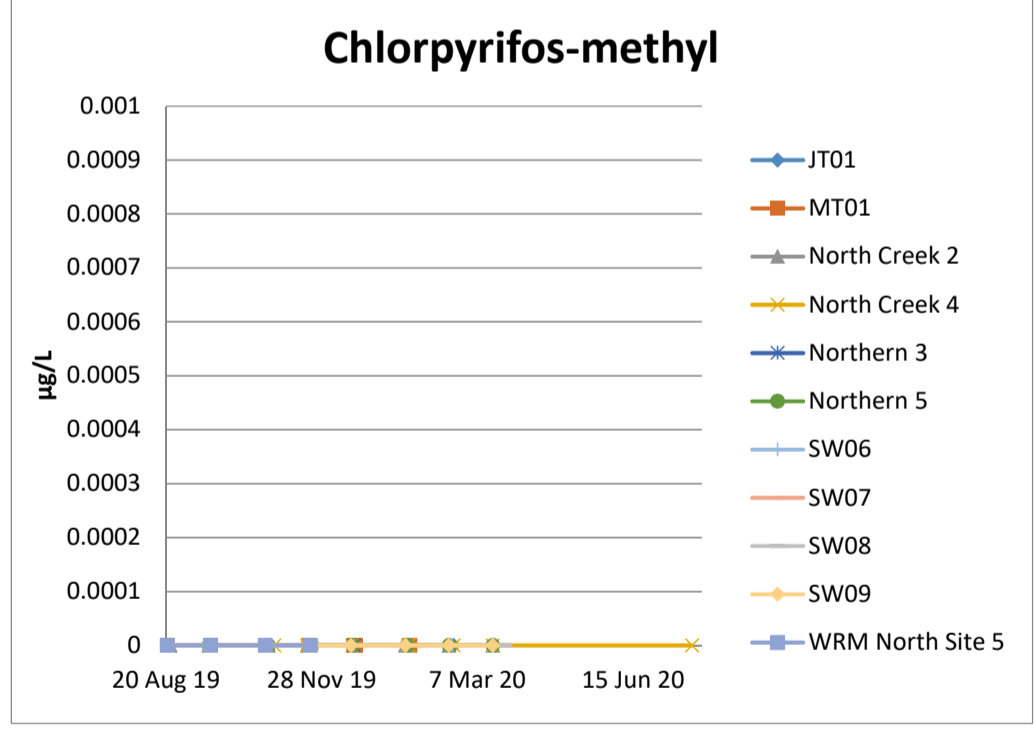
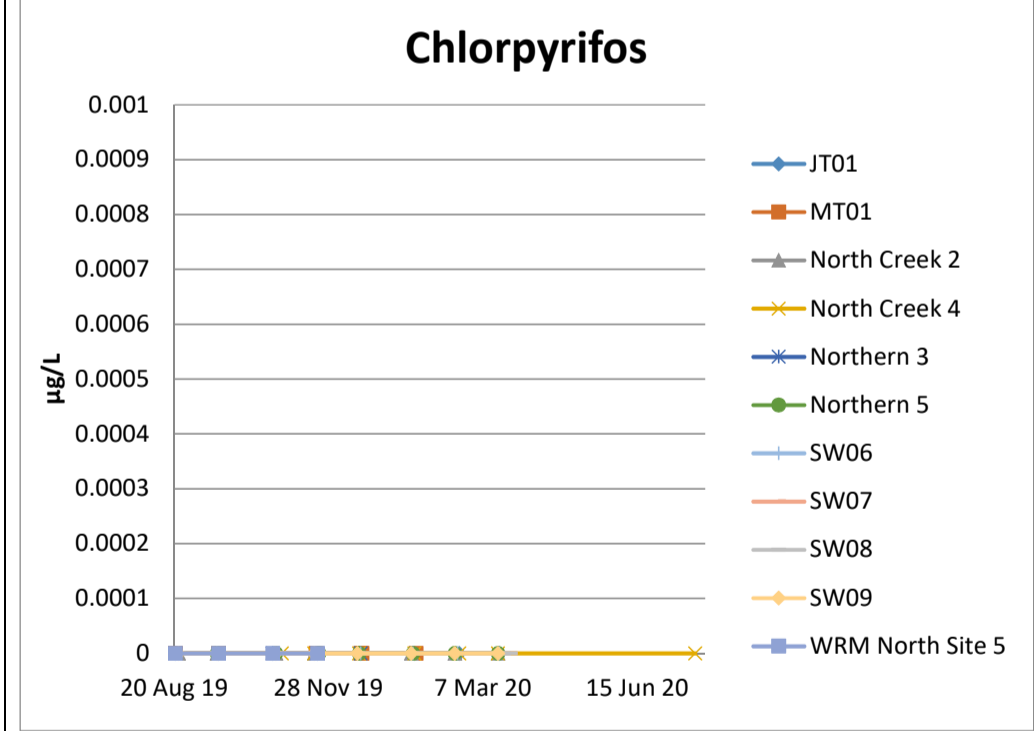
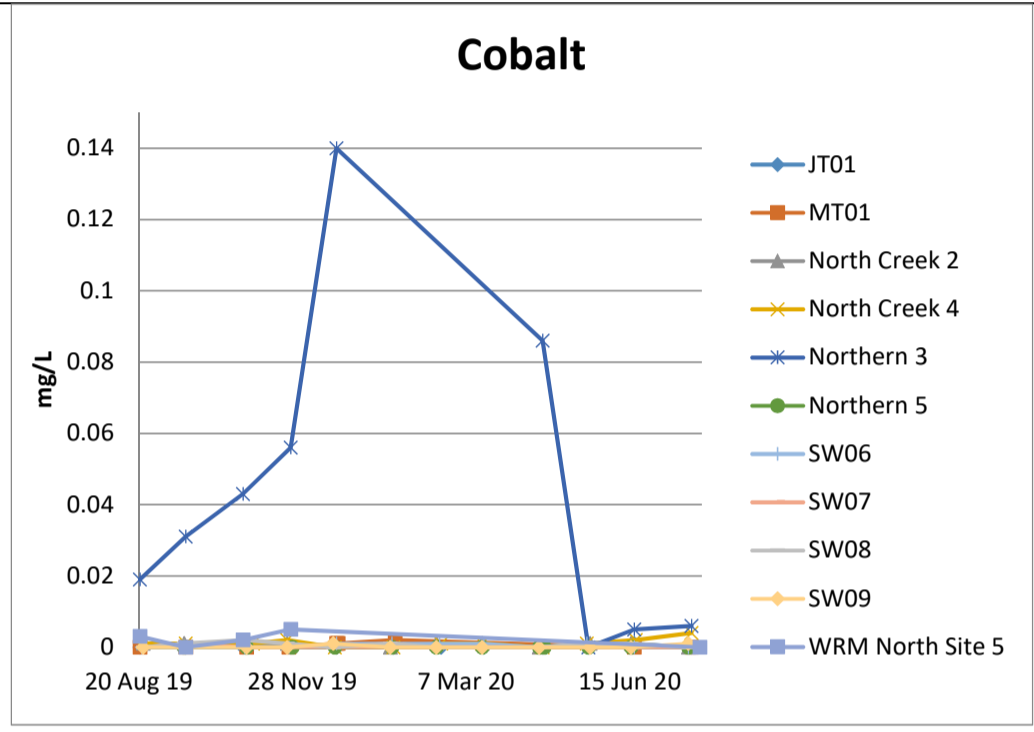
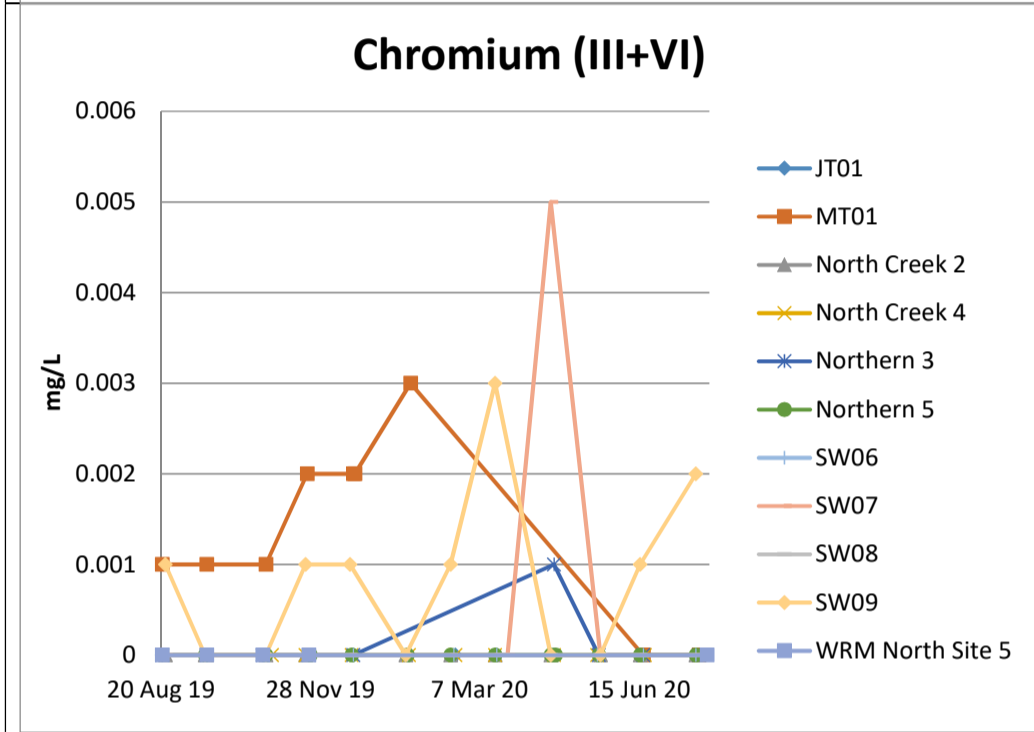
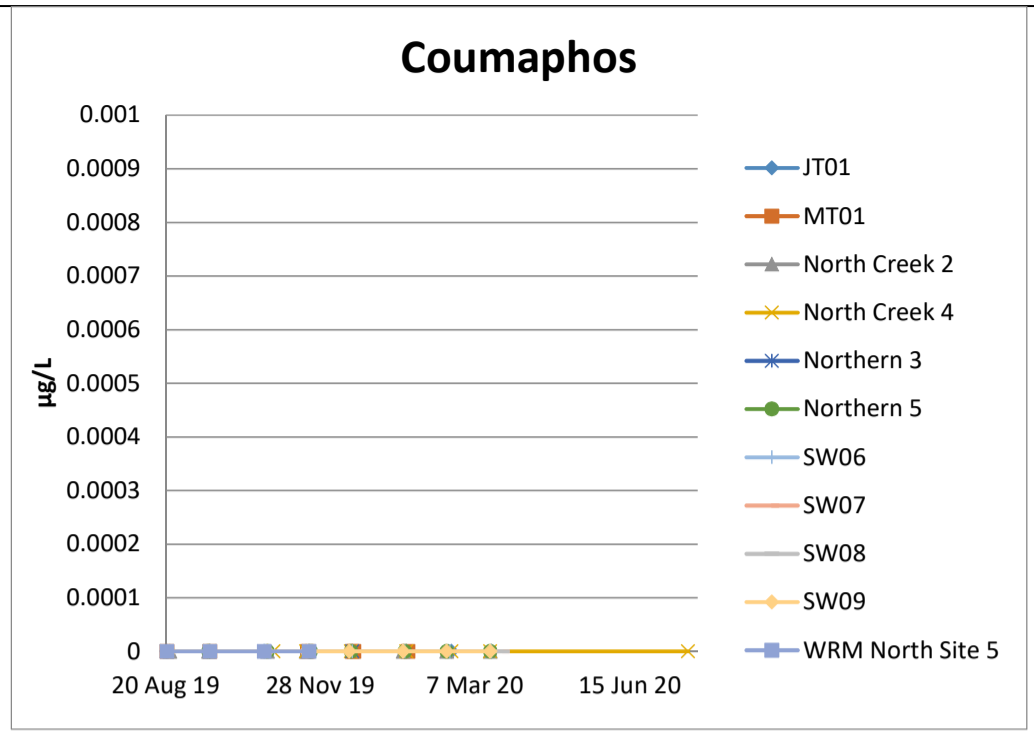
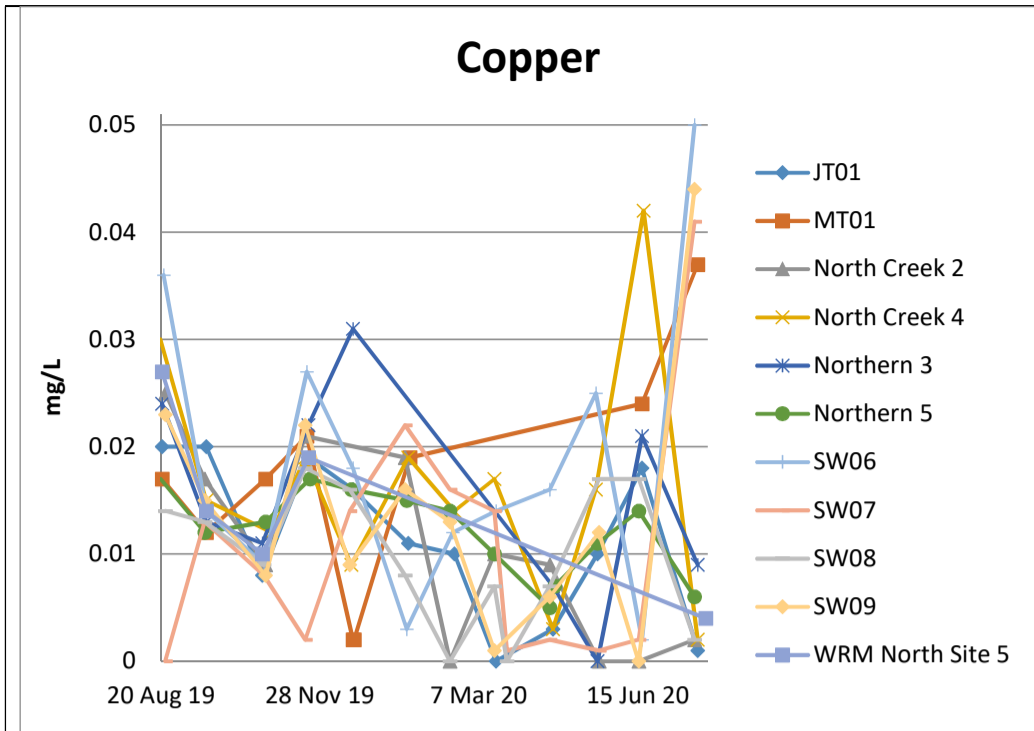


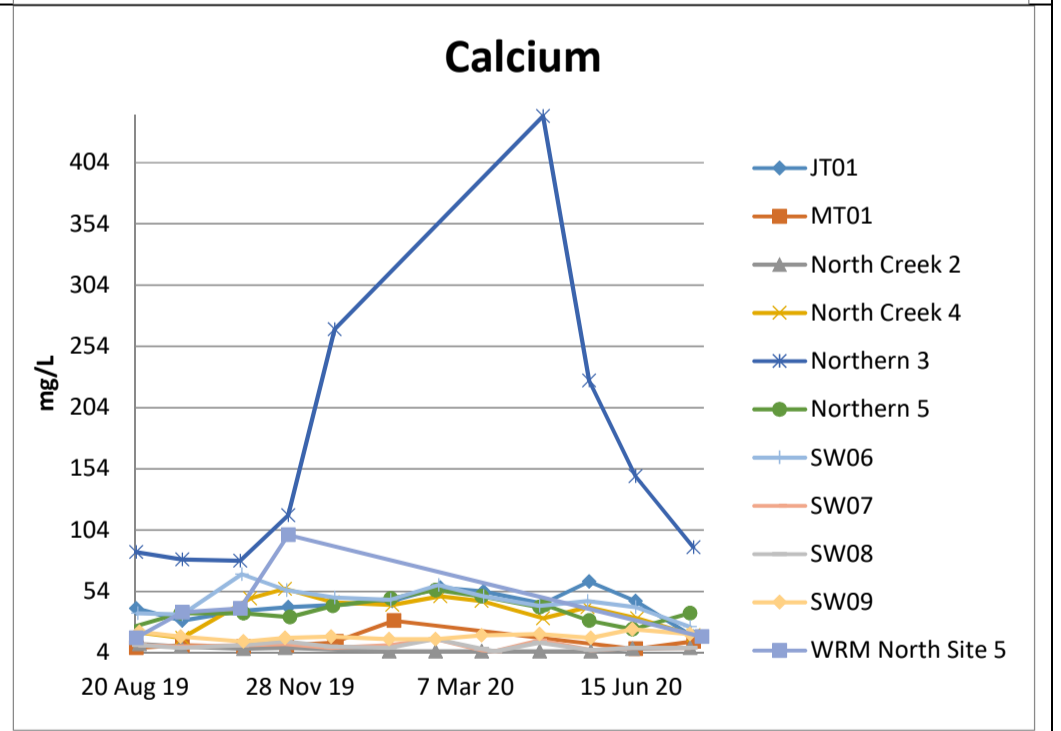
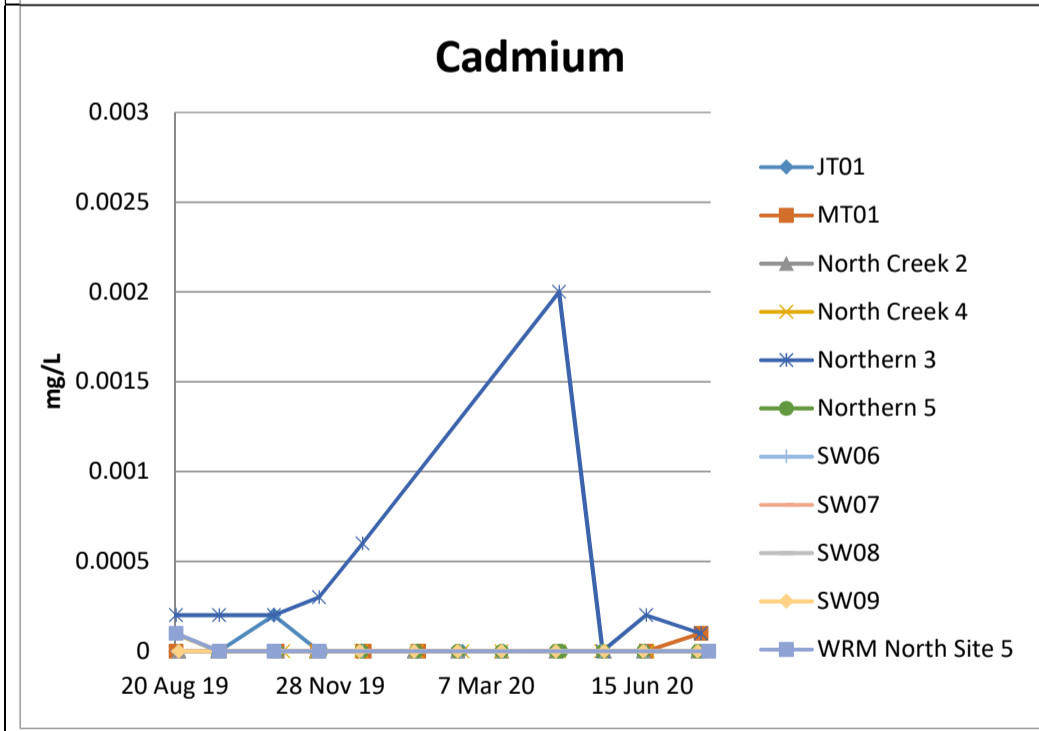
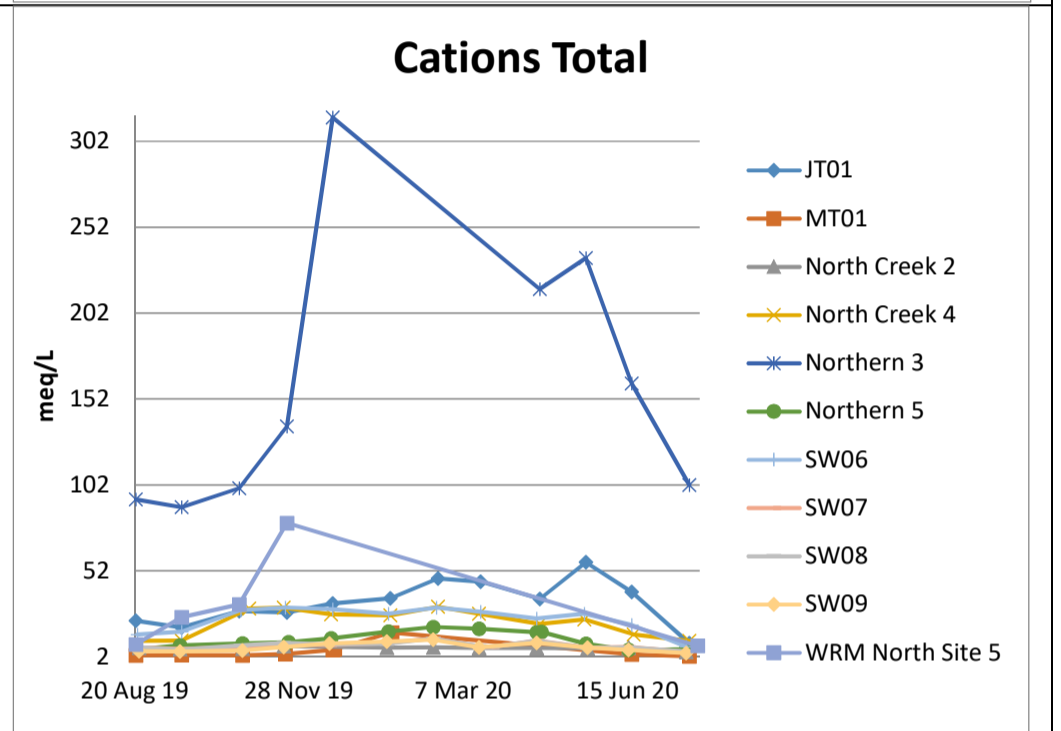
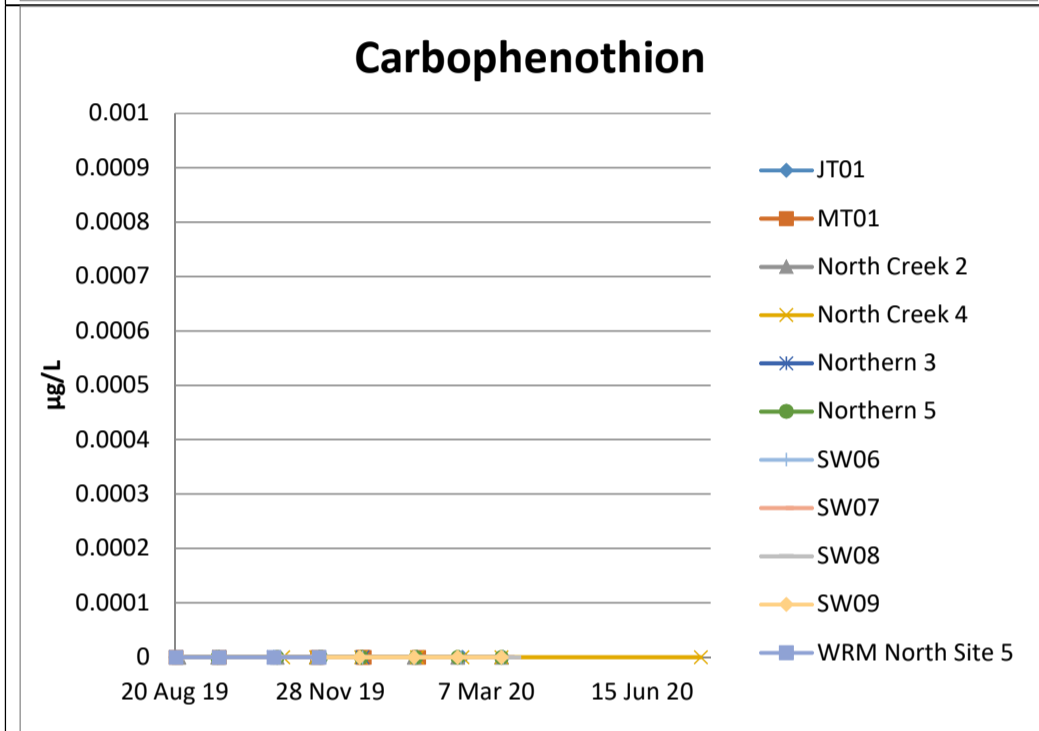
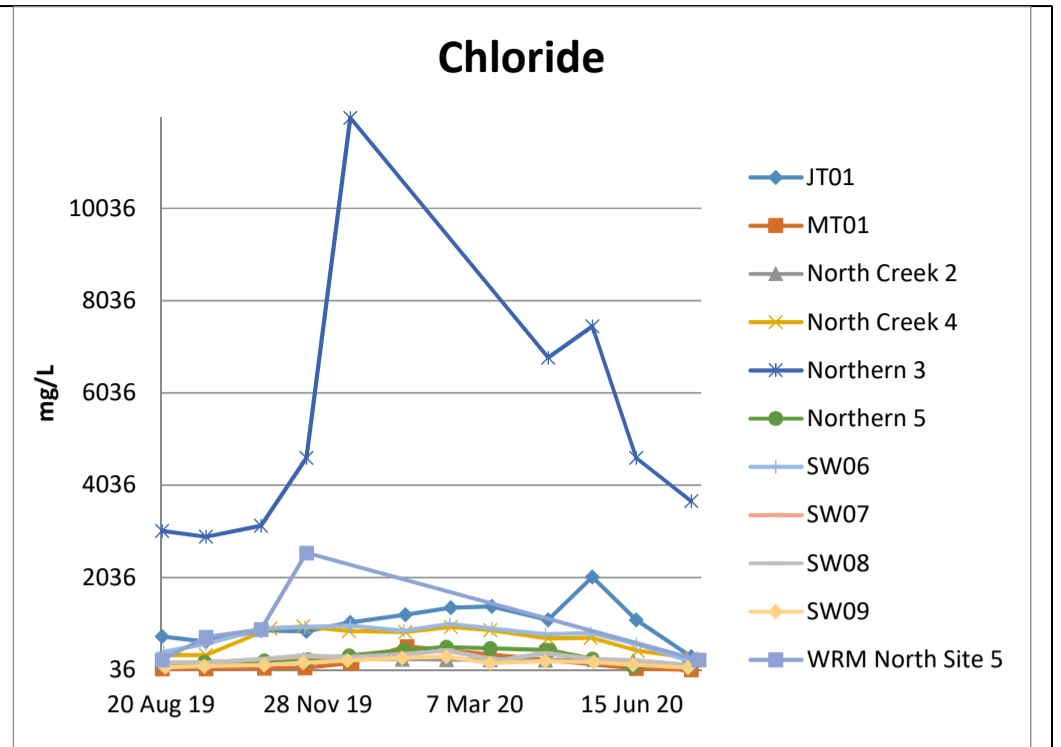
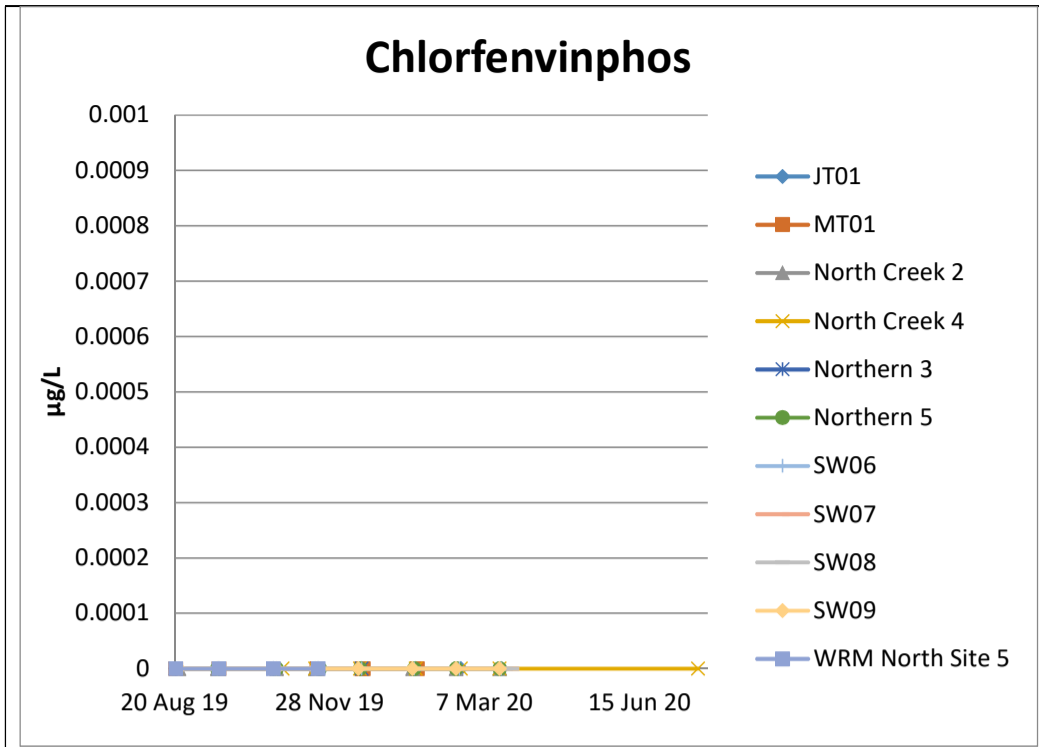


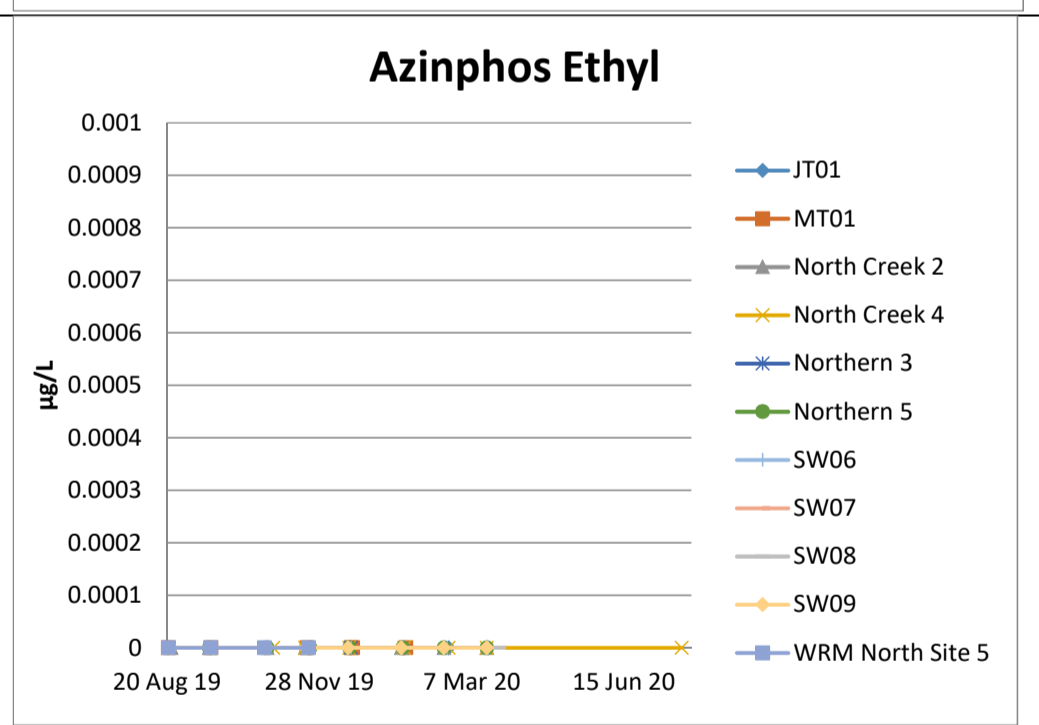
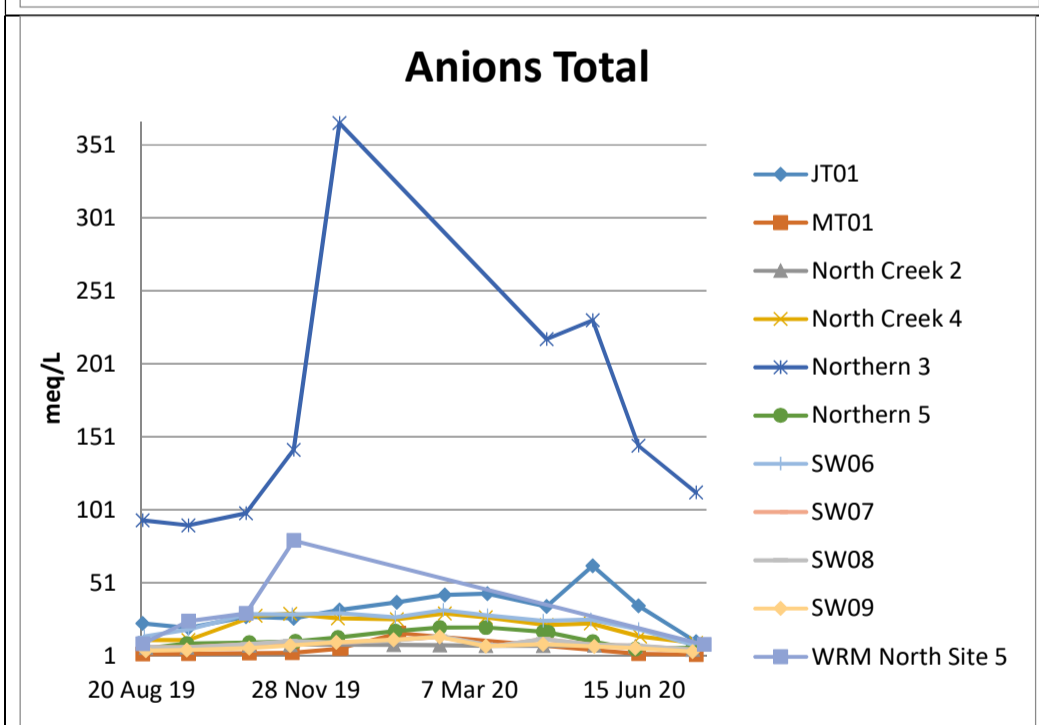
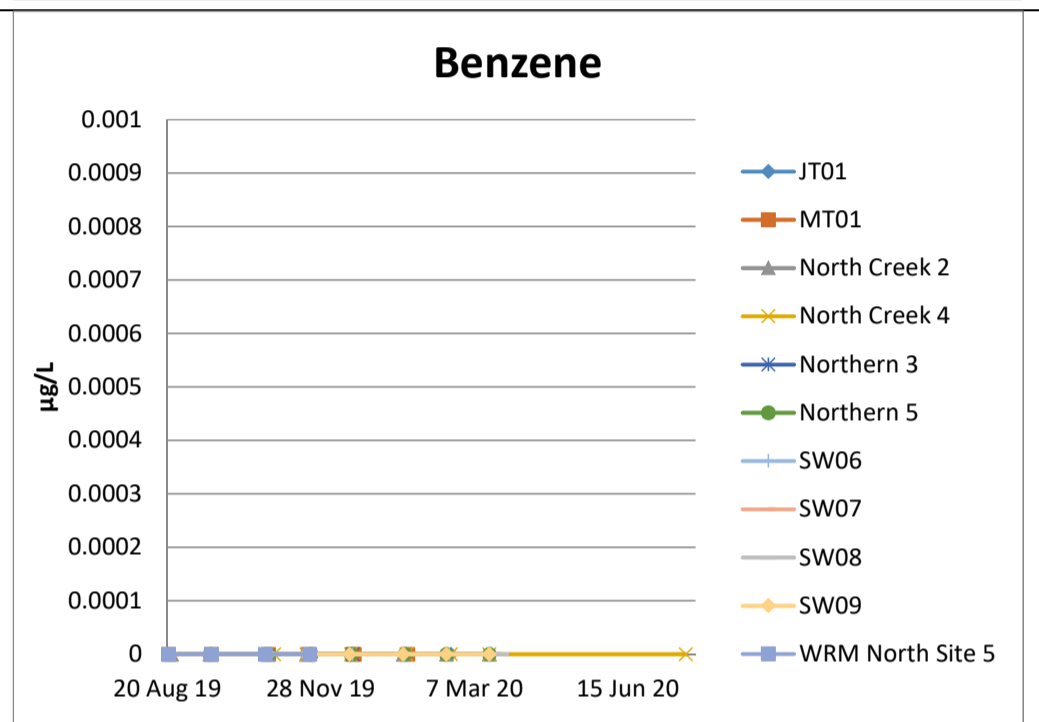
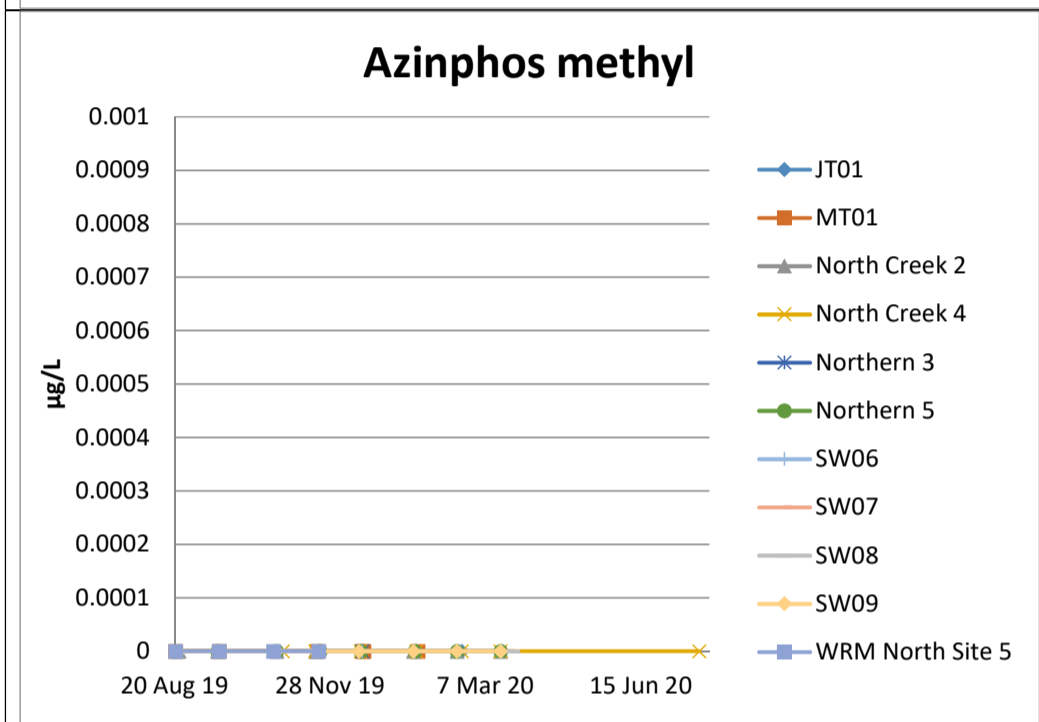
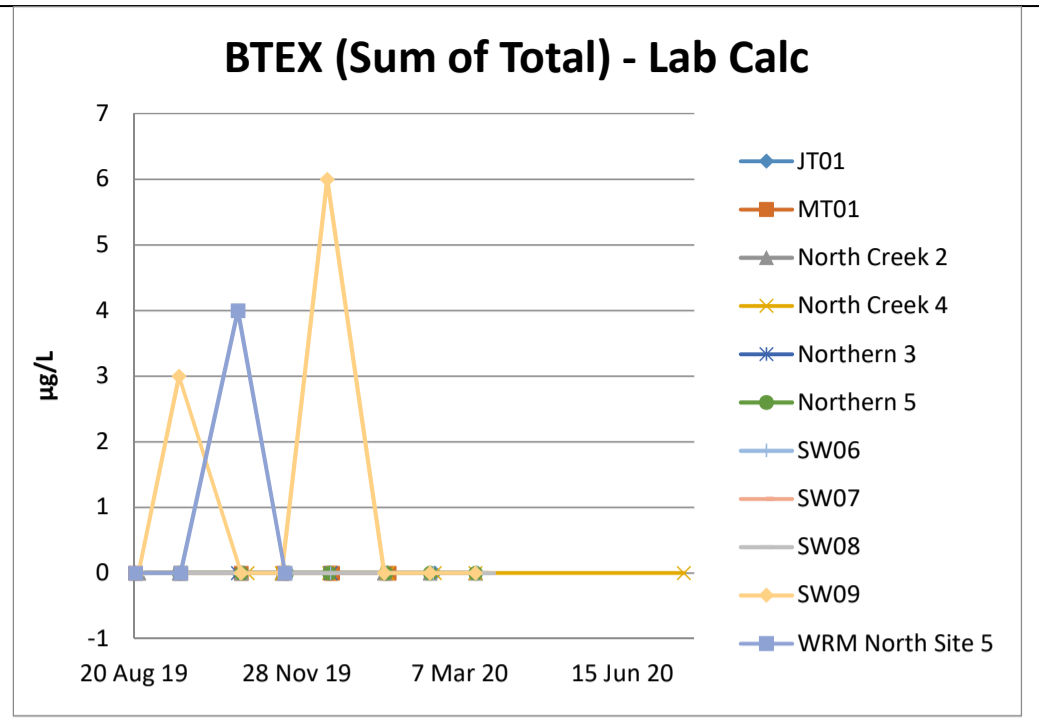
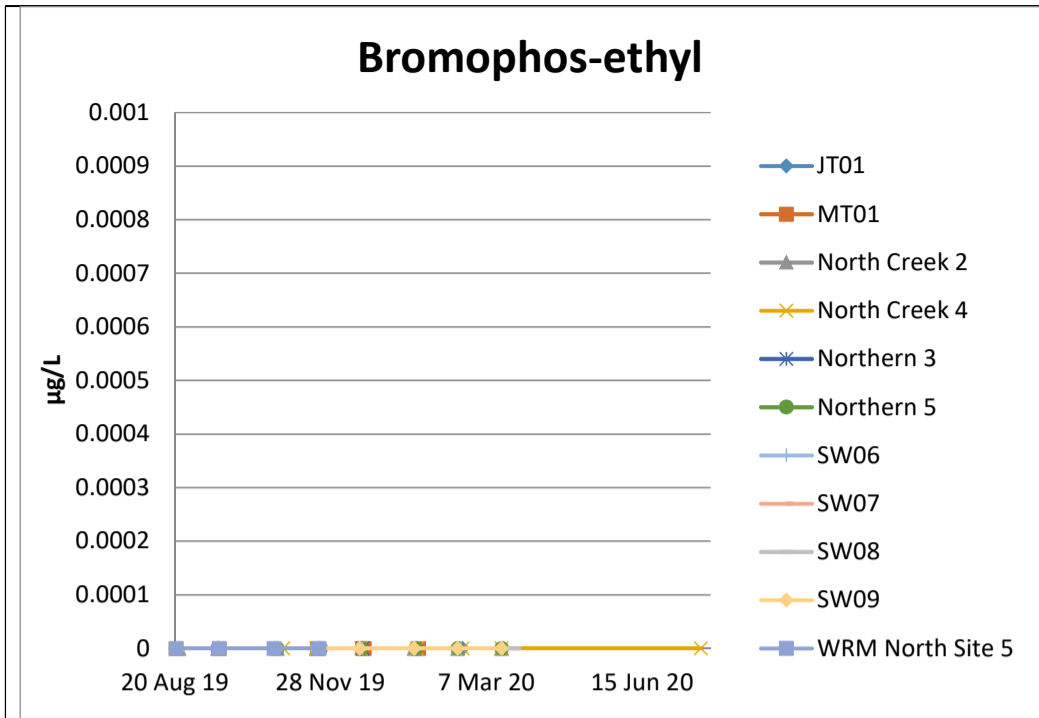


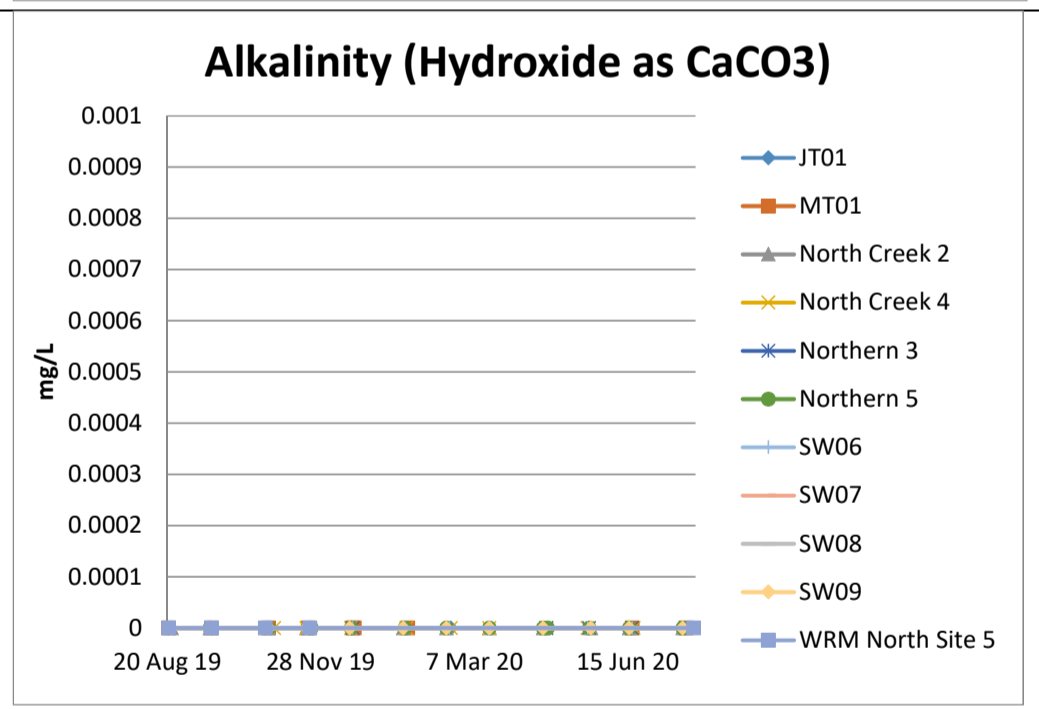
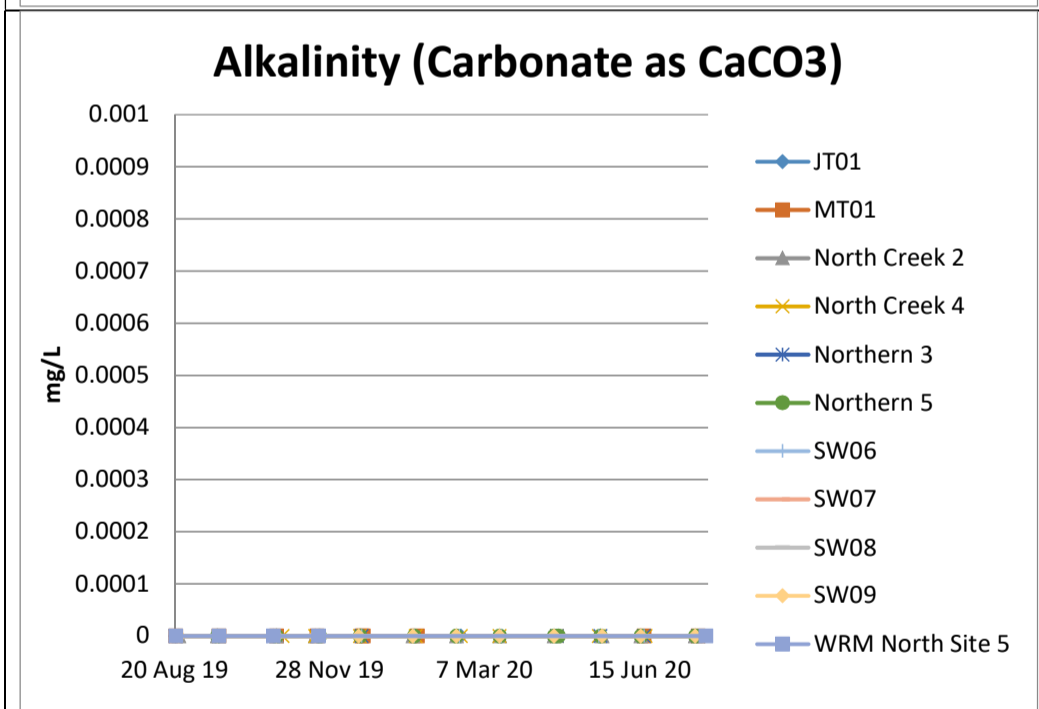
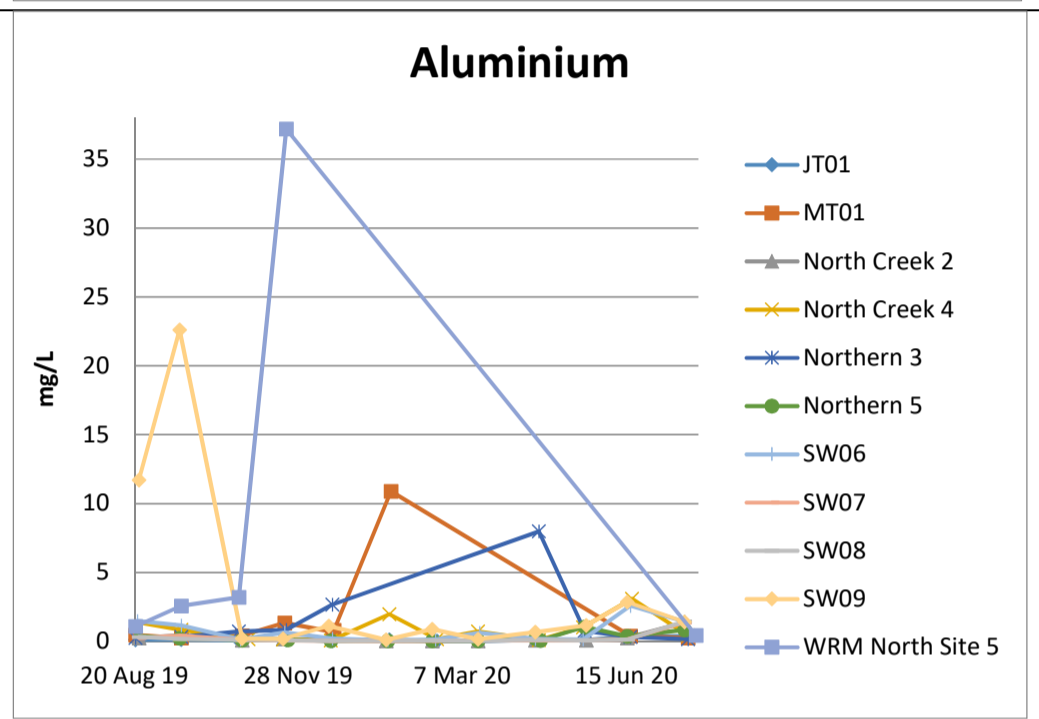
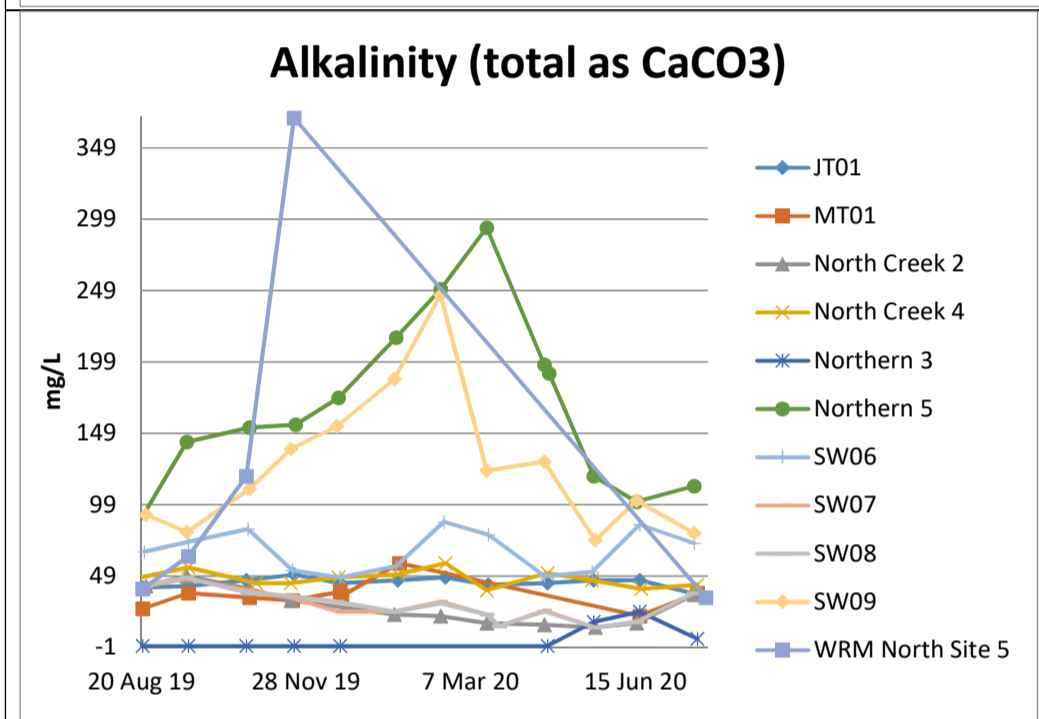
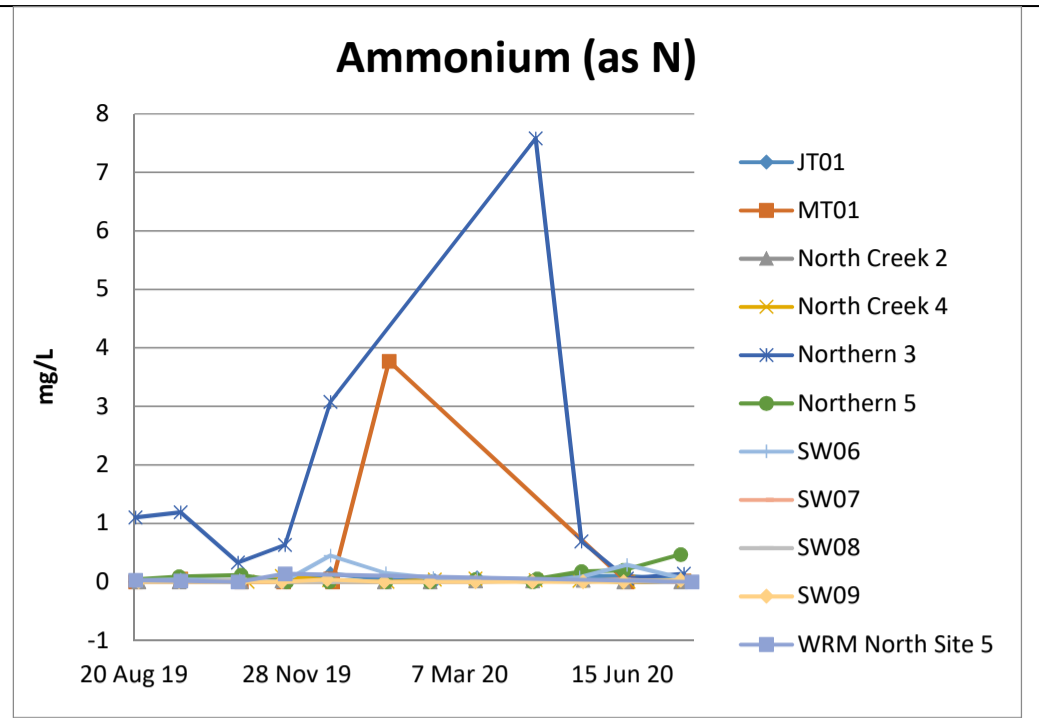
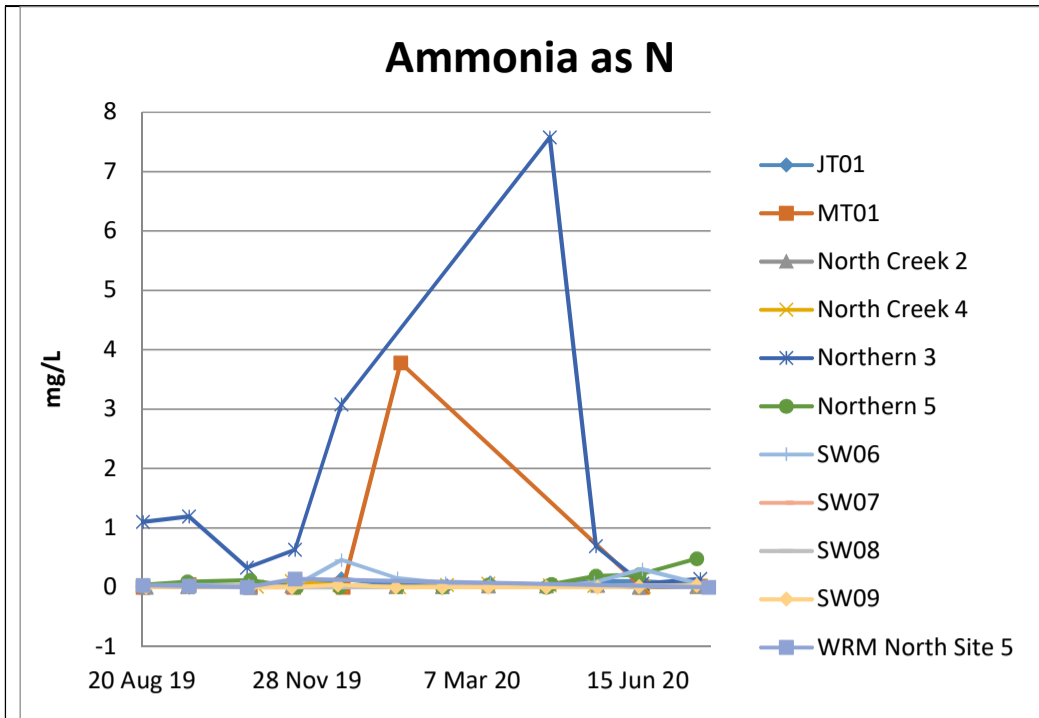




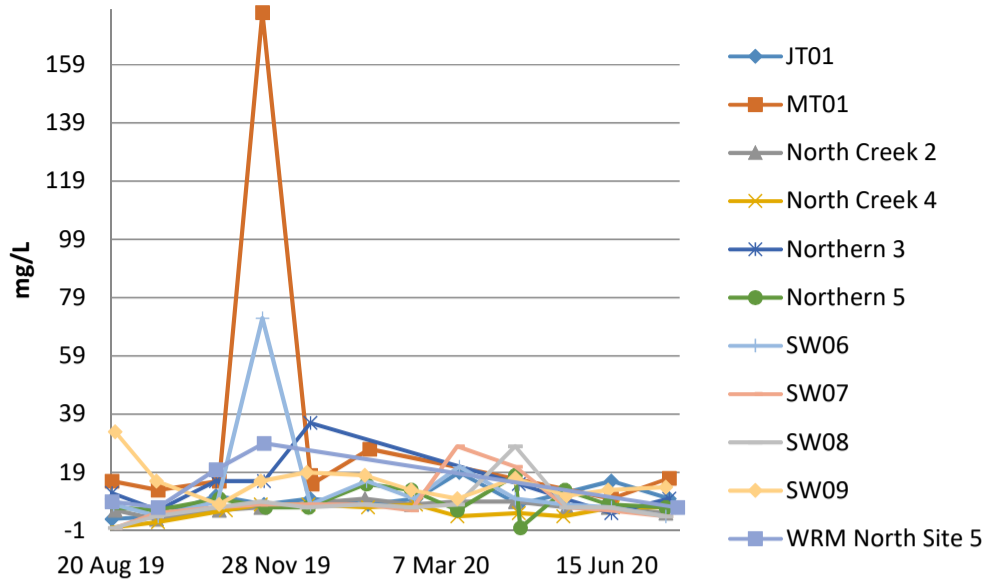




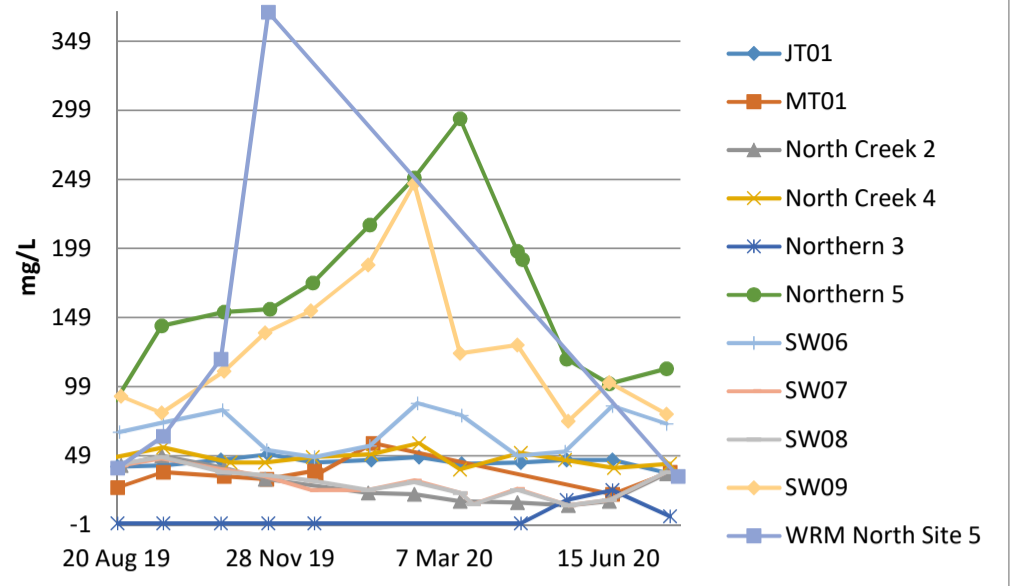




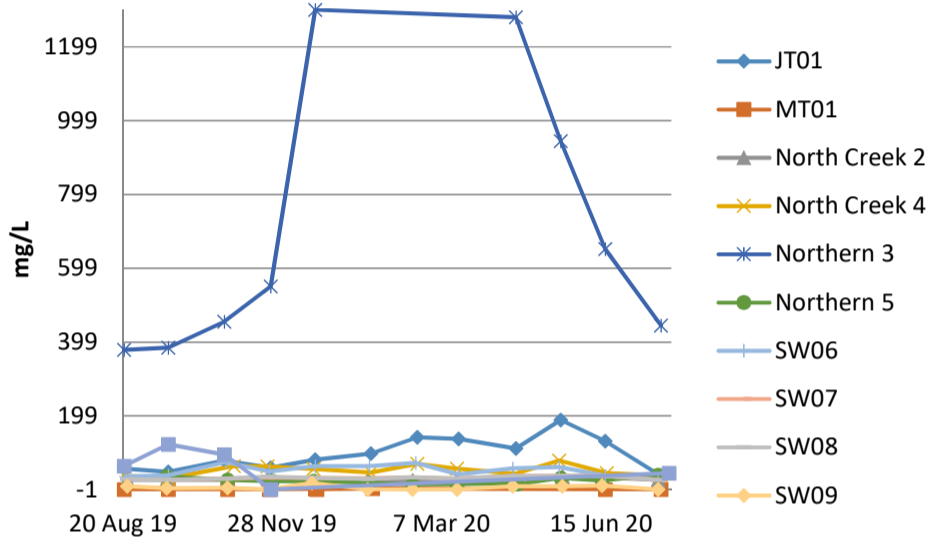
Acidity (as CaCO3)



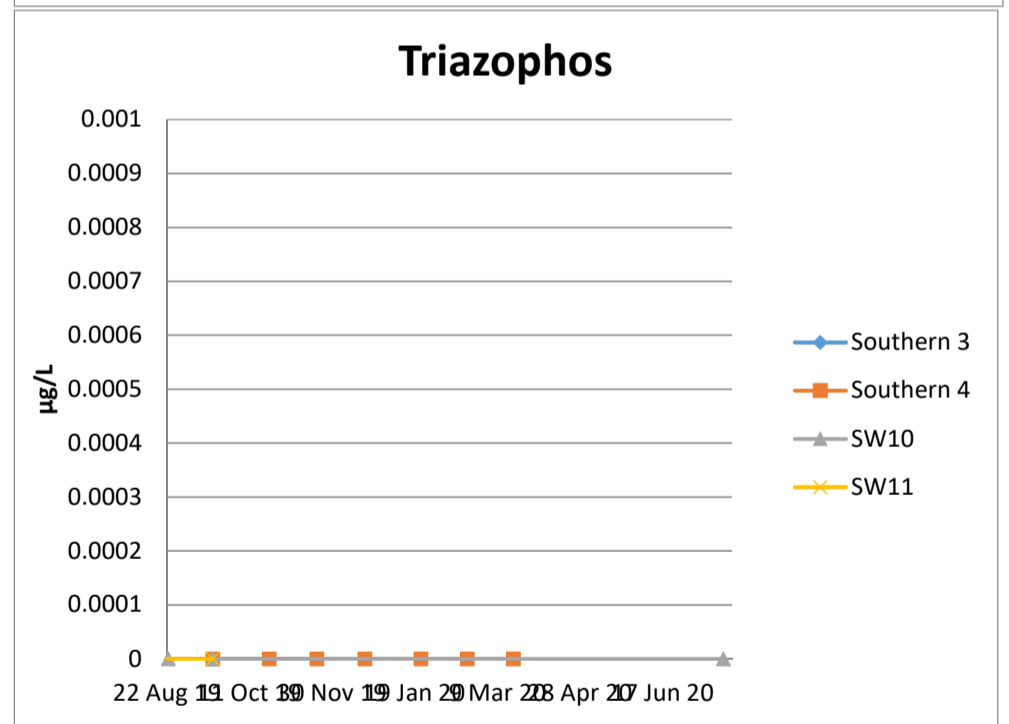
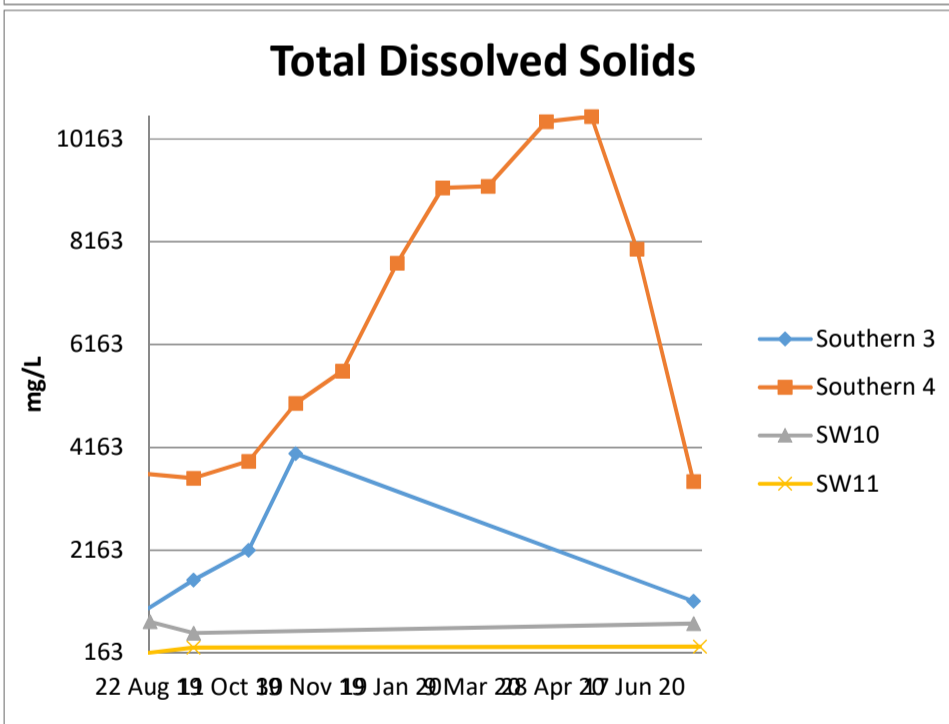
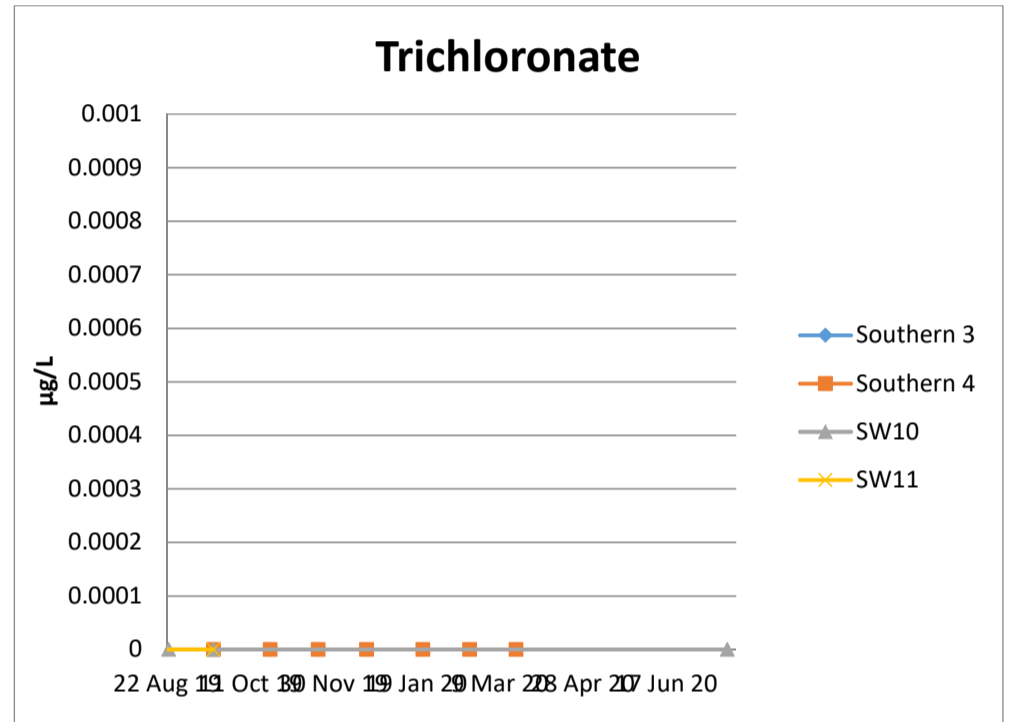
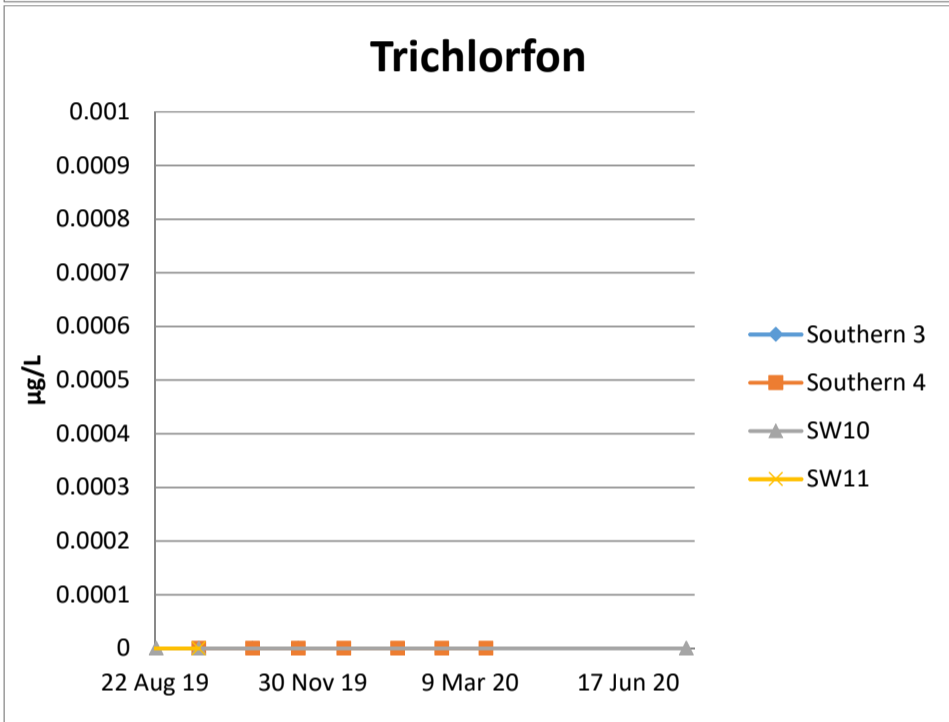
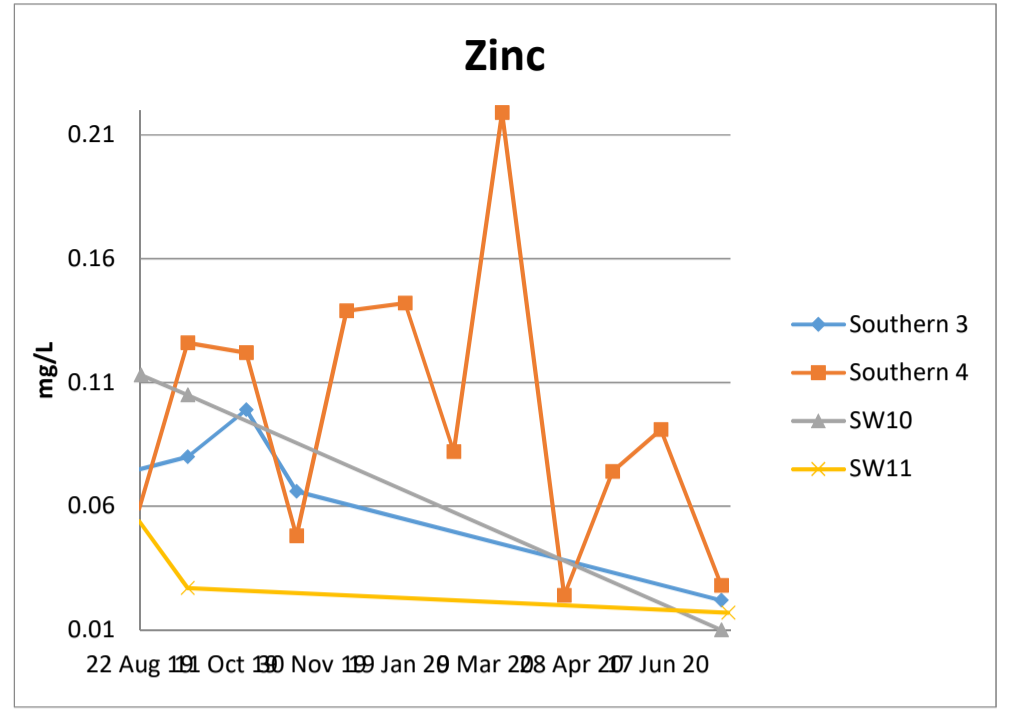
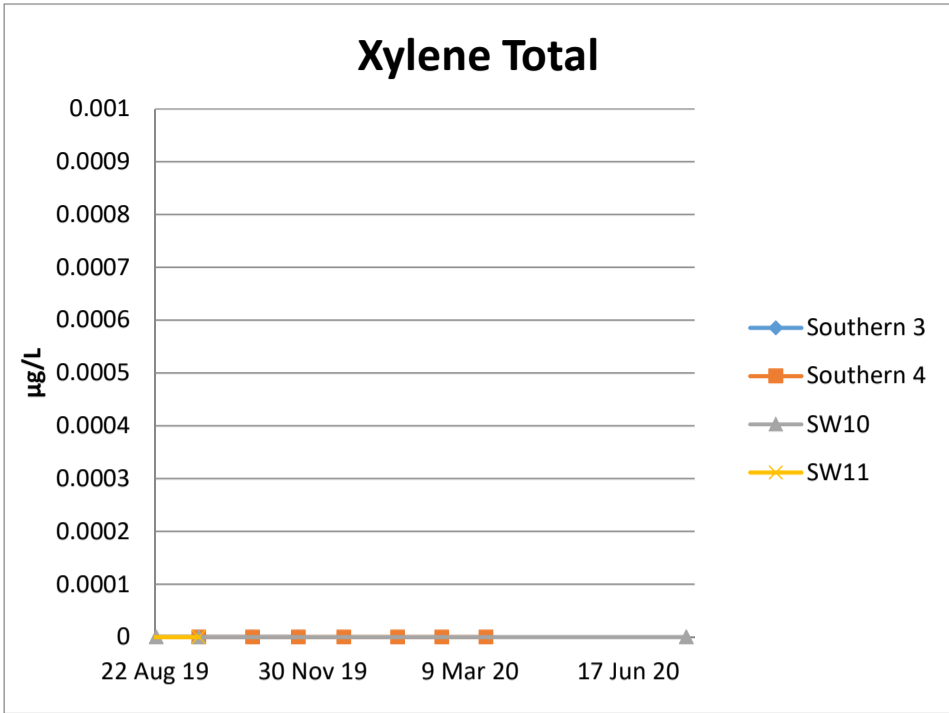
Alkalinity (Bicarbonate as CaCO3)

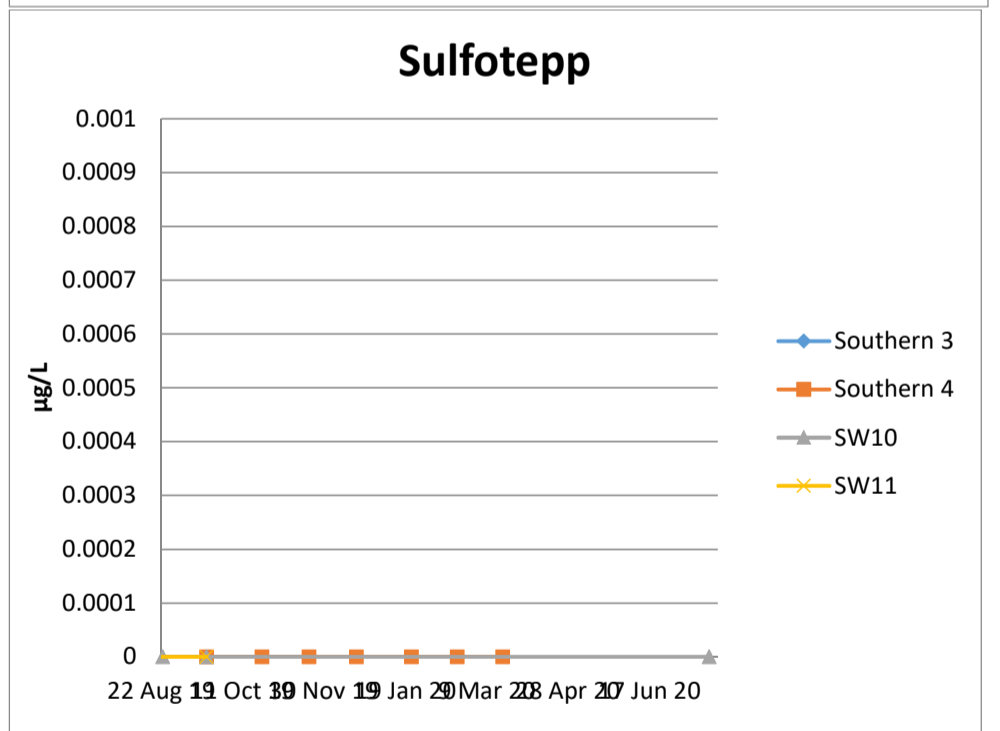
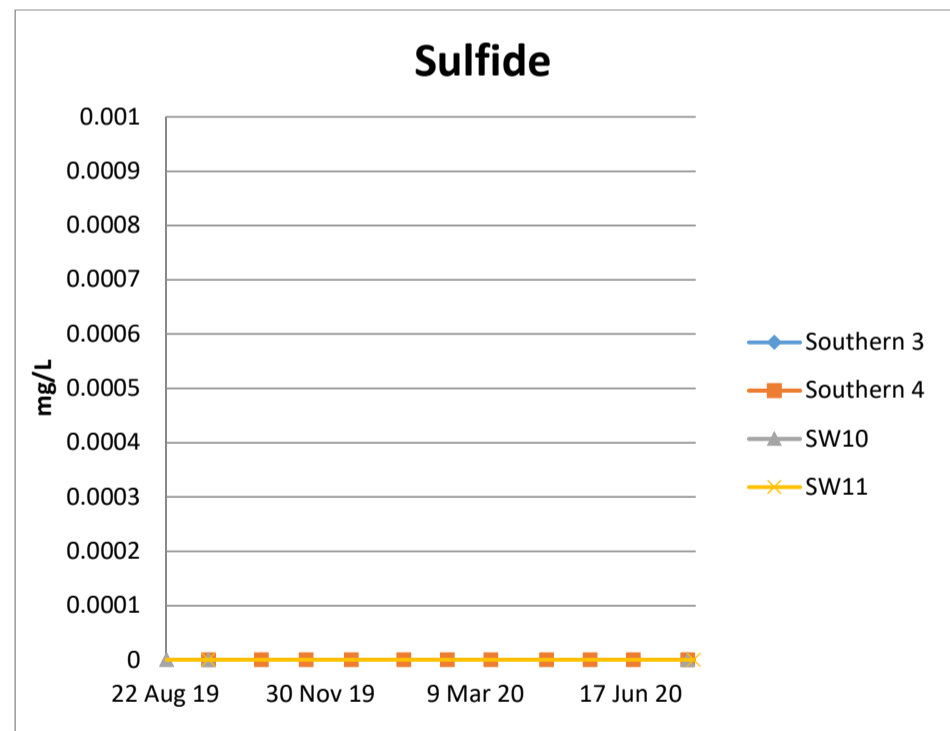
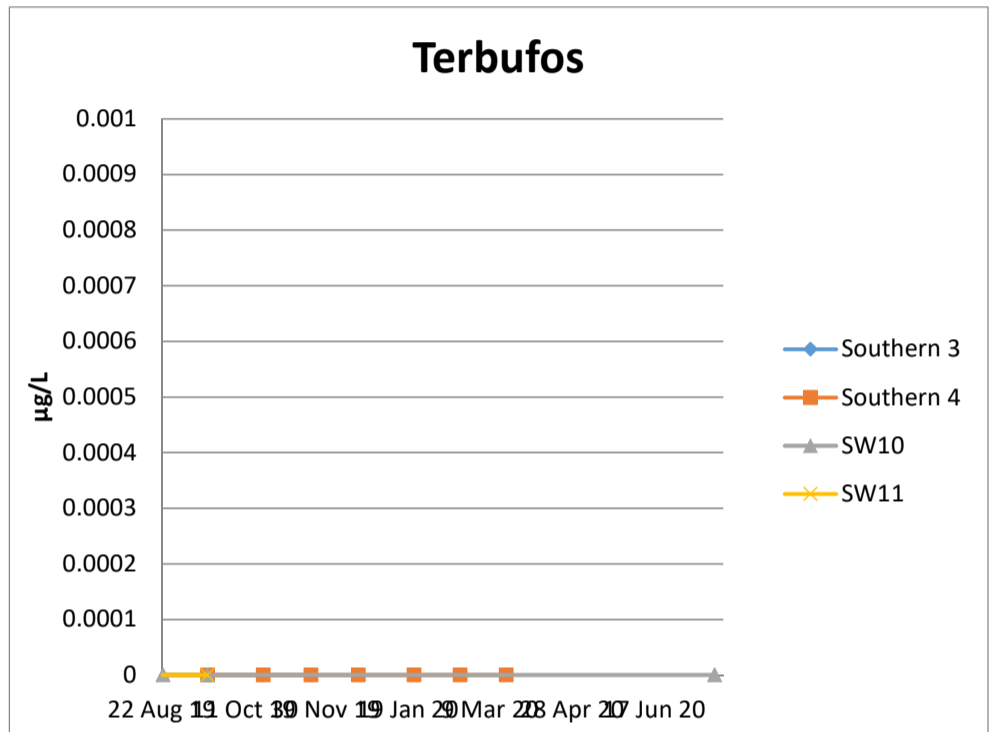
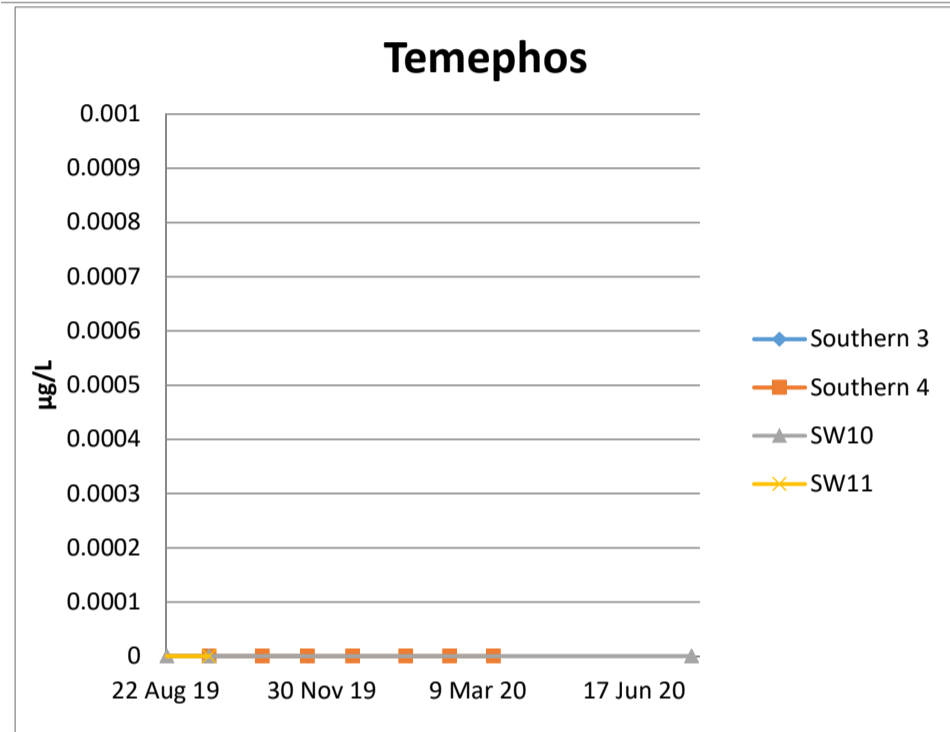
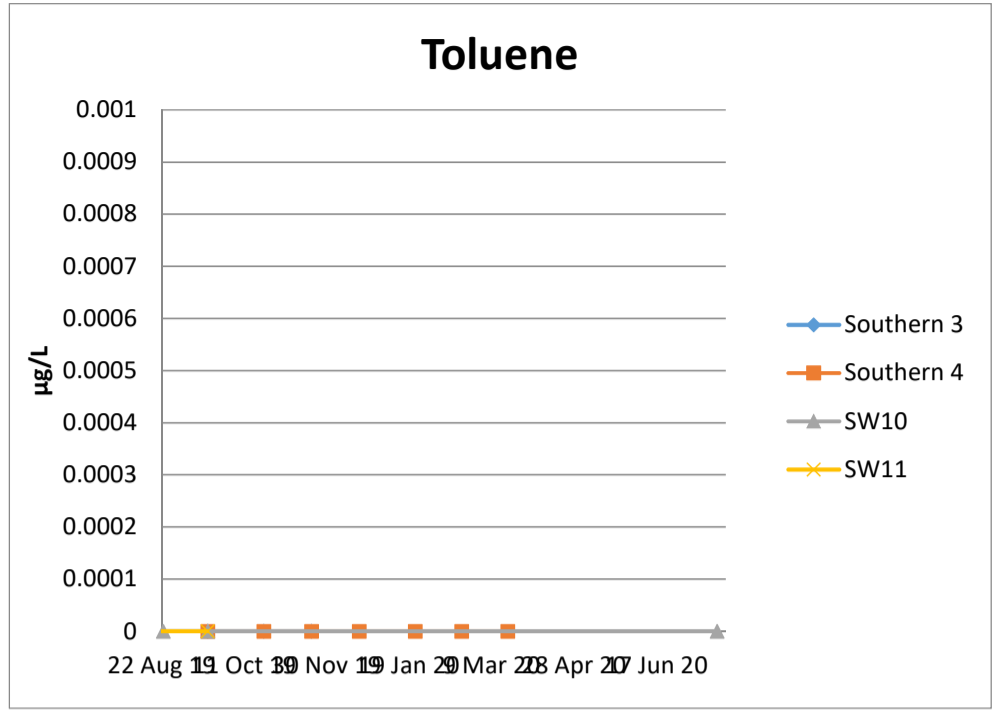
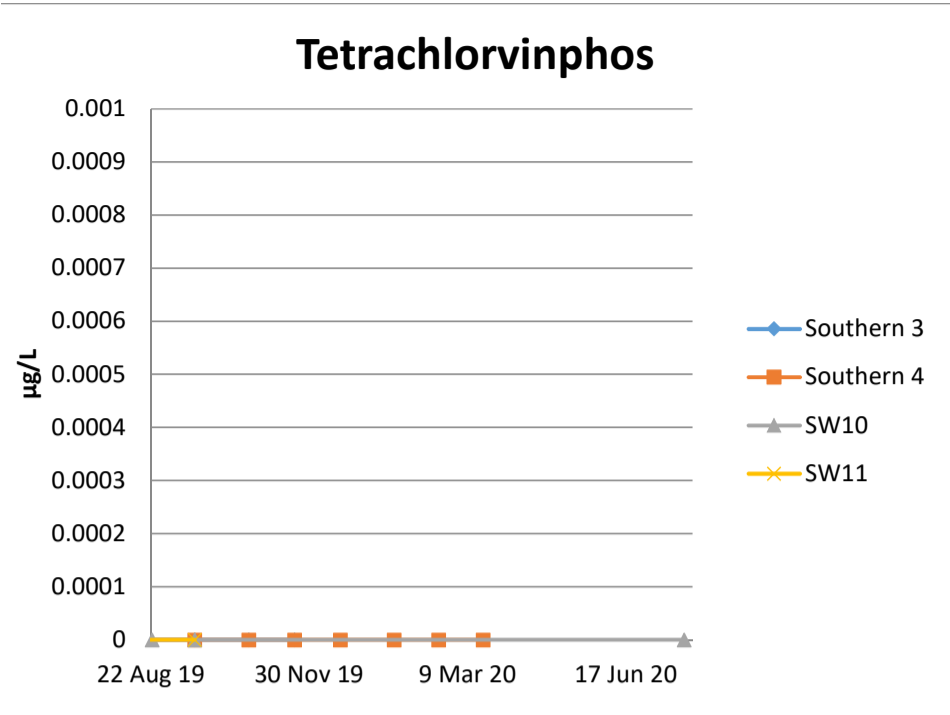


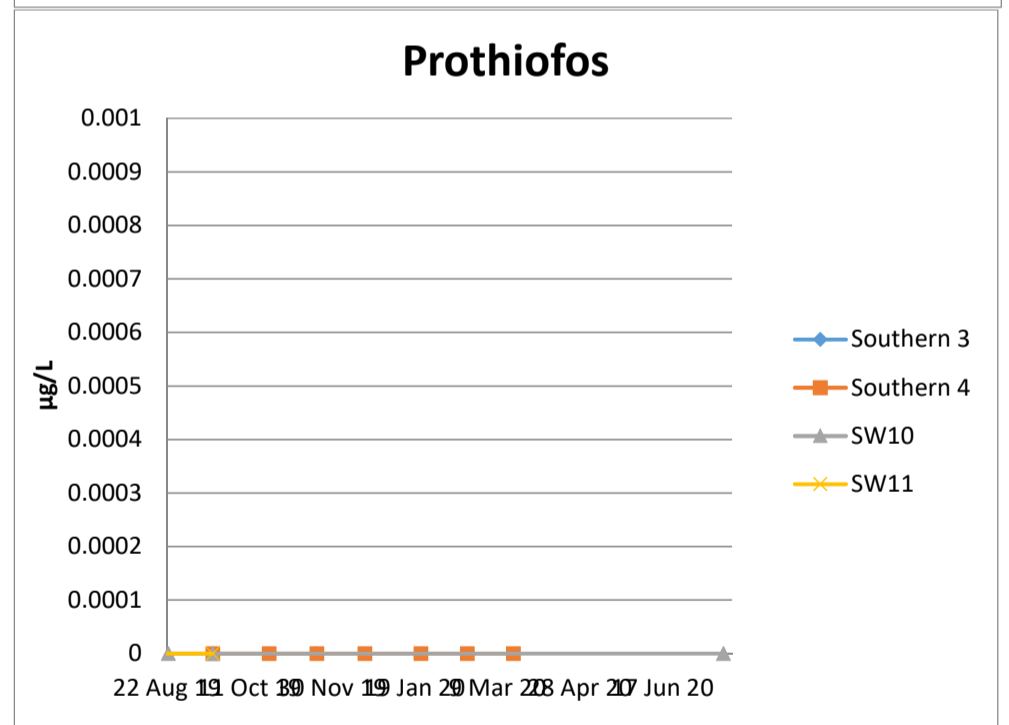
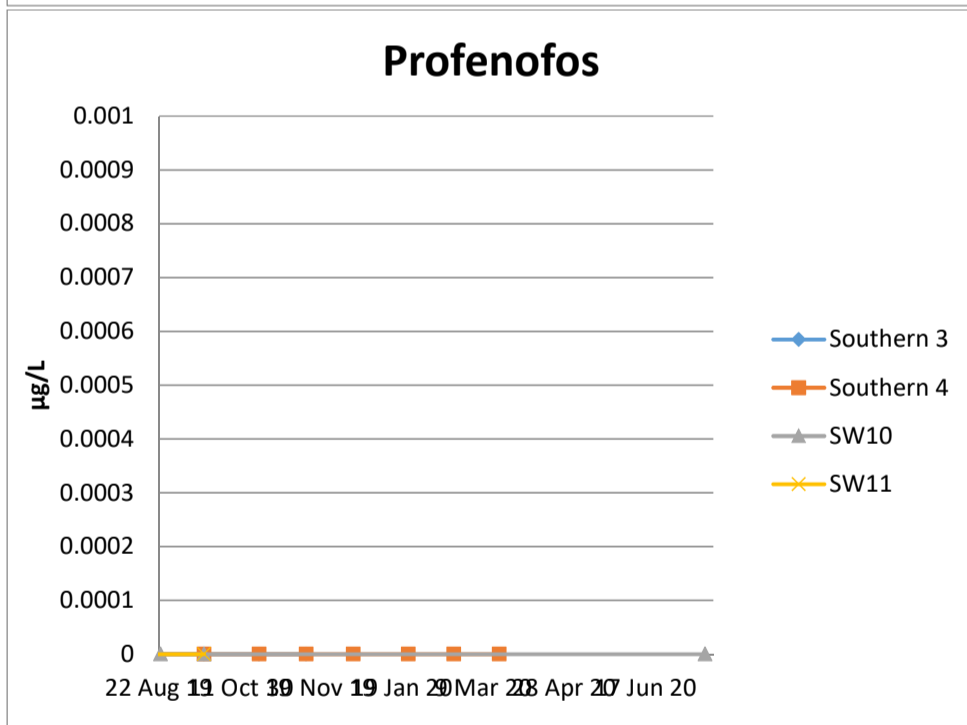
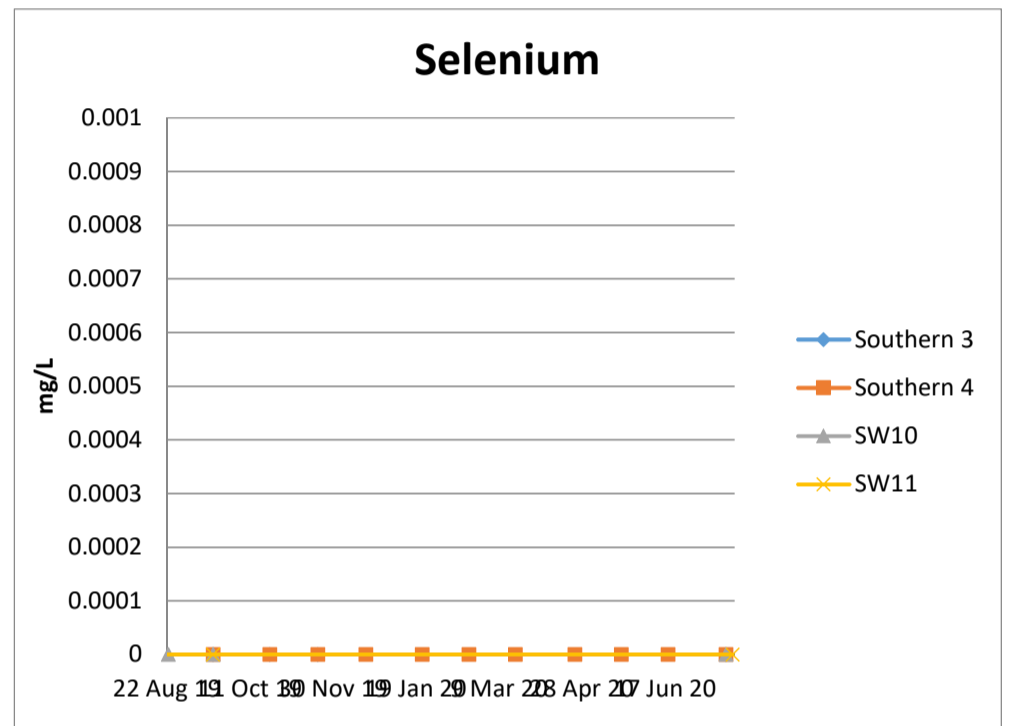
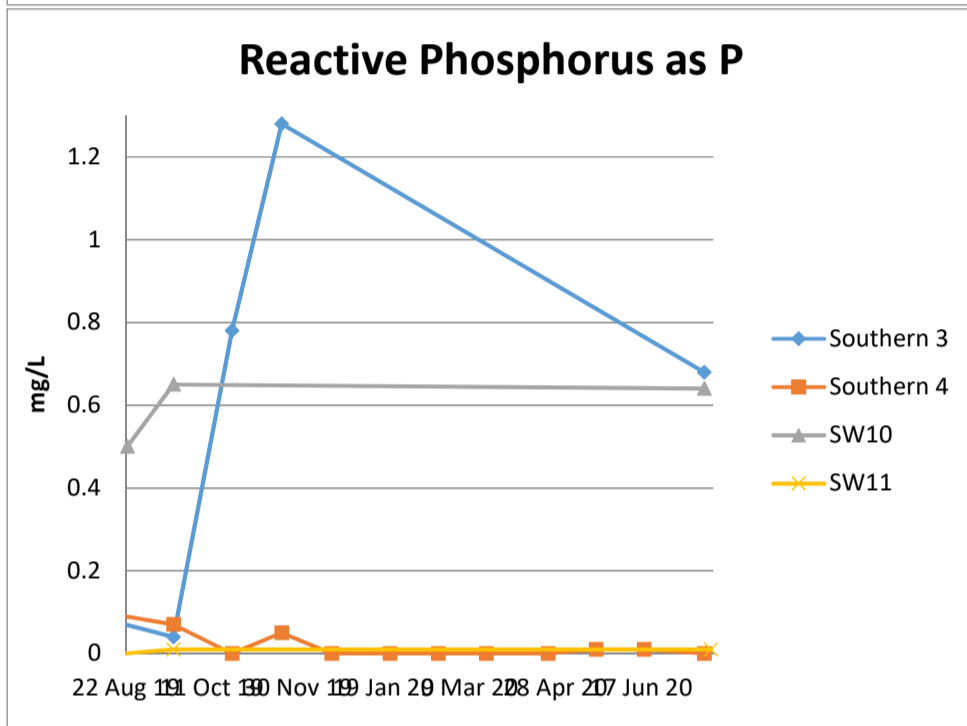
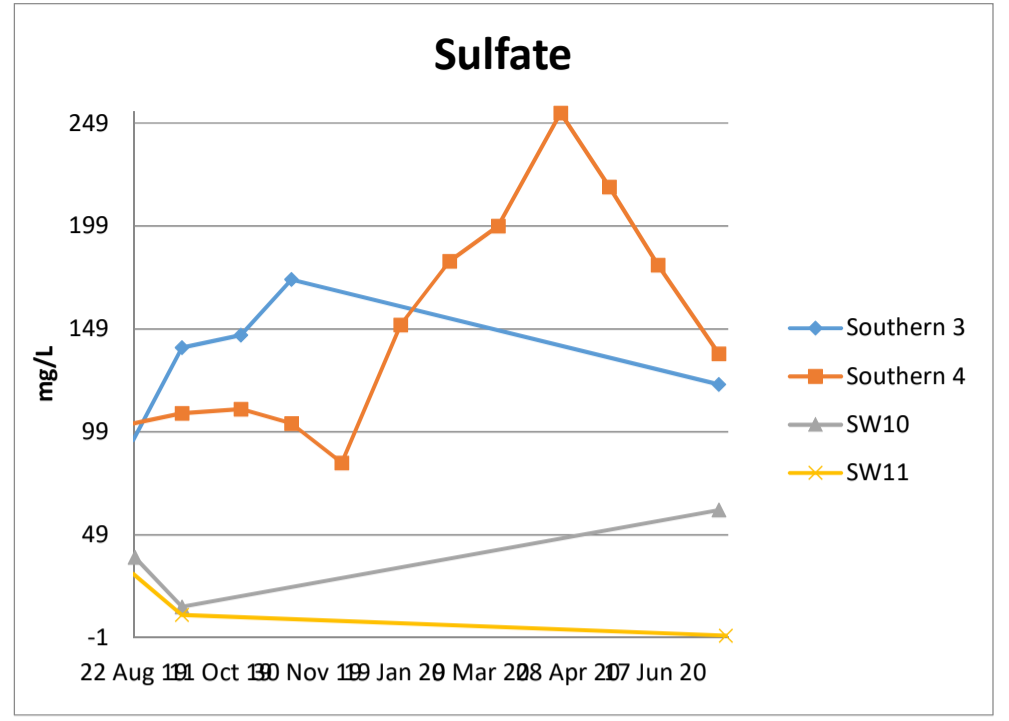
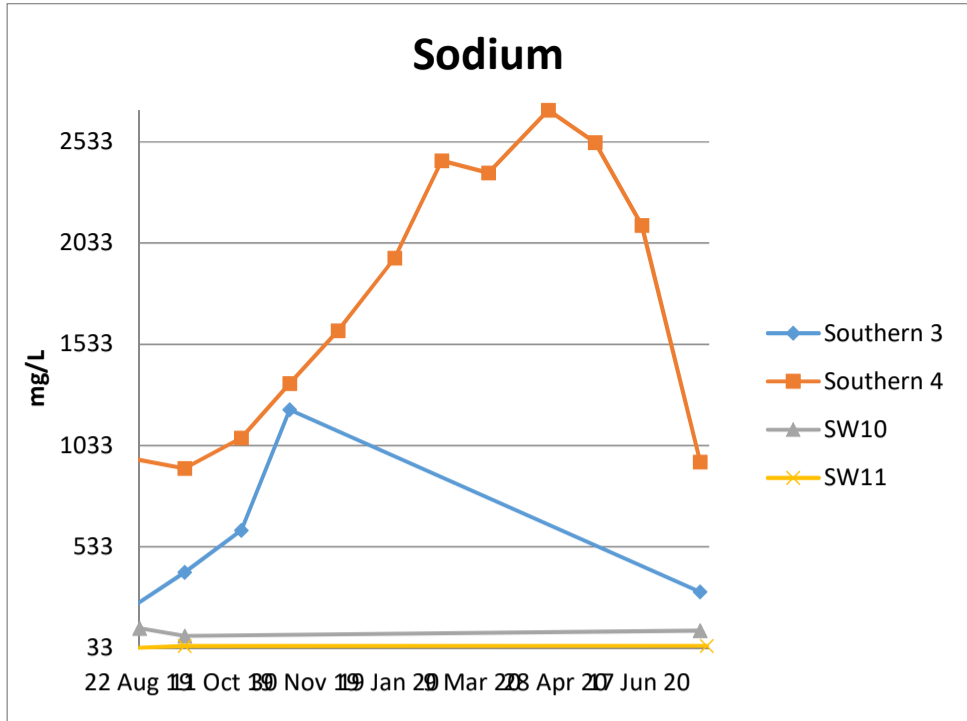
Sulfate



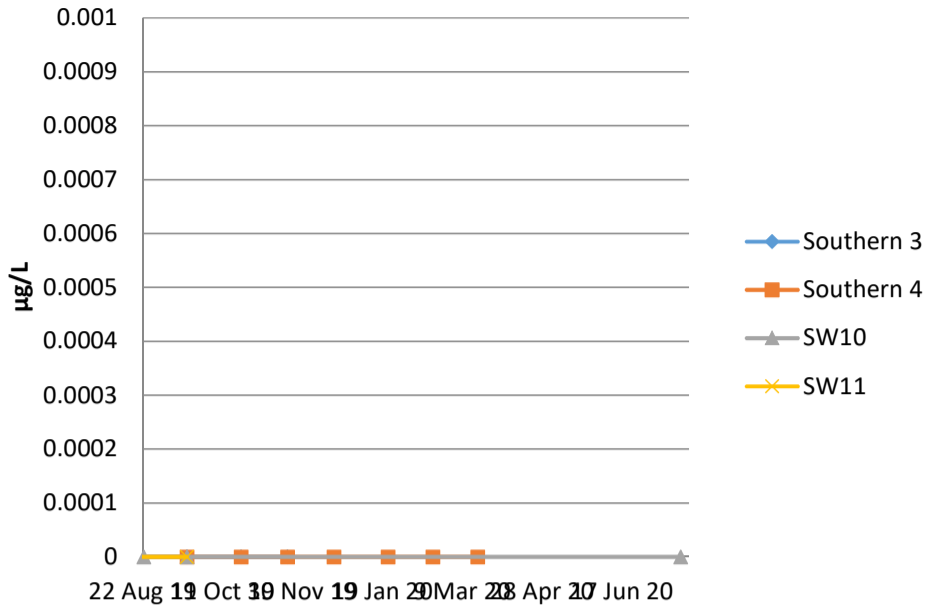
South Surface water Graphs



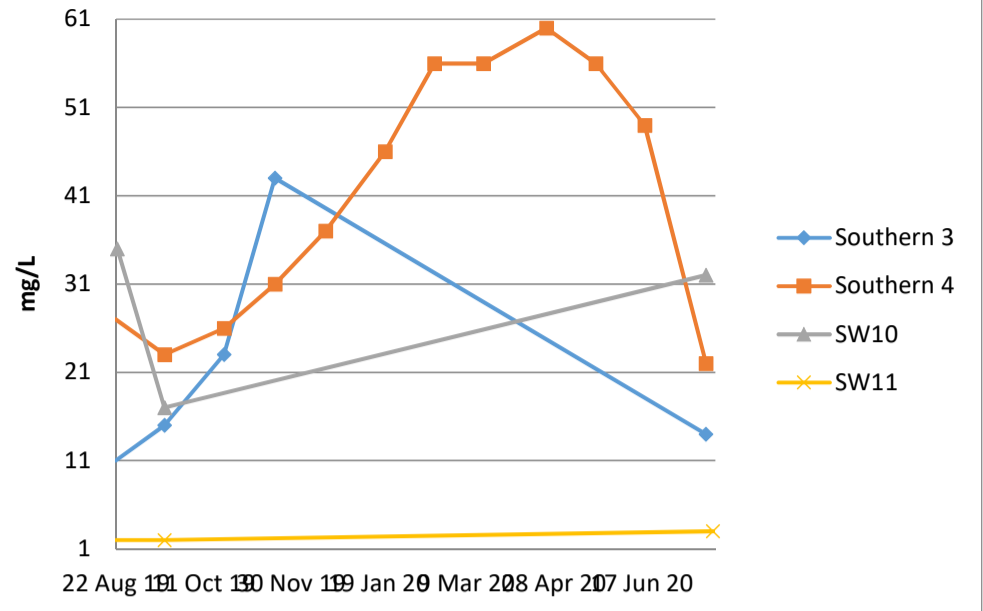




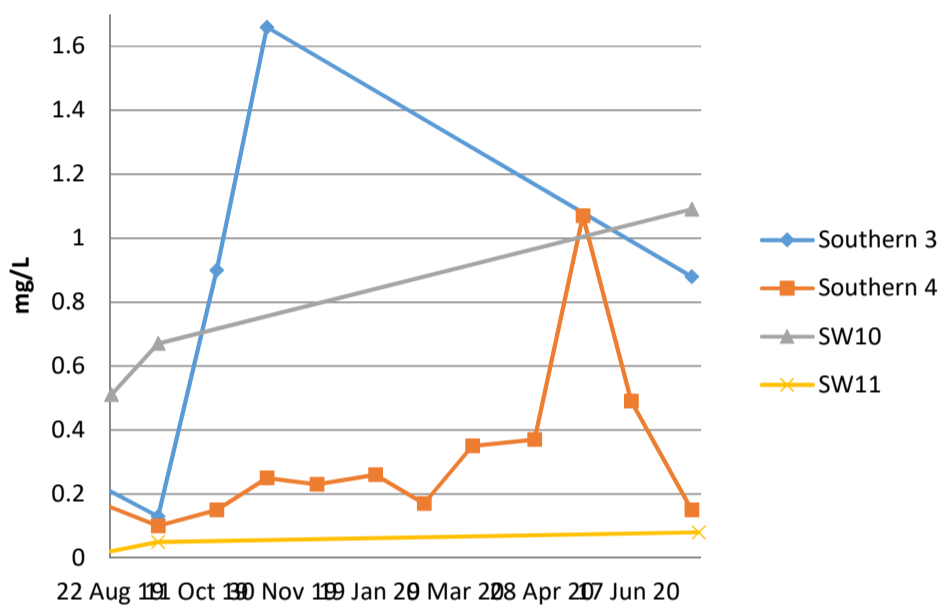
Pirimphos-ethyl



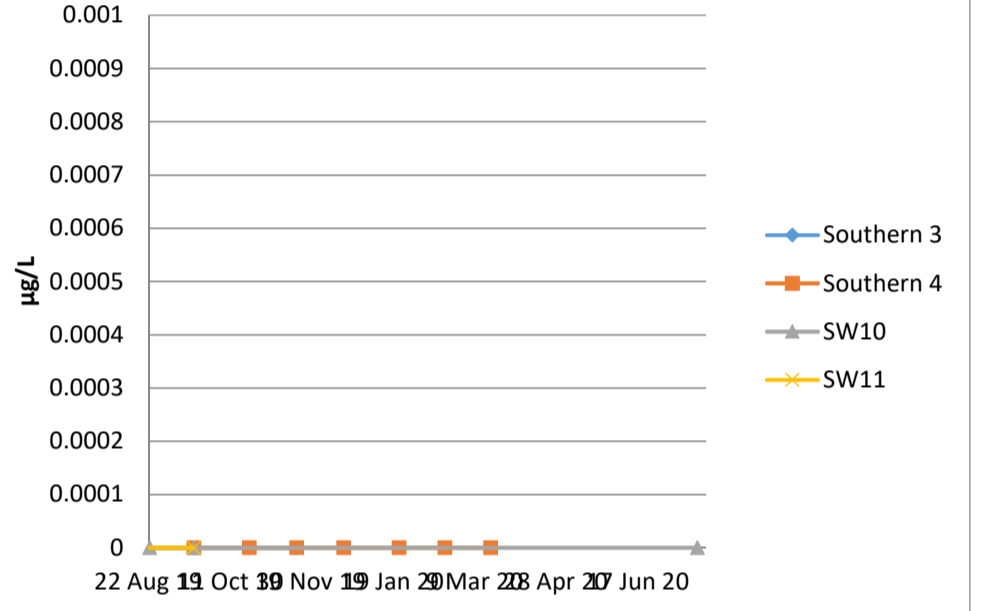
Potassium



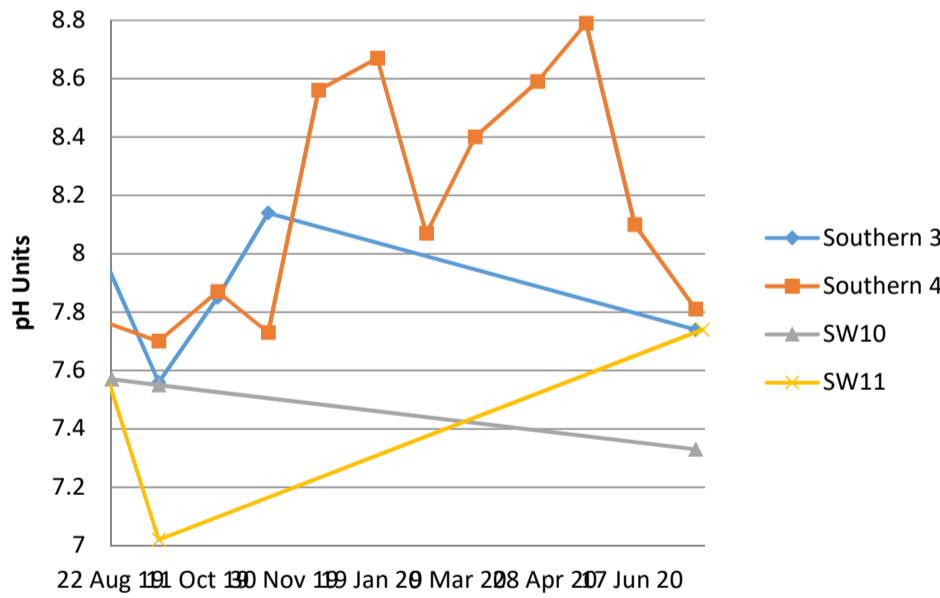
Phosphorus (Total)



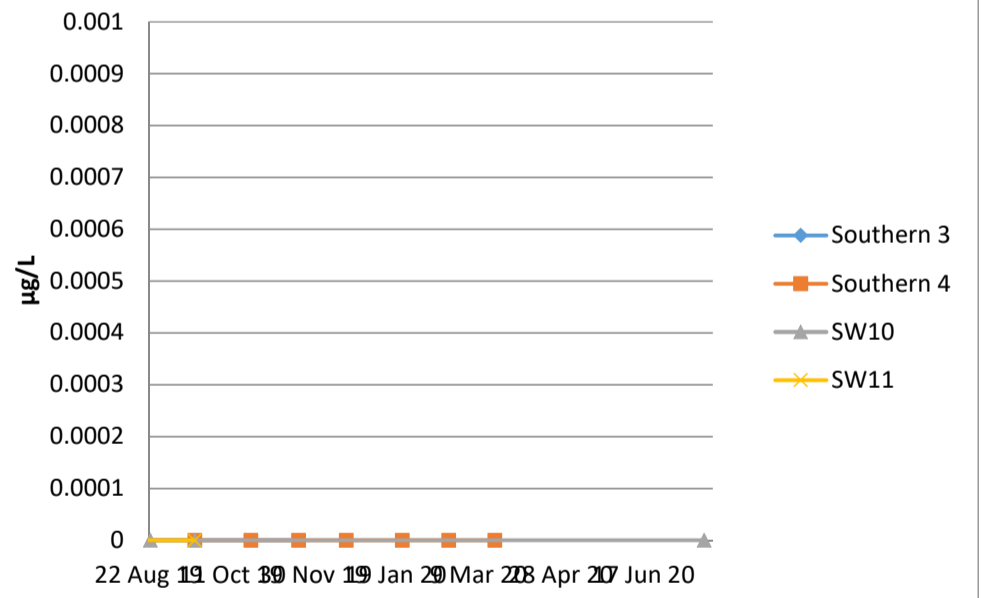
Pirimiphos-methyl

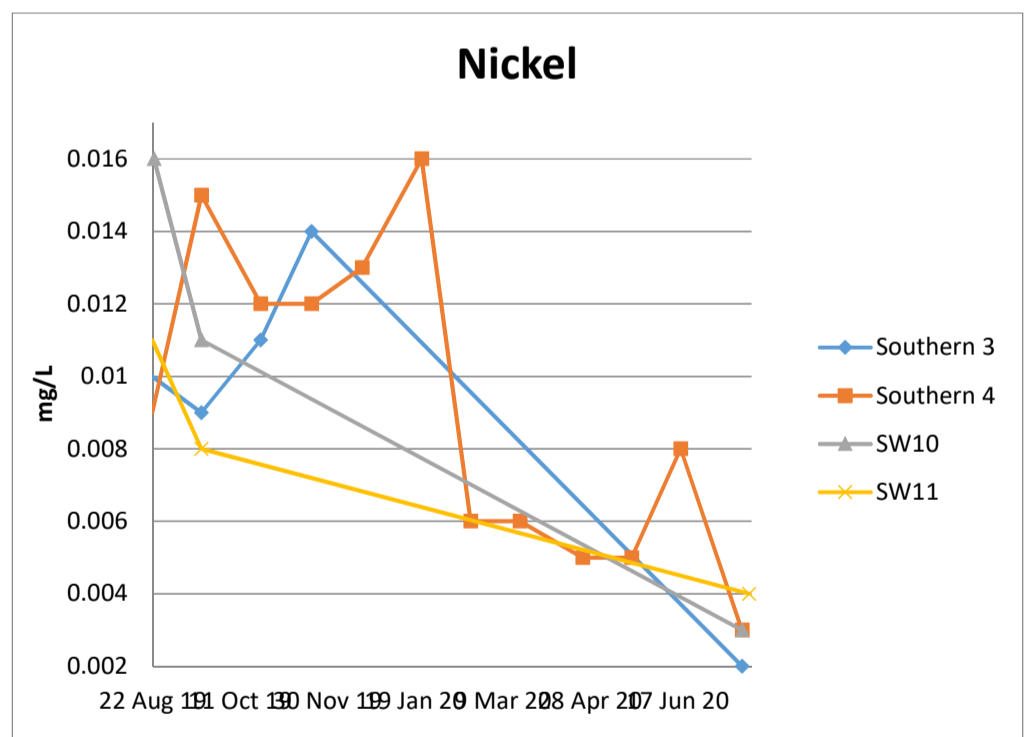
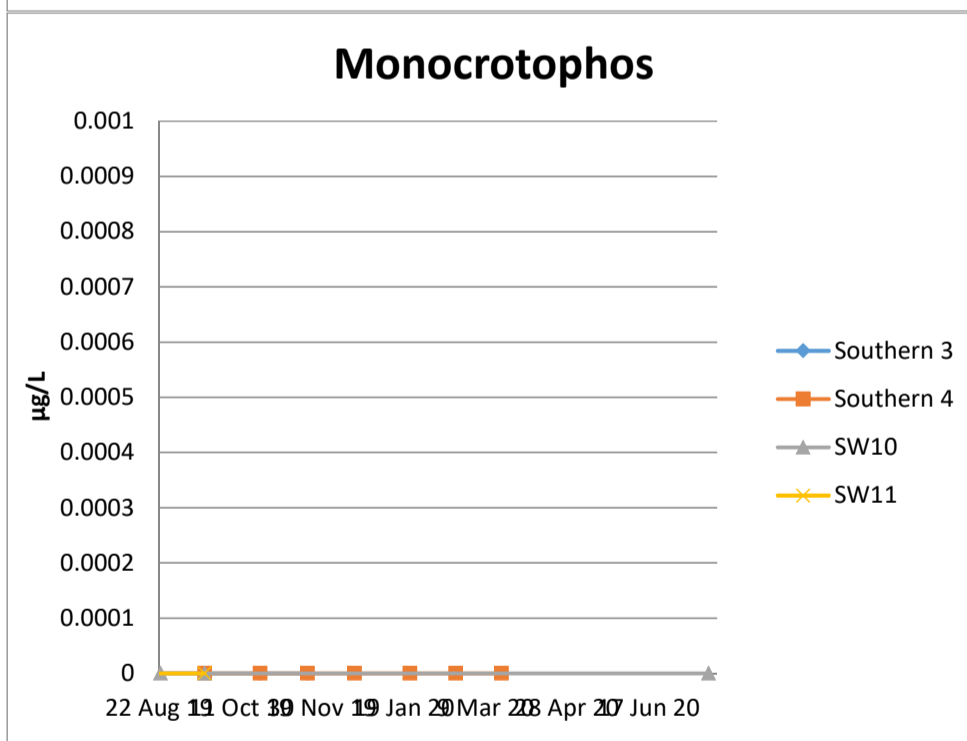
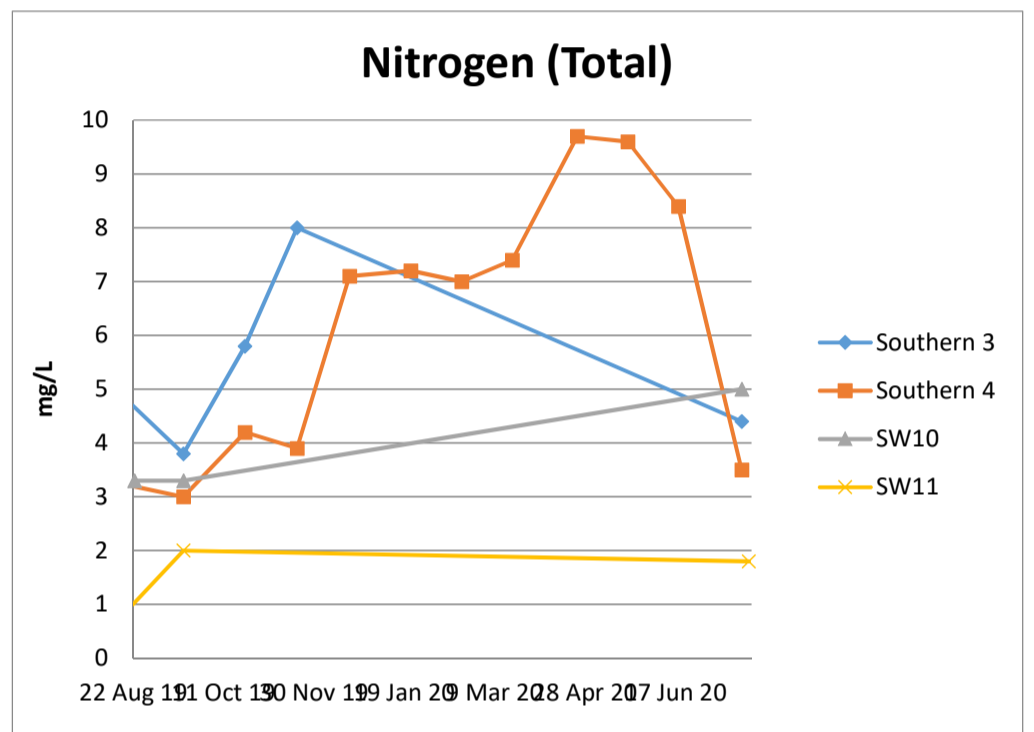
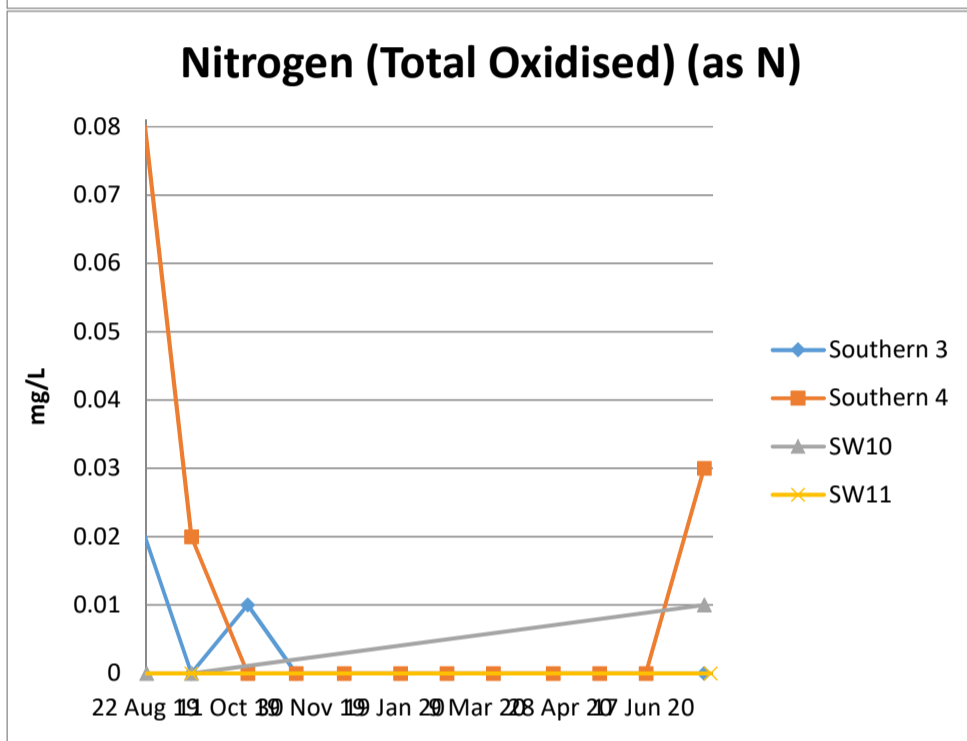
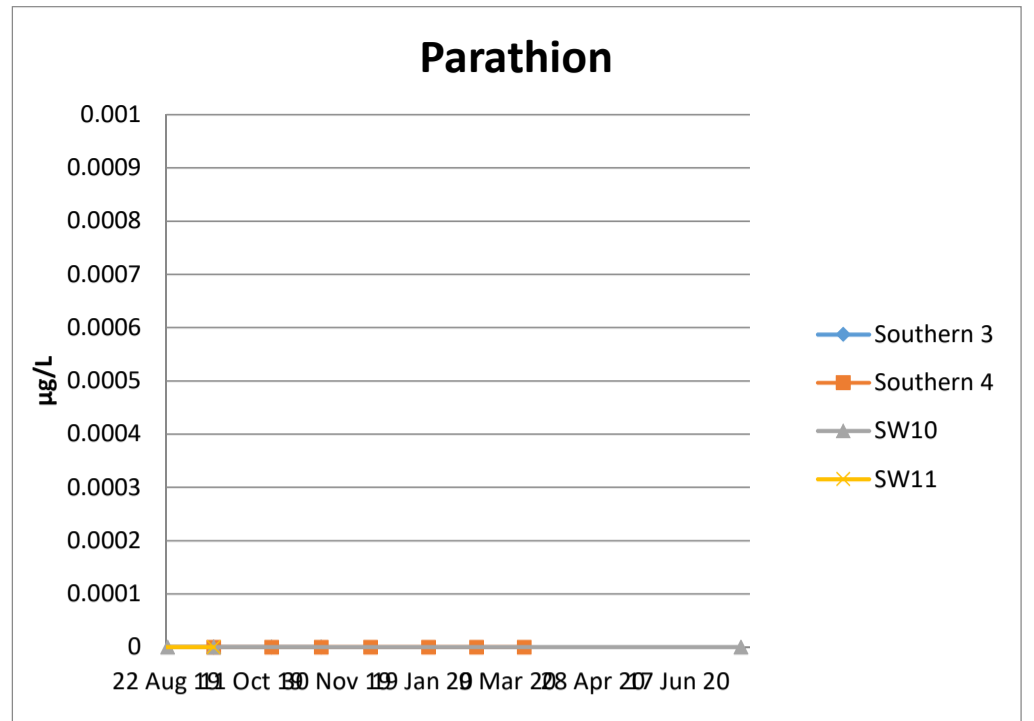
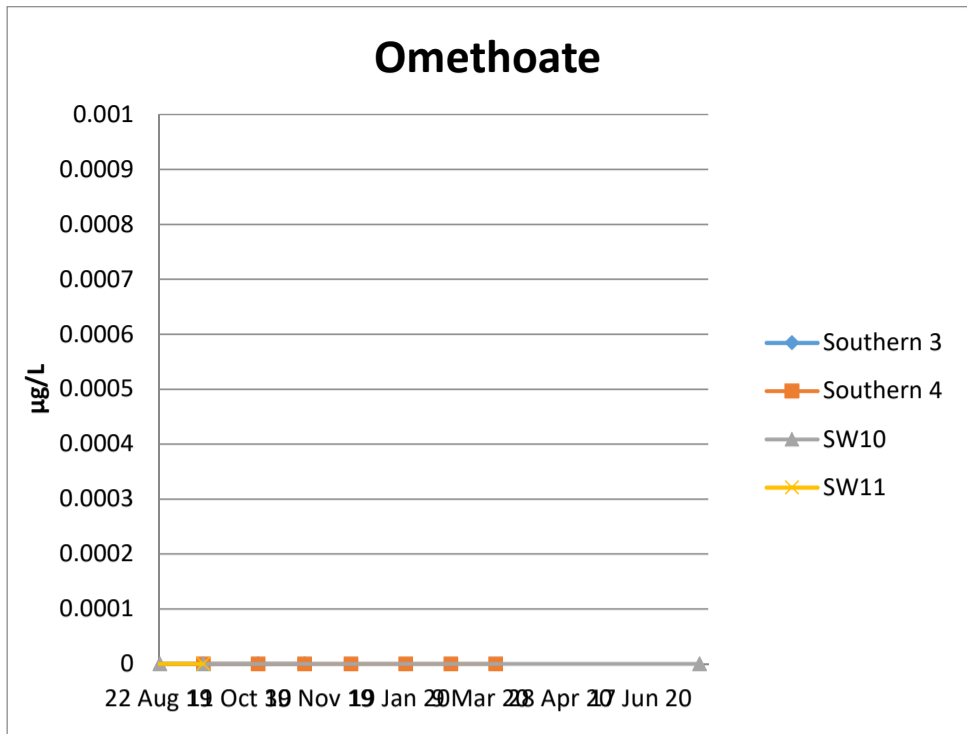


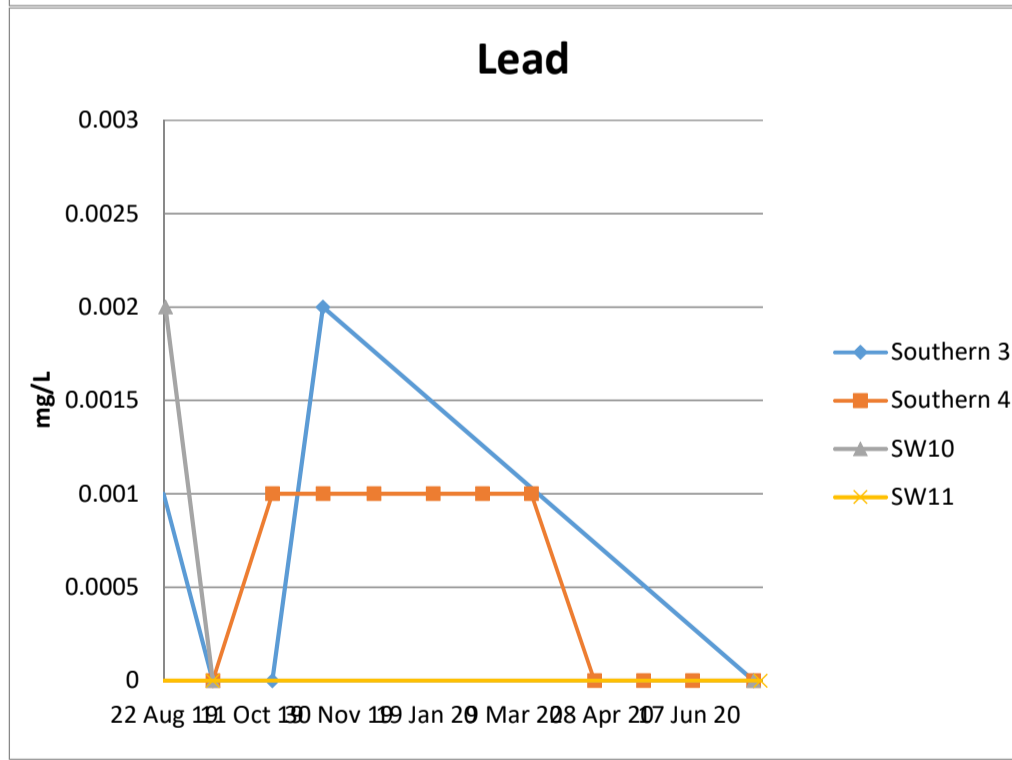
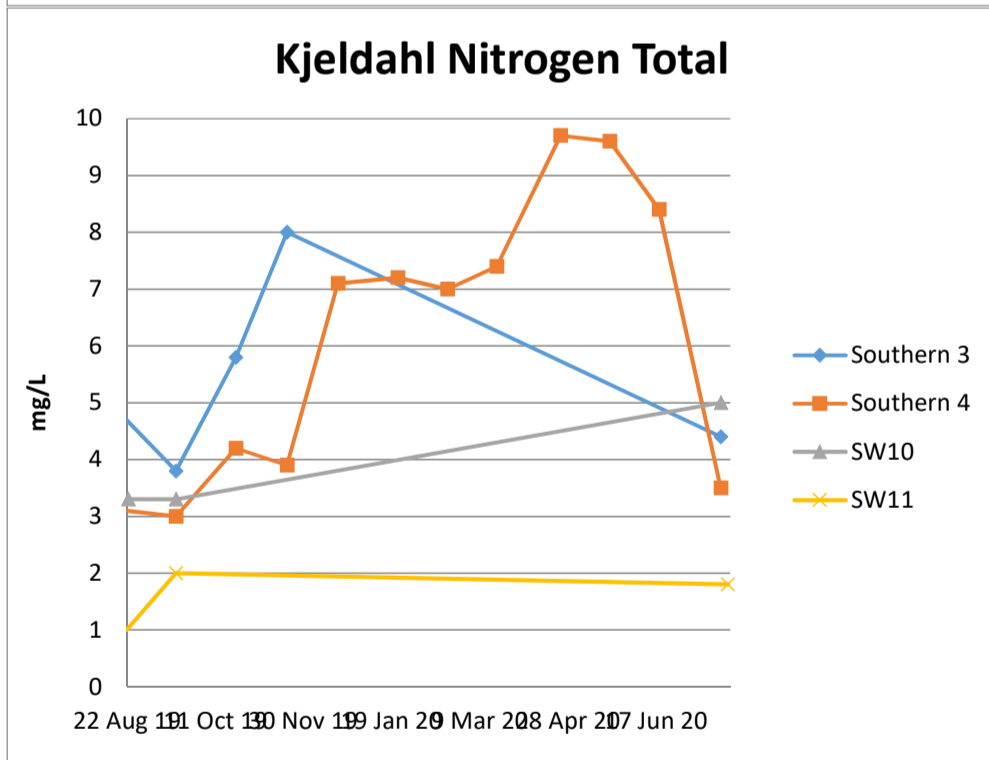
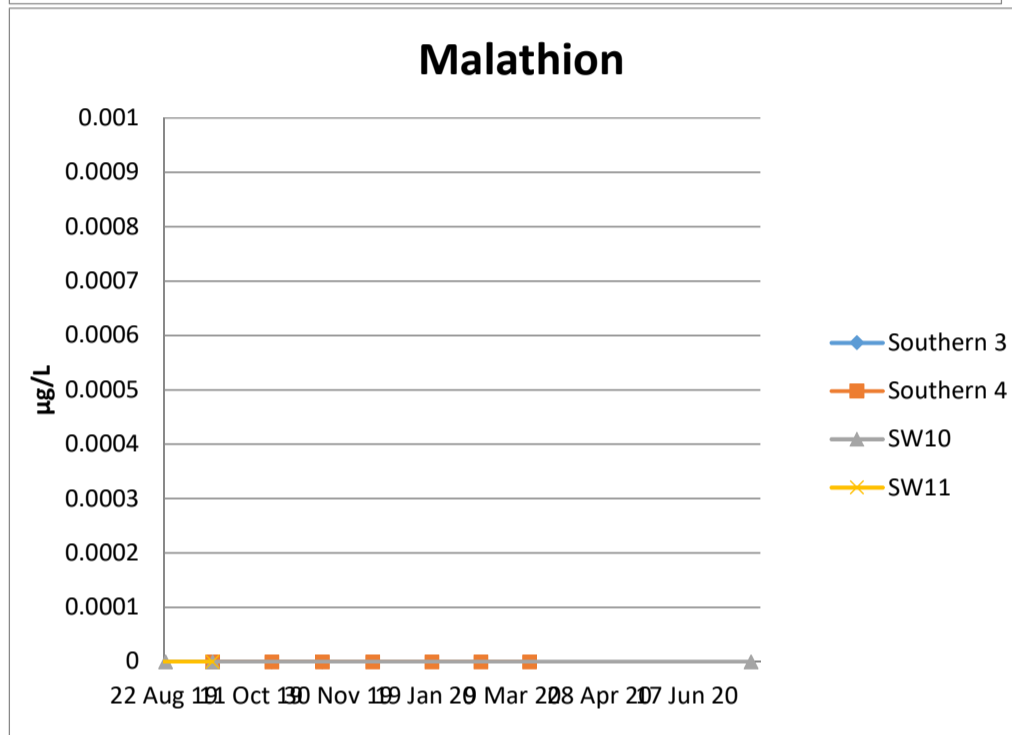
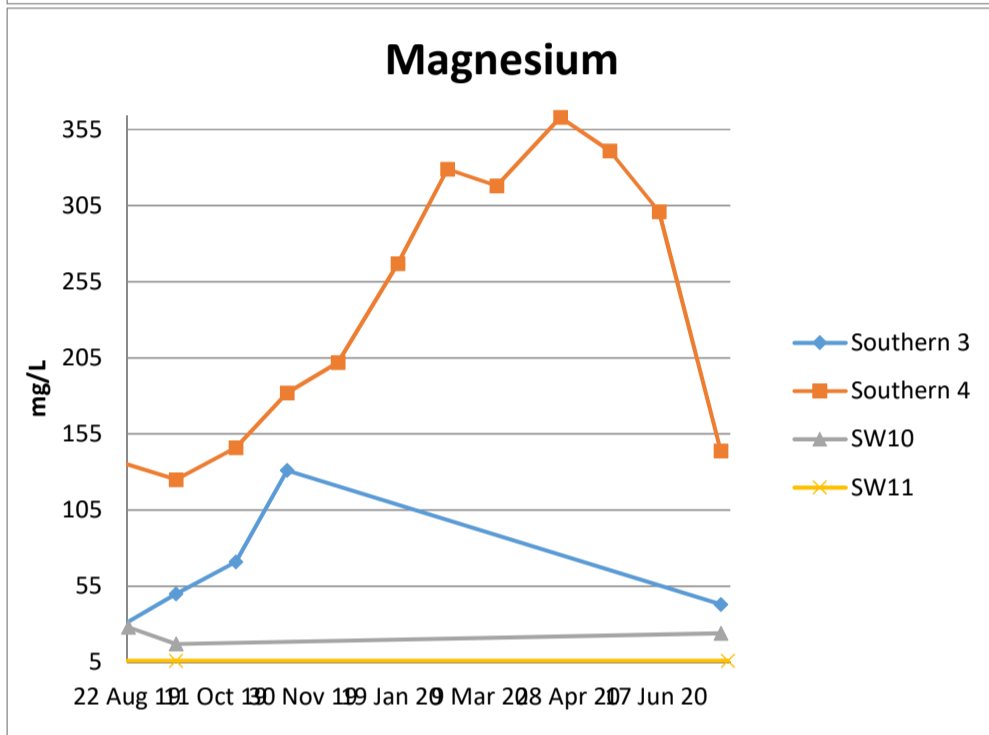
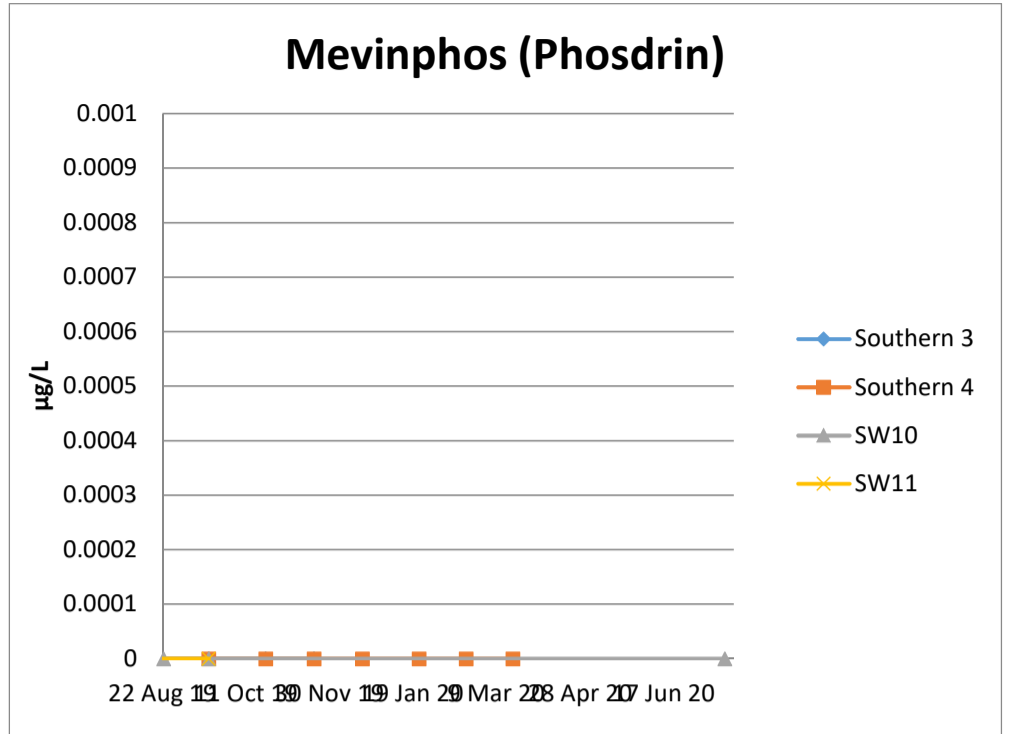
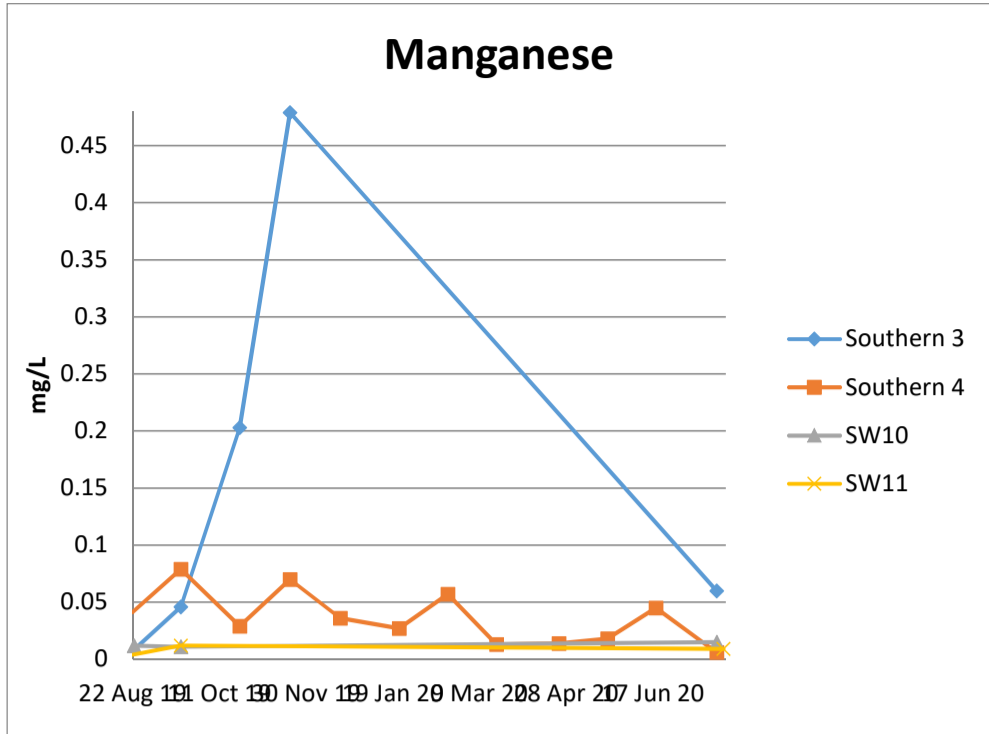
pH (Lab)

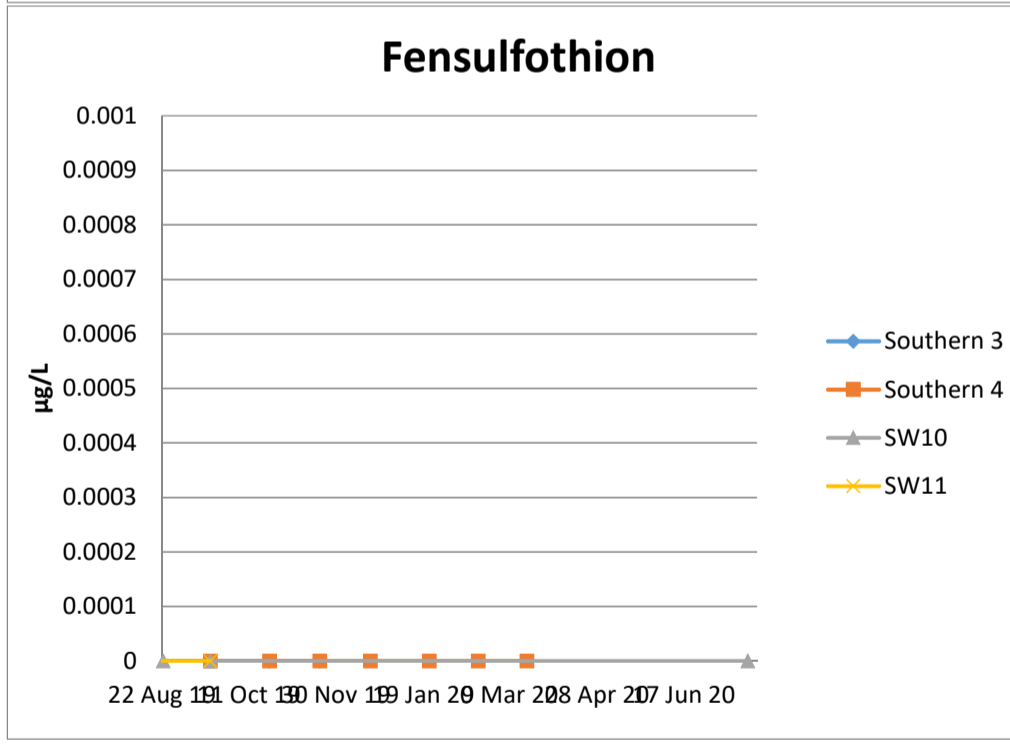
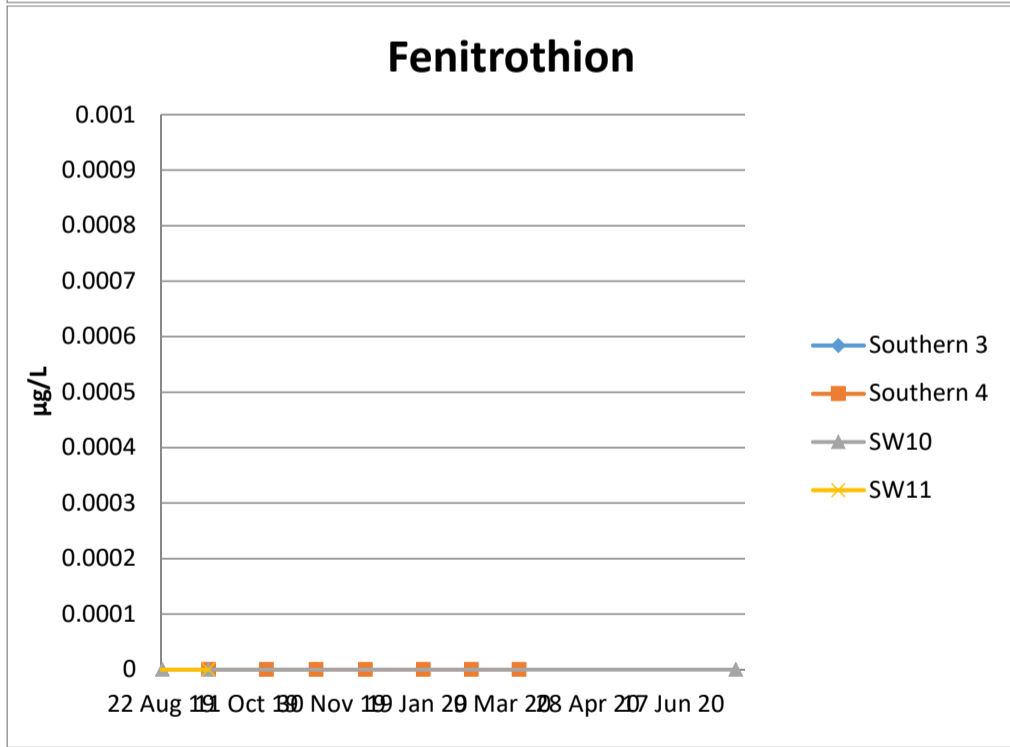
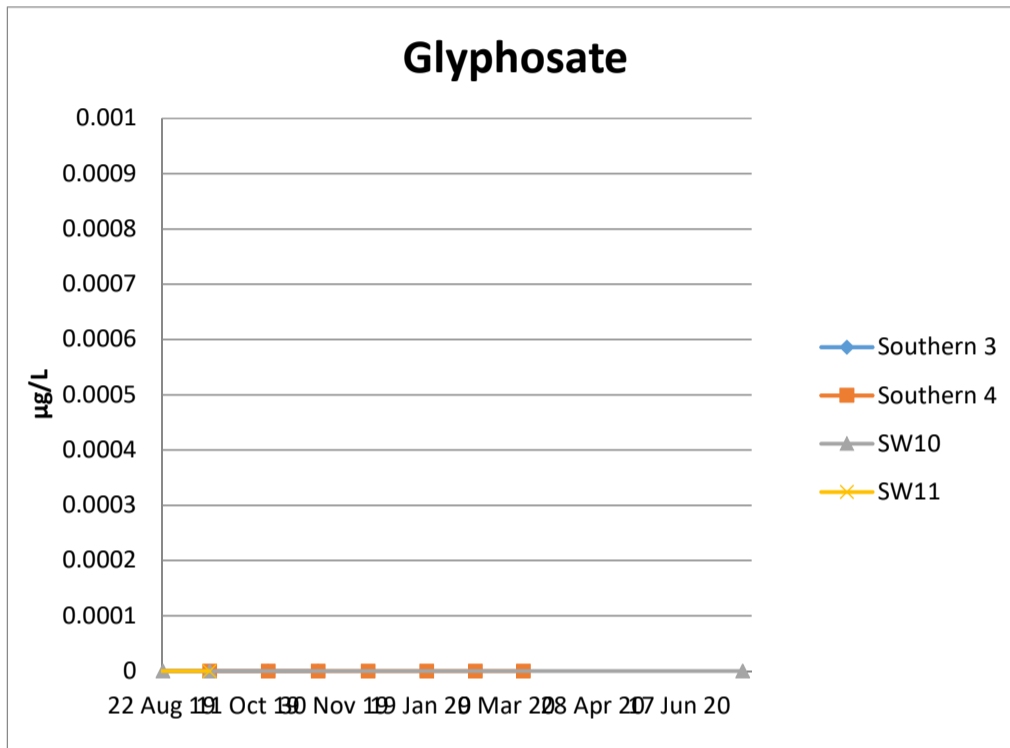
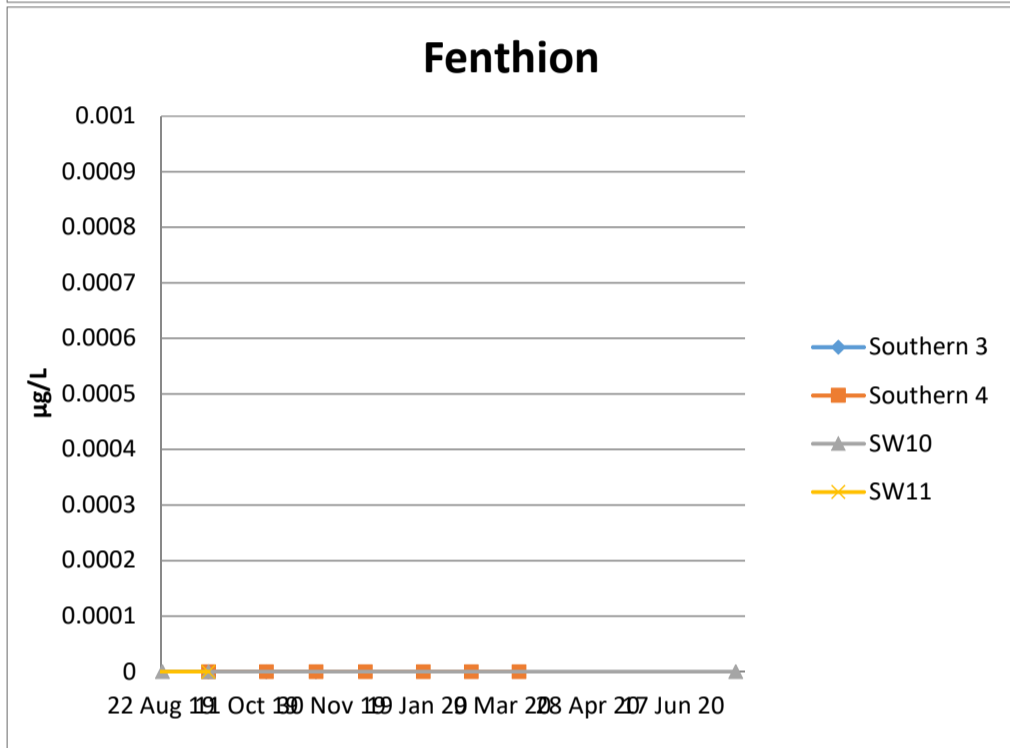
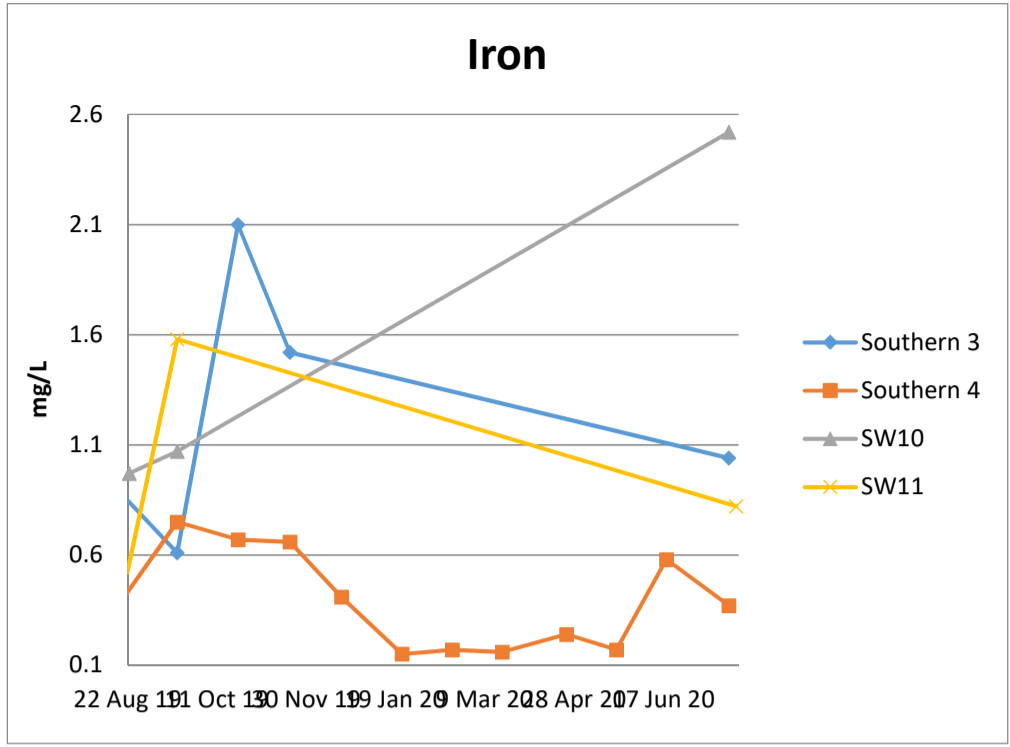
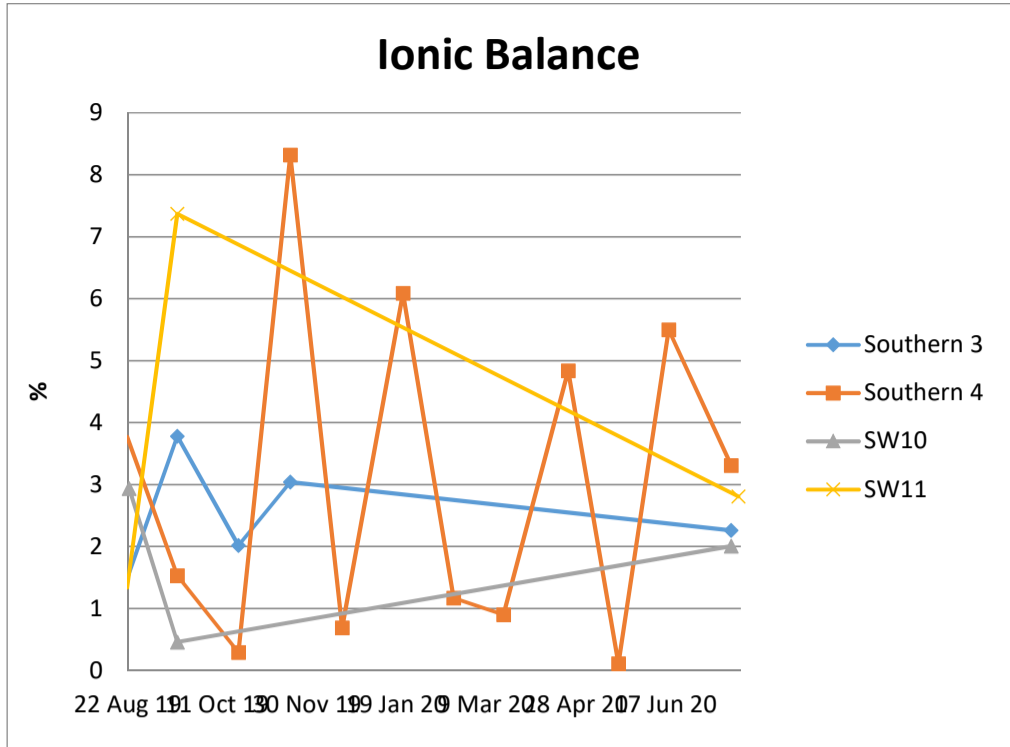


Phorate

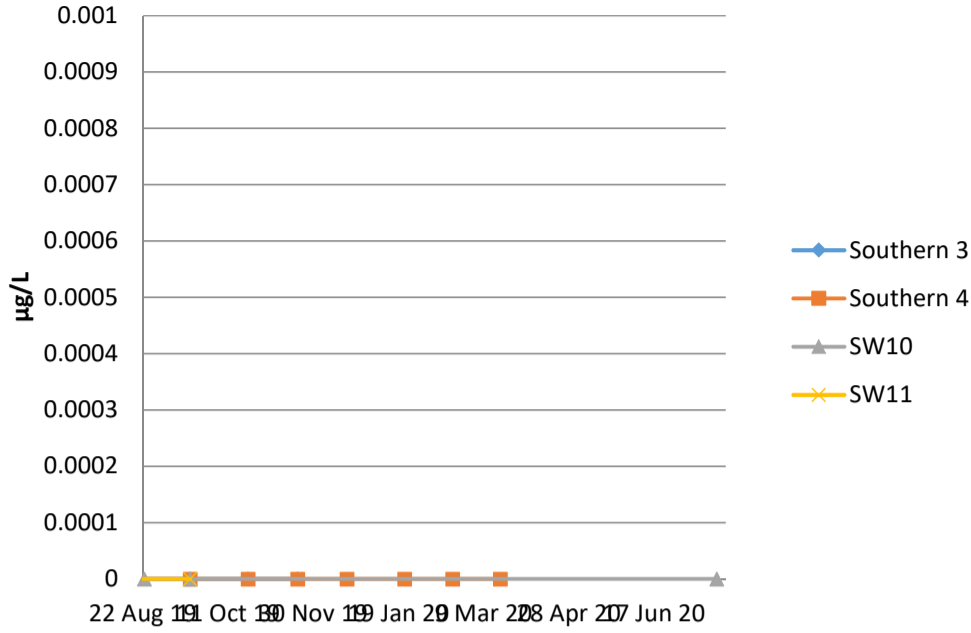




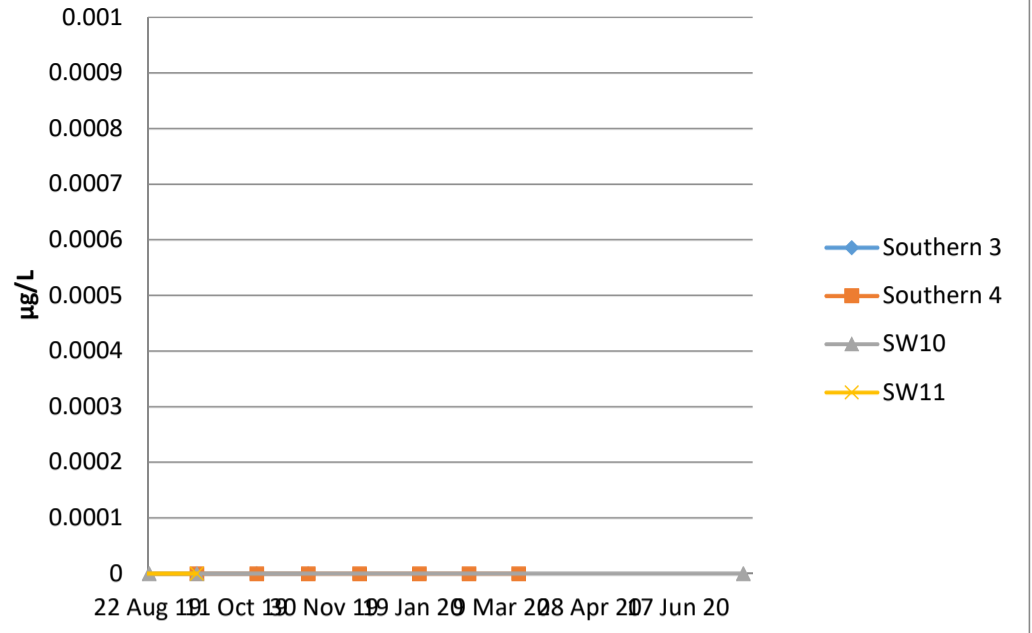




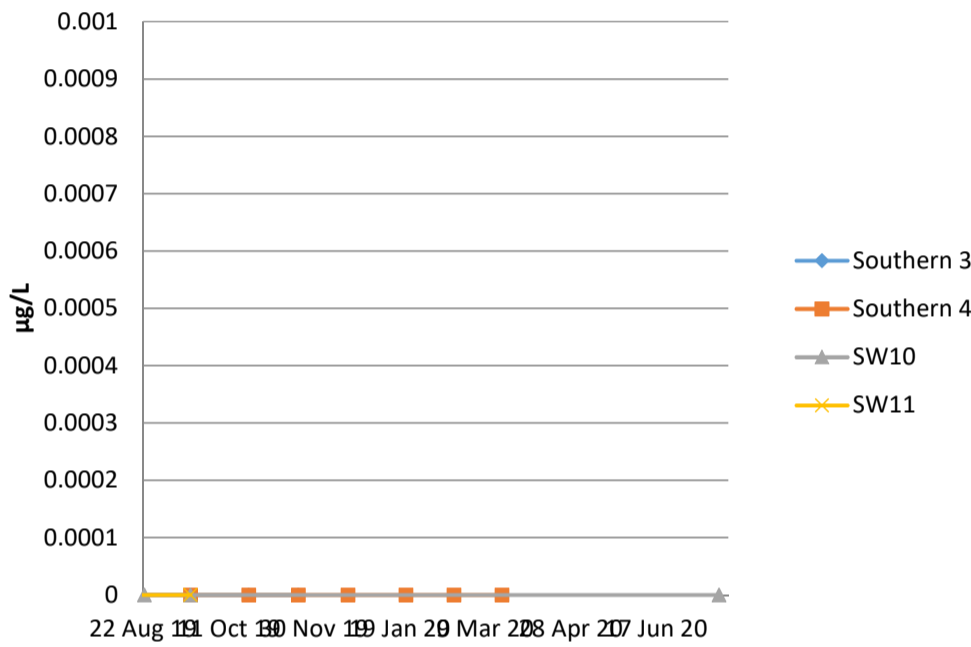
F4 (>C34-C40 Fraction)



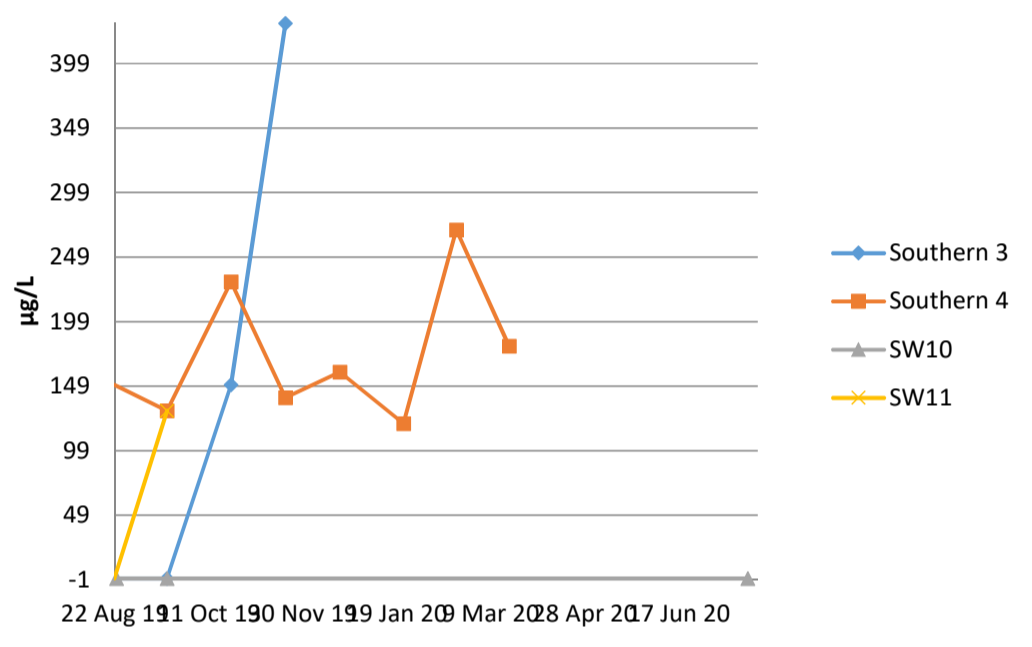
Fenamiphos



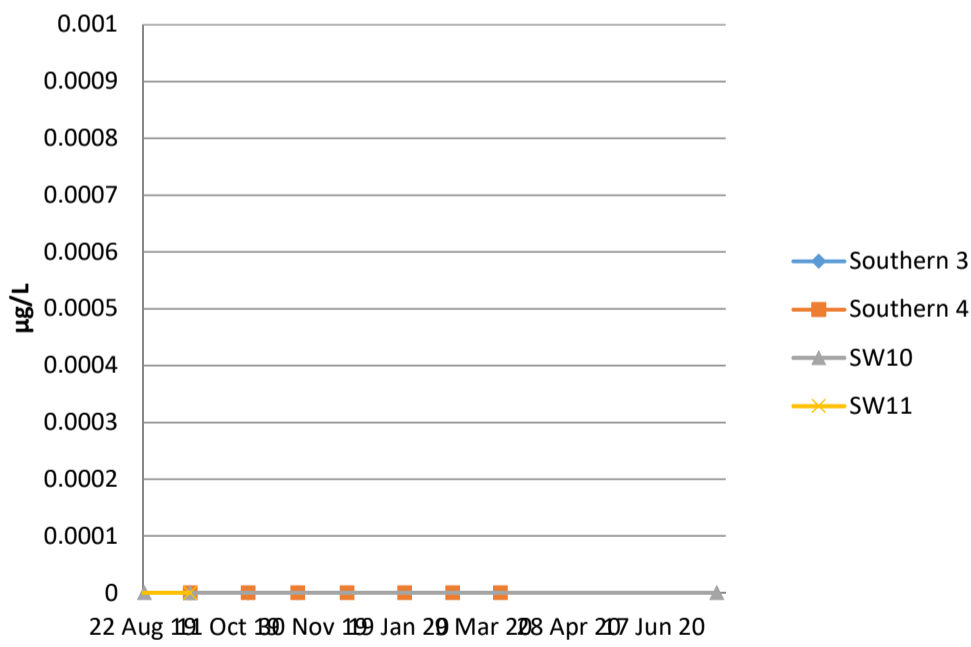
F2 (>C10-C16 minus Naphthalene)



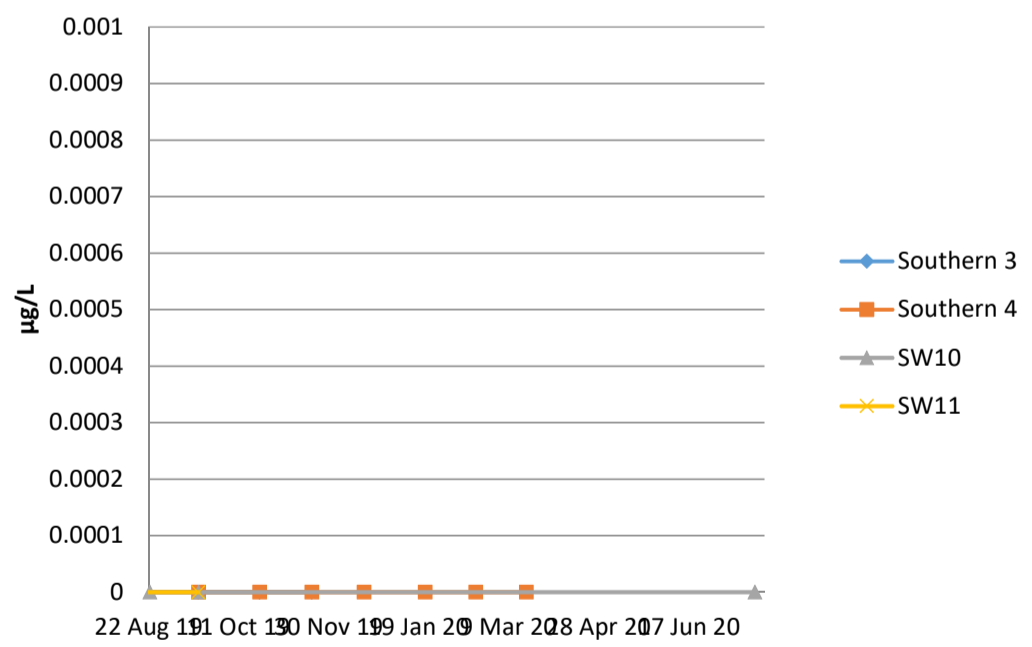
F3 (>C16-C34 Fraction)



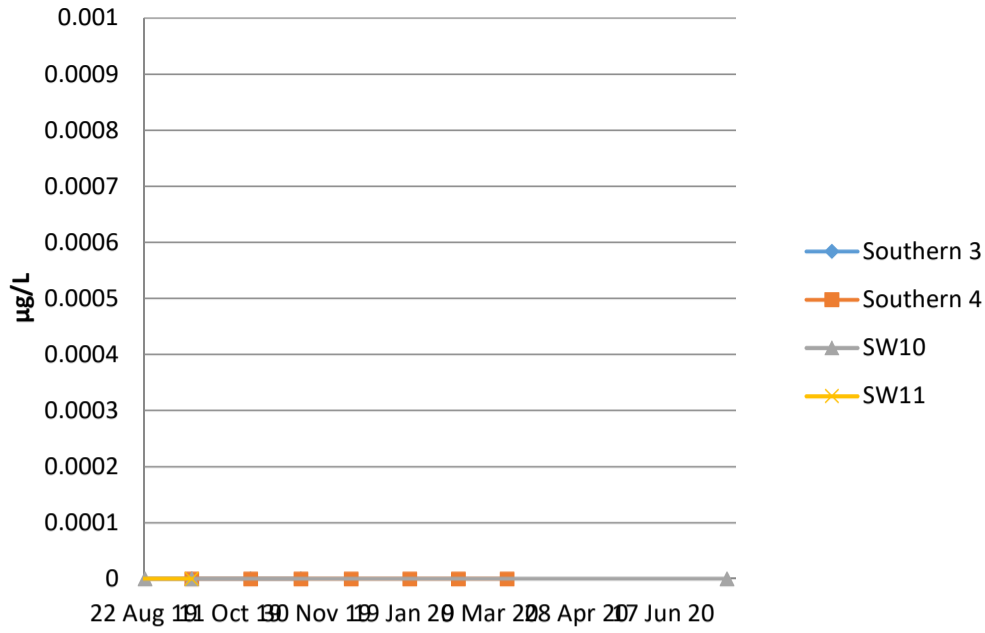
Ethylbenzene



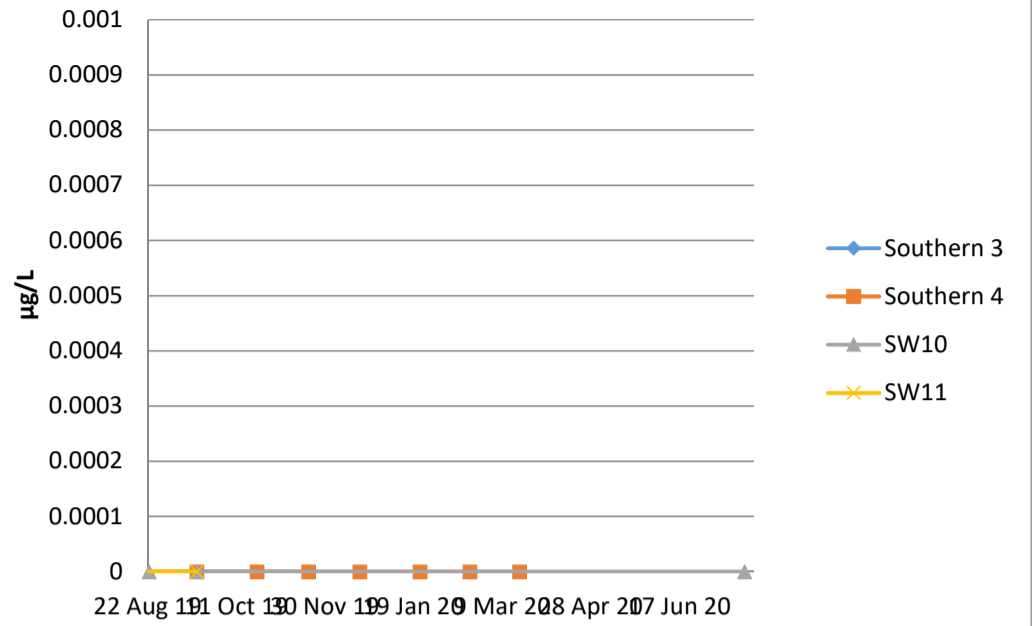
F1 (C6-C10 minus BTEX)



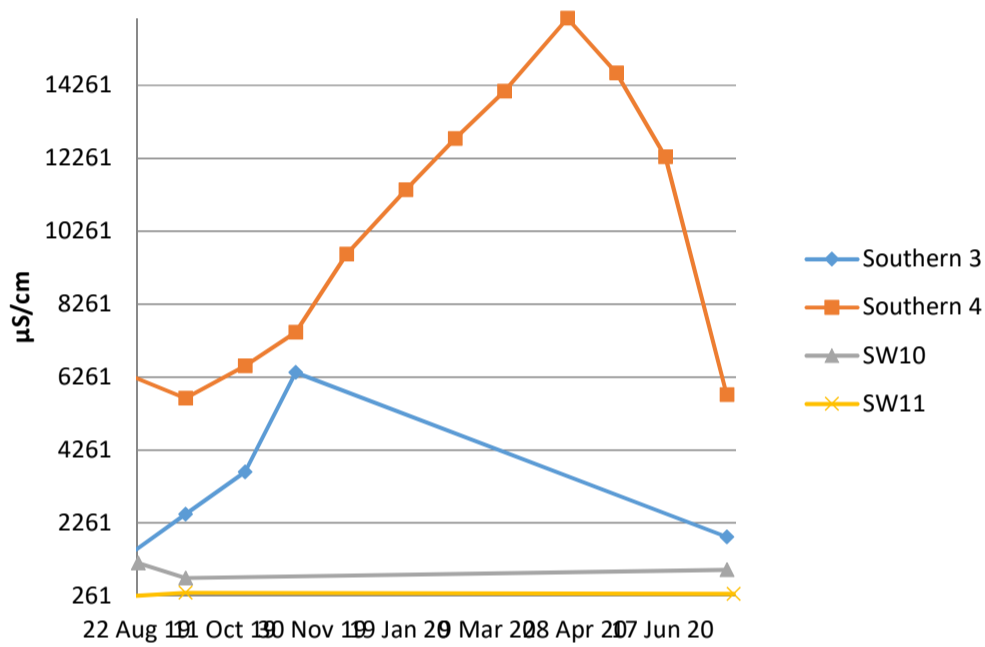
Ethion



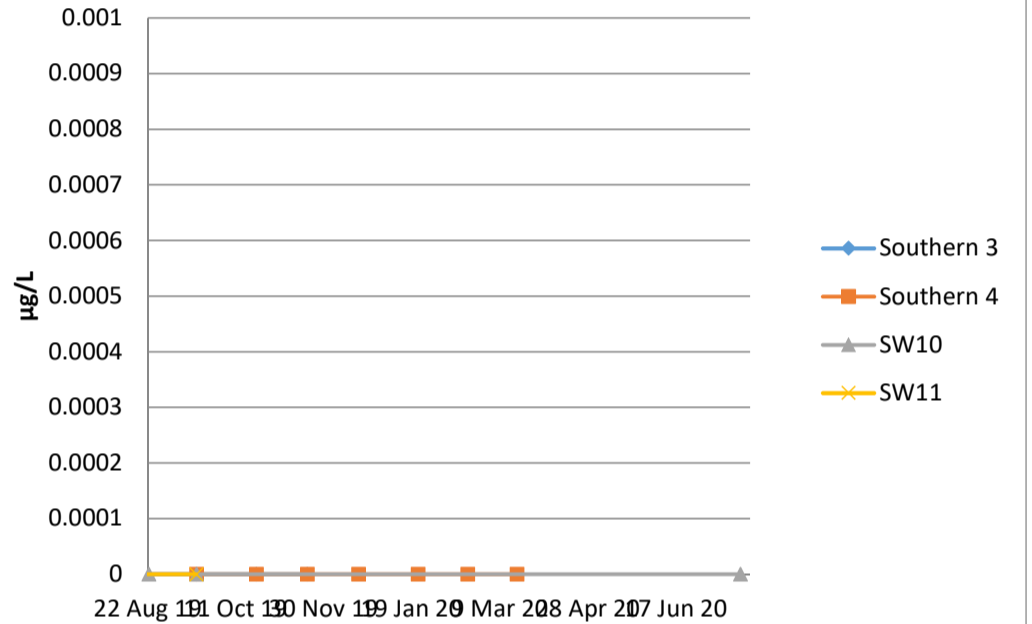
Ethoprop



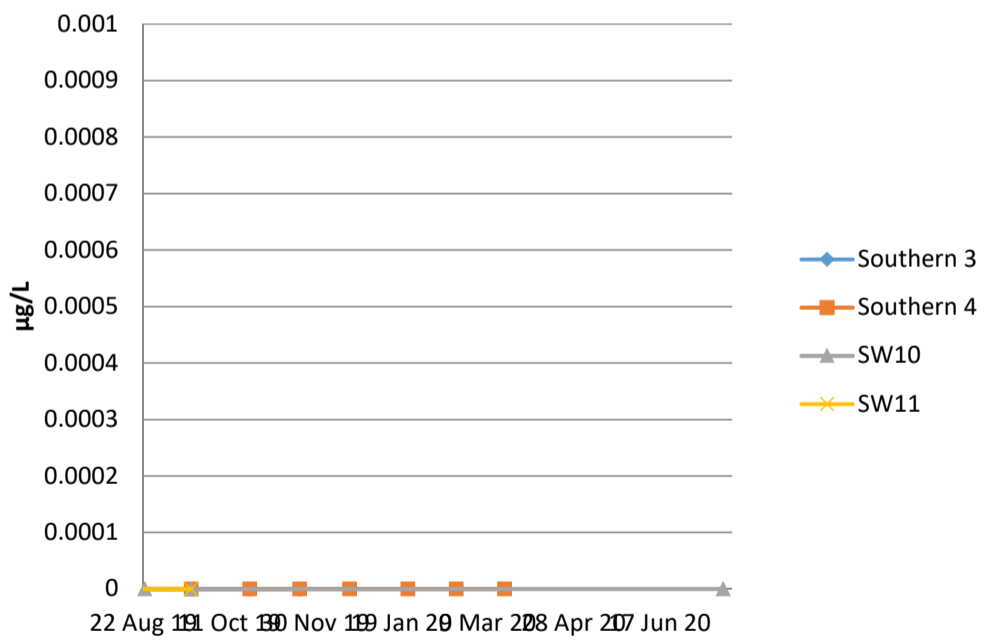
Electrical conductivity (lab)



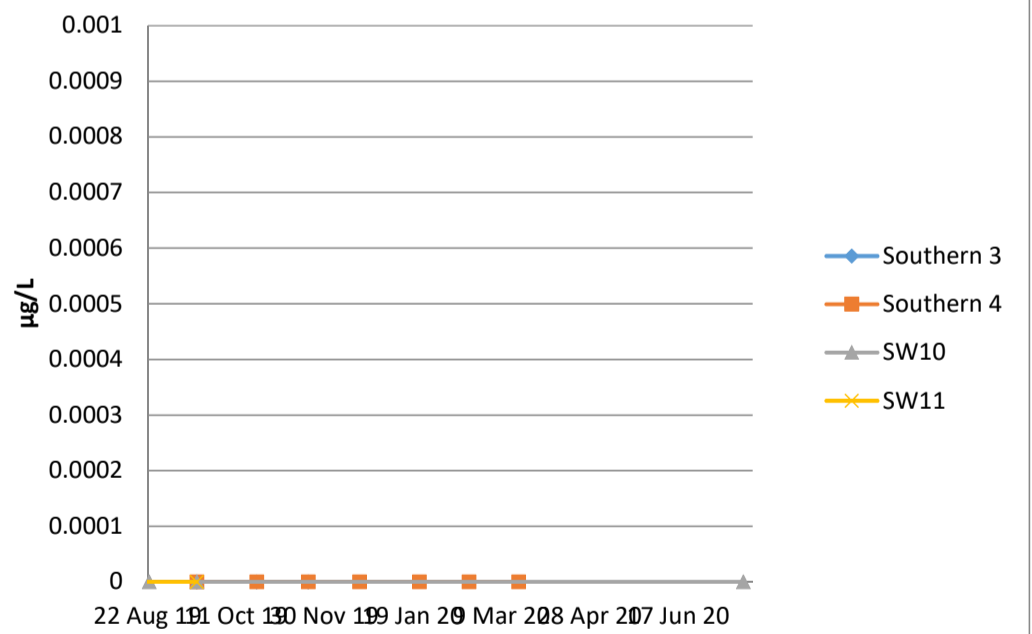
EPN



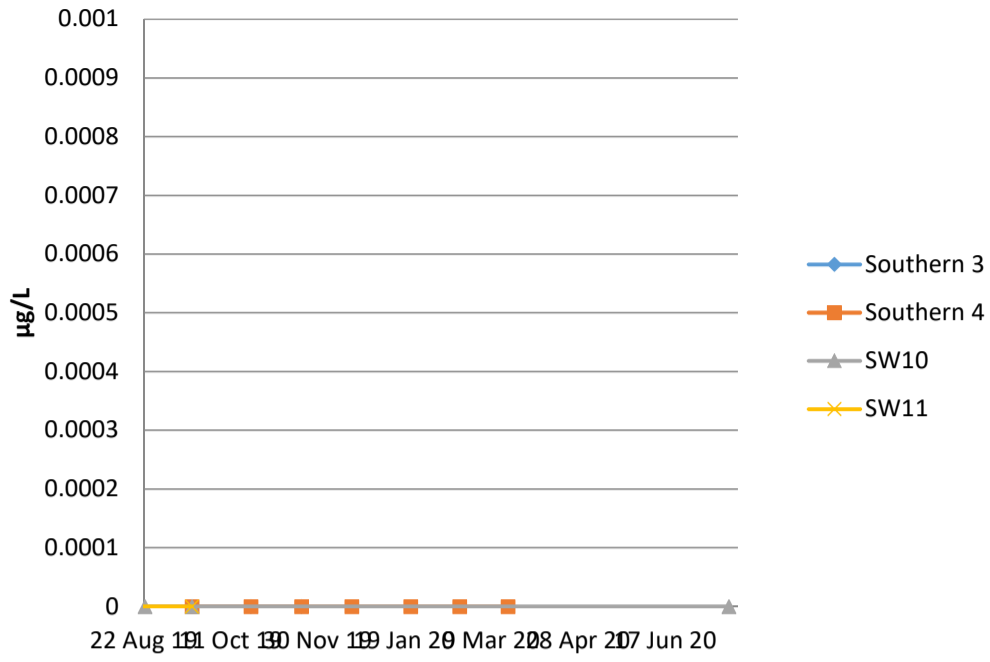
Dimethoate



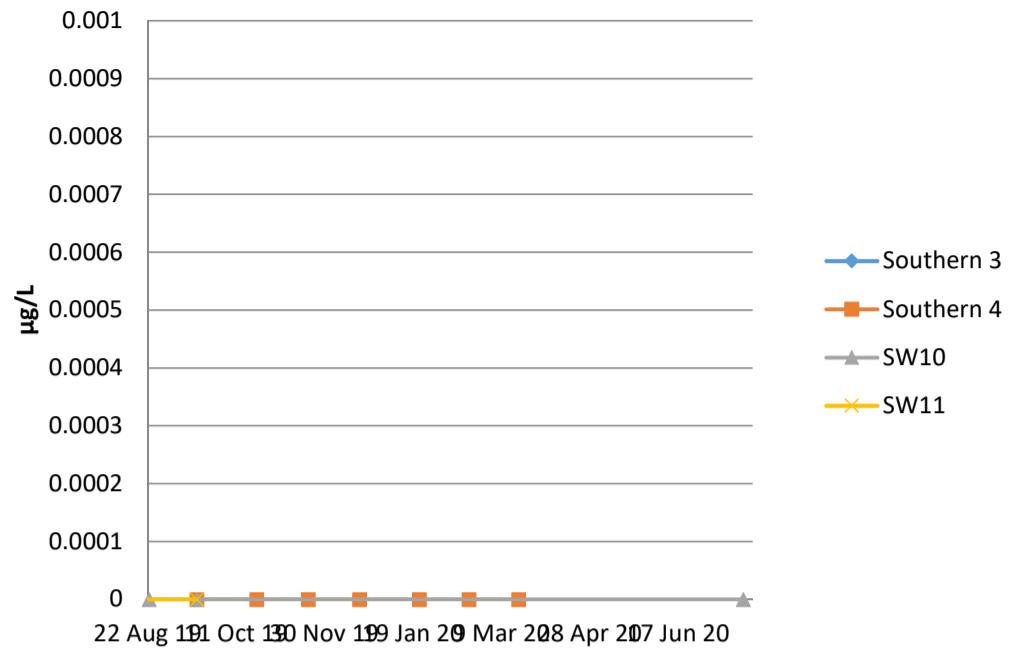
Disulfoton



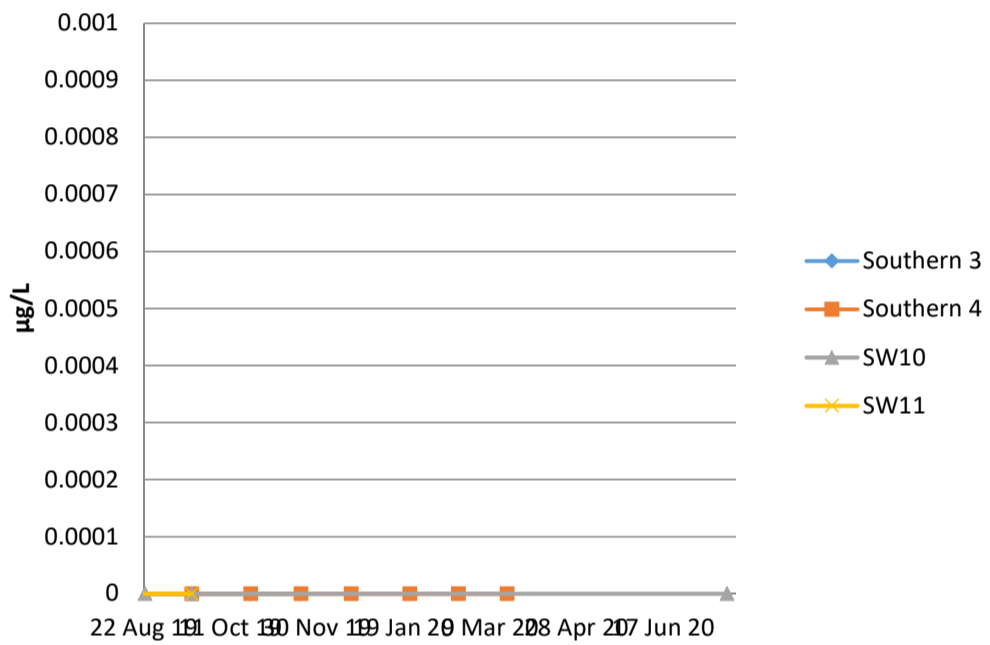
Diazinon



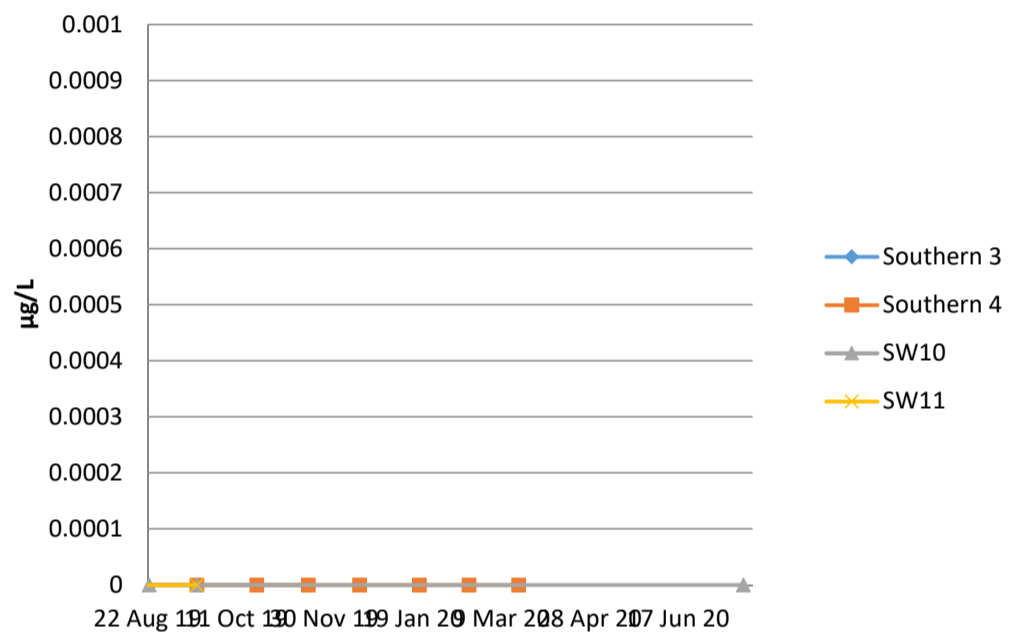
Dichlorvos



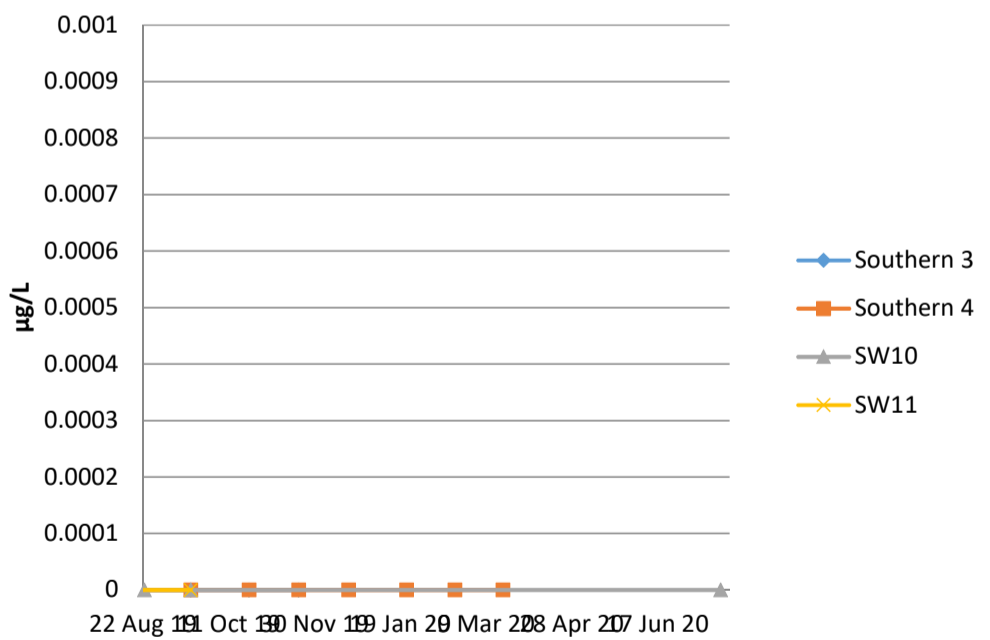
Demeton-S



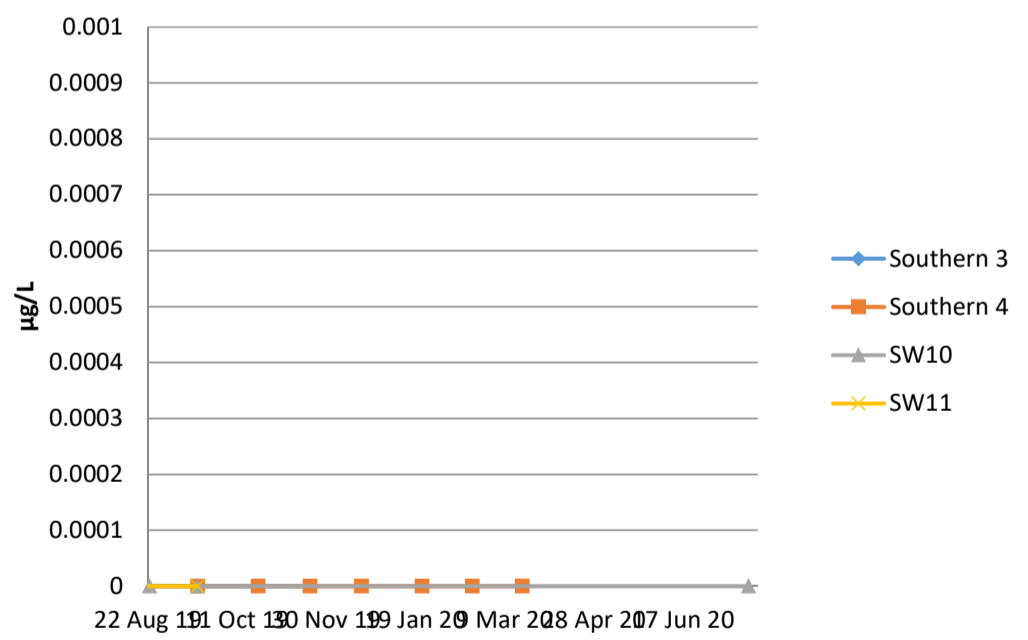
Demeton-S-methyl

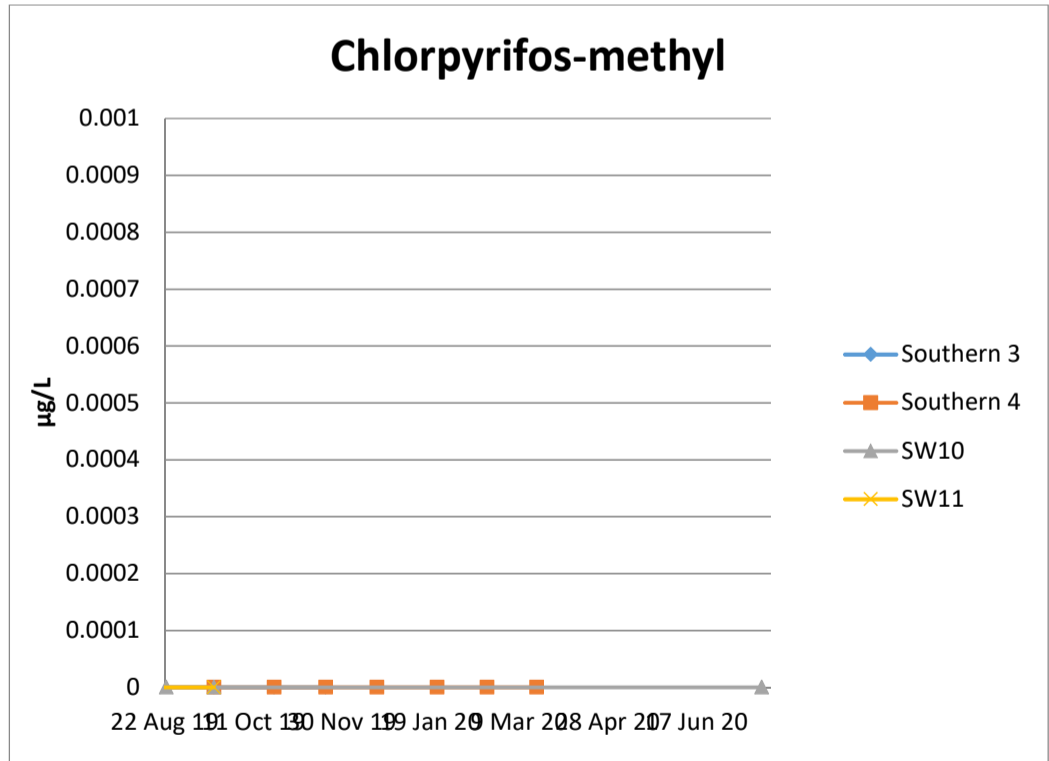
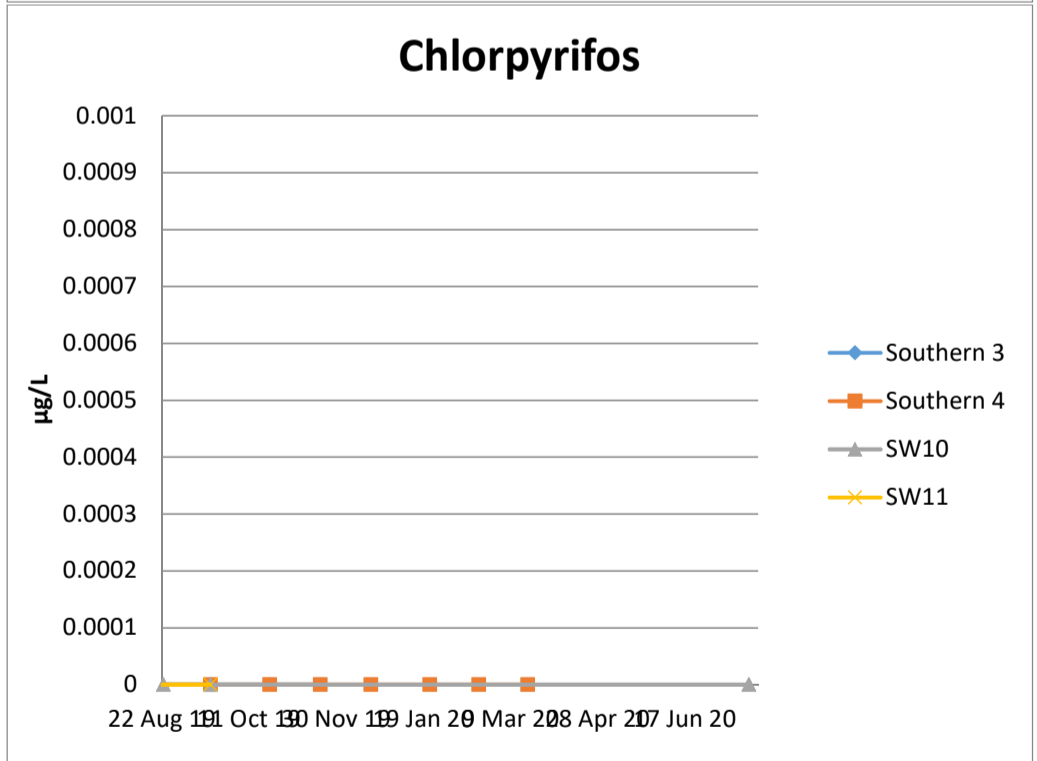
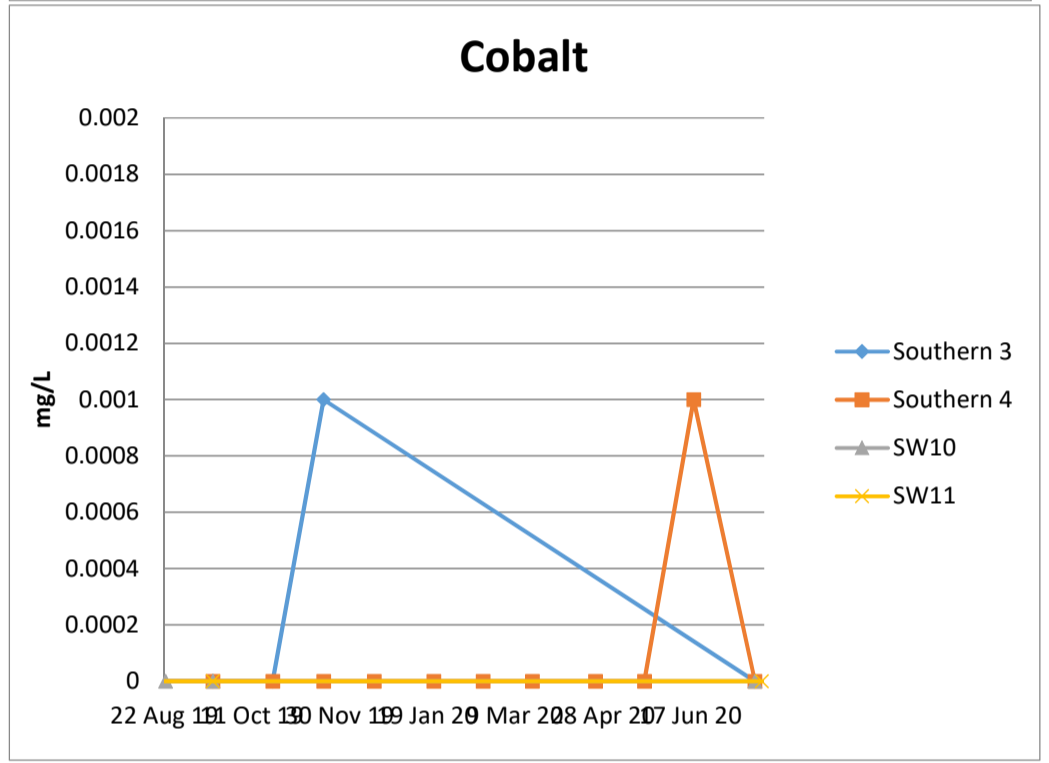
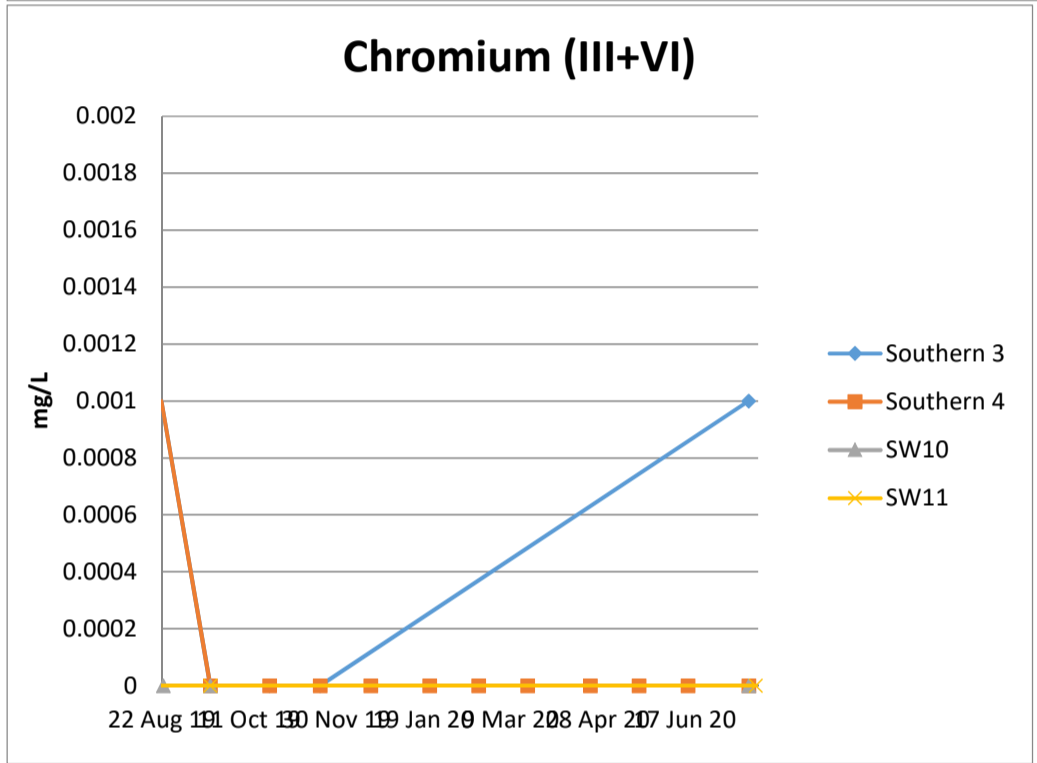
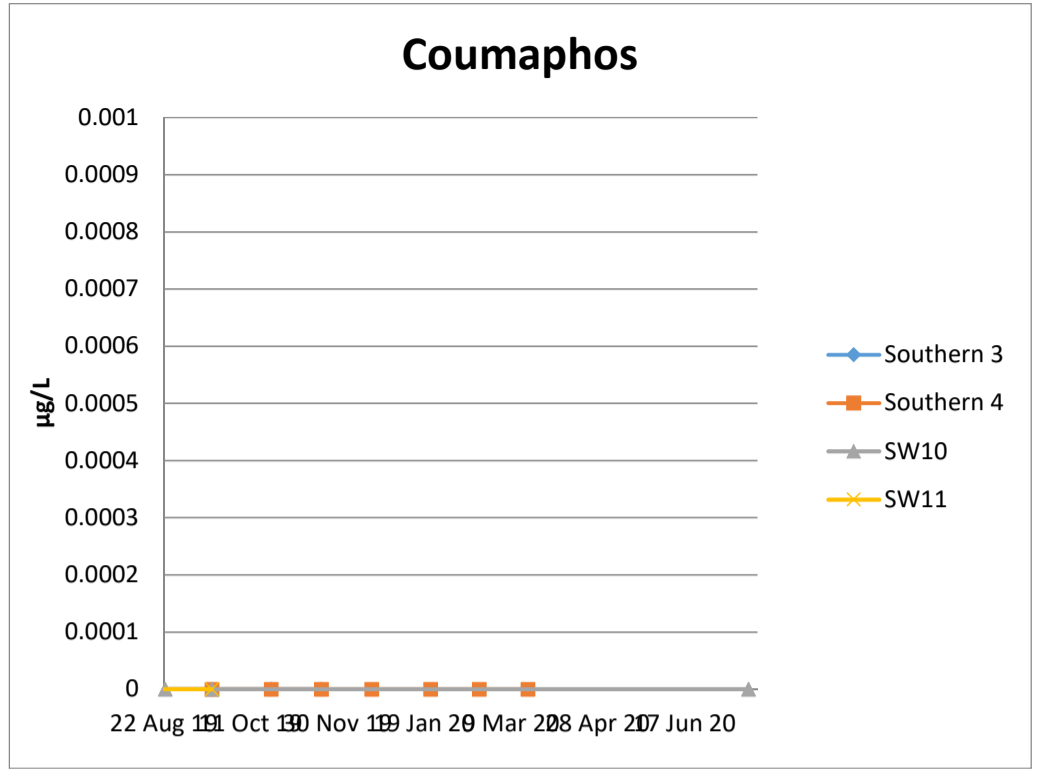
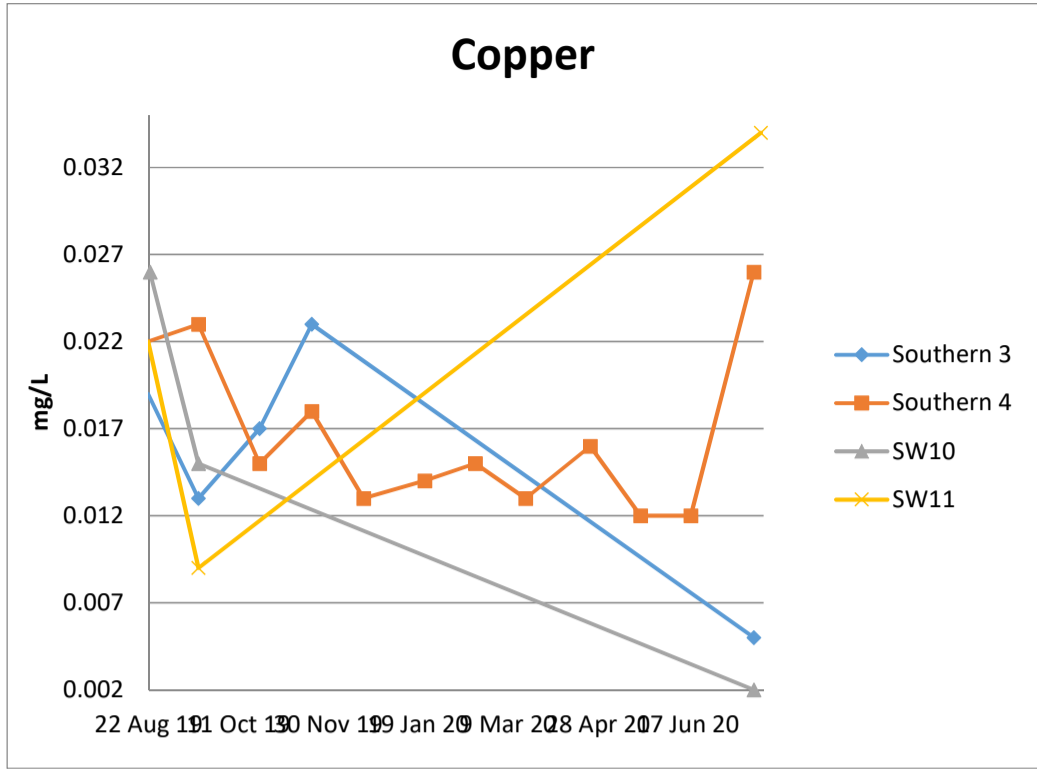


Demeton-O

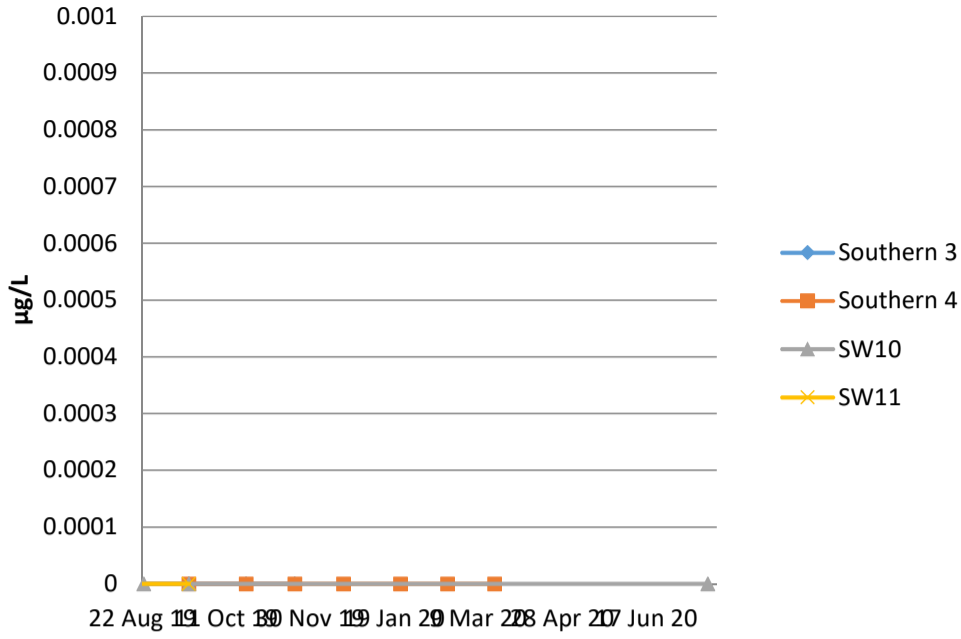


Demeton-O & Demeton-S

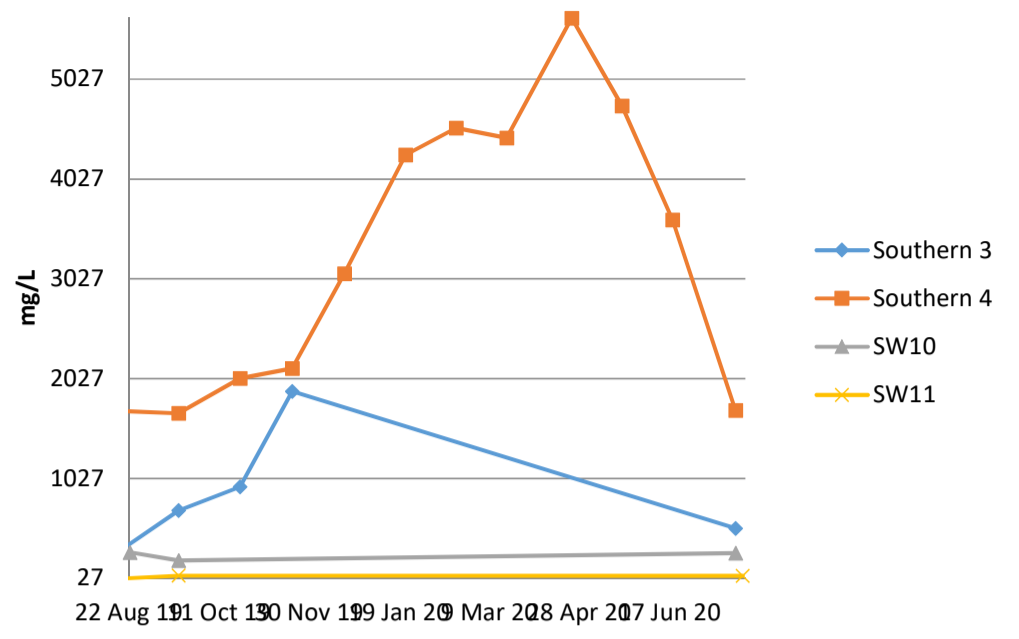




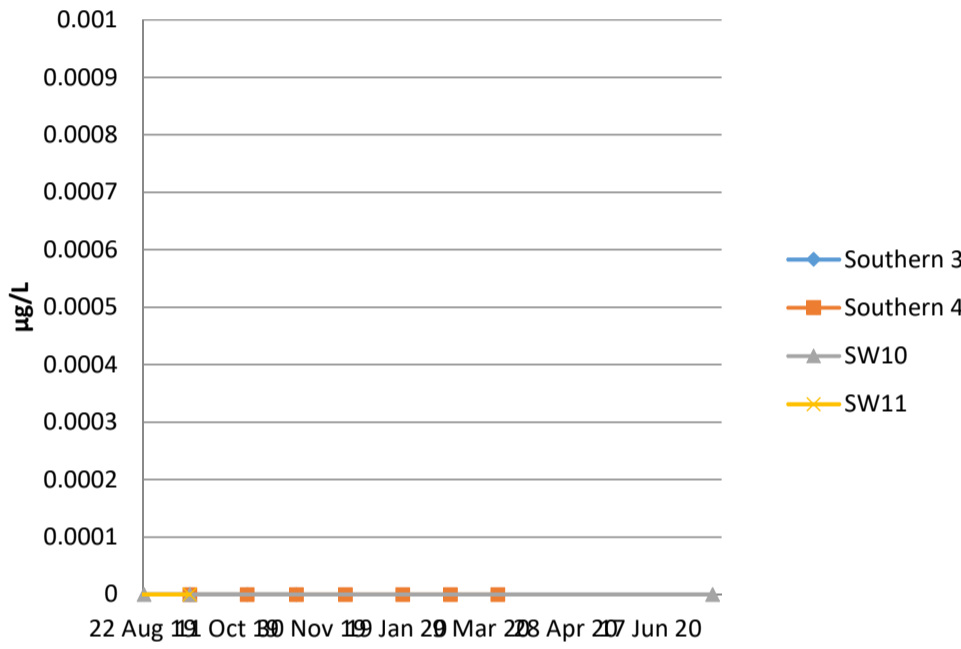
Chlorfenvinphos



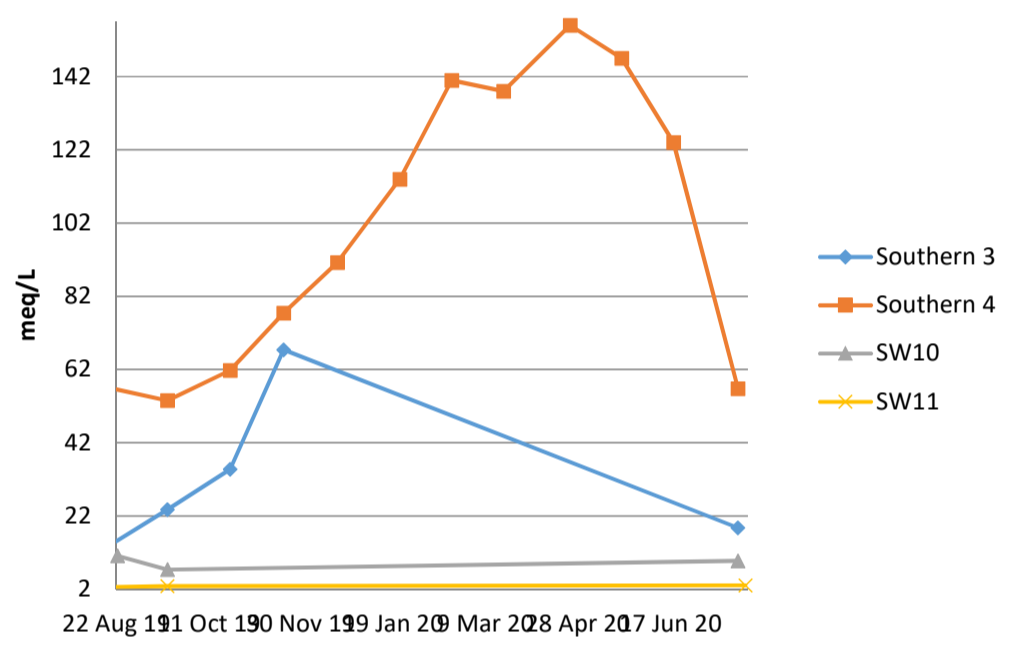
Chloride



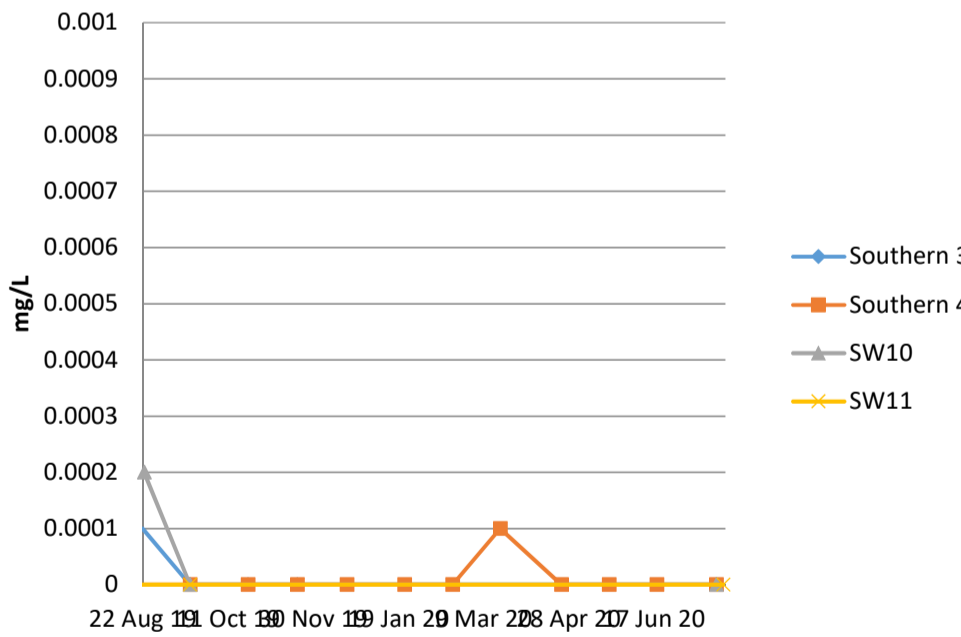
Carbophenothion



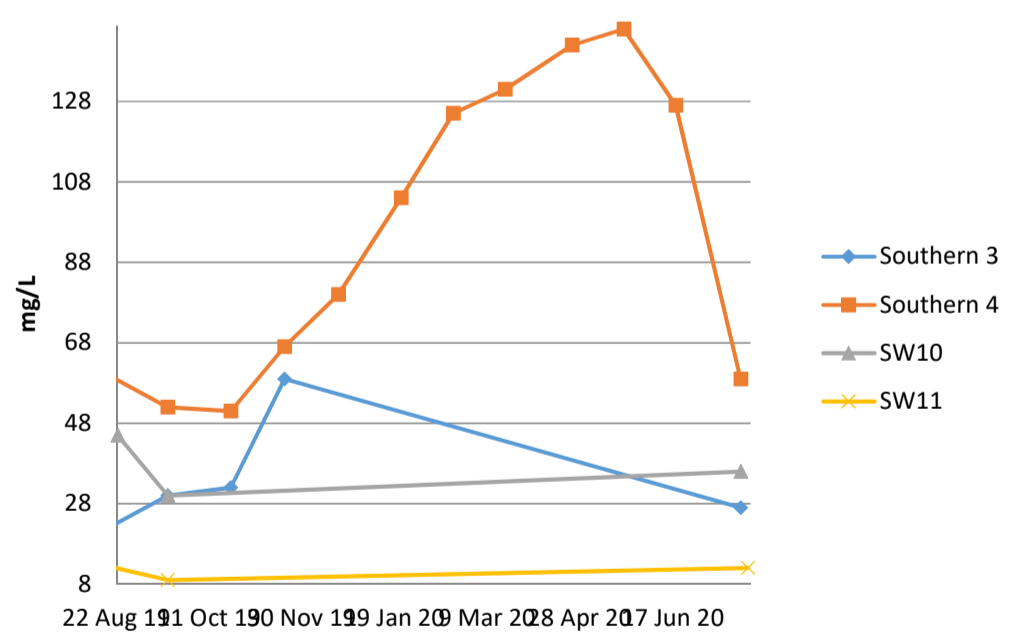
Cations Total



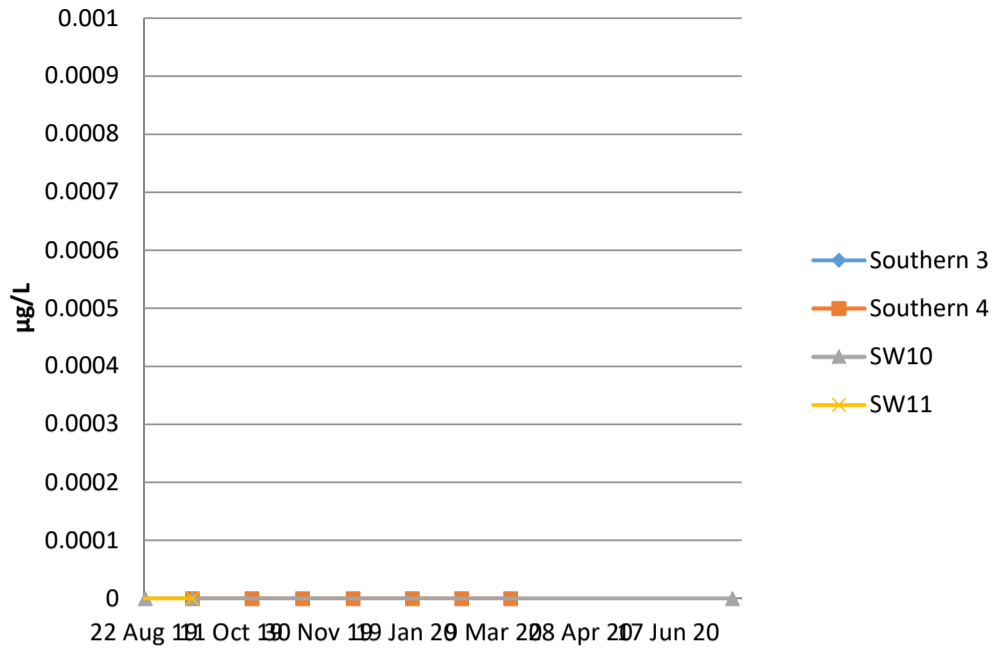
Cadmium



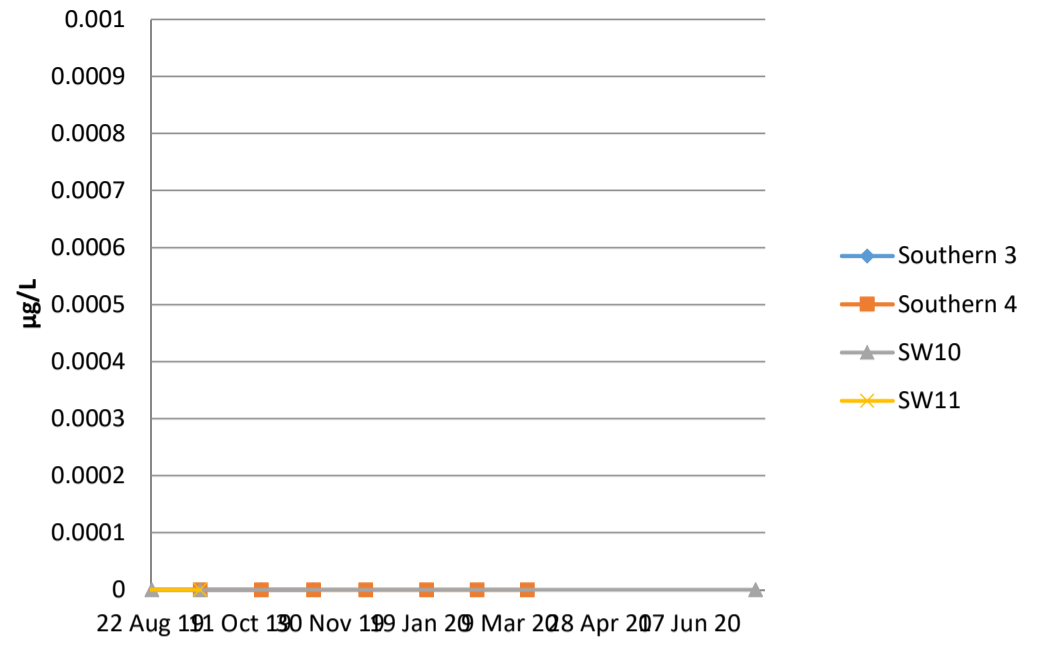
Calcium



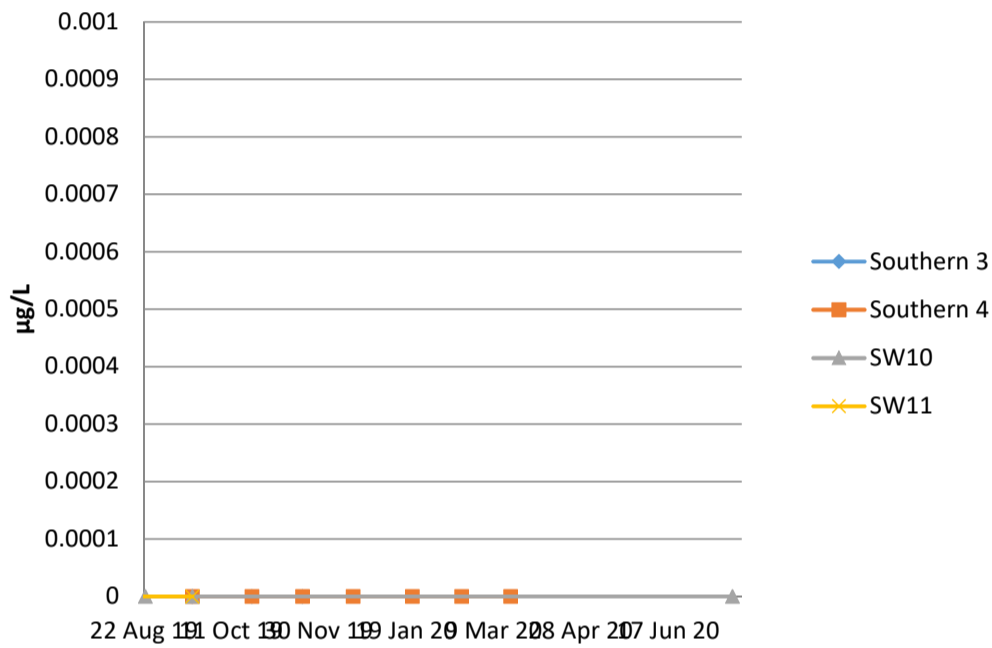
Bromophos-ethyl



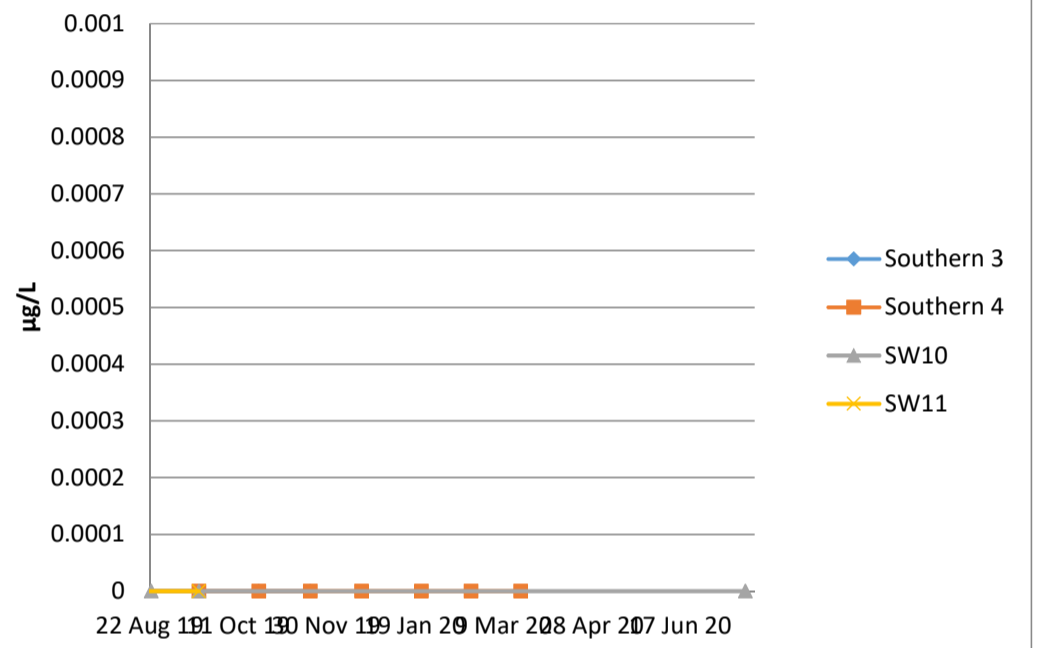
BTEX (Sum of Total) - Lab Calc



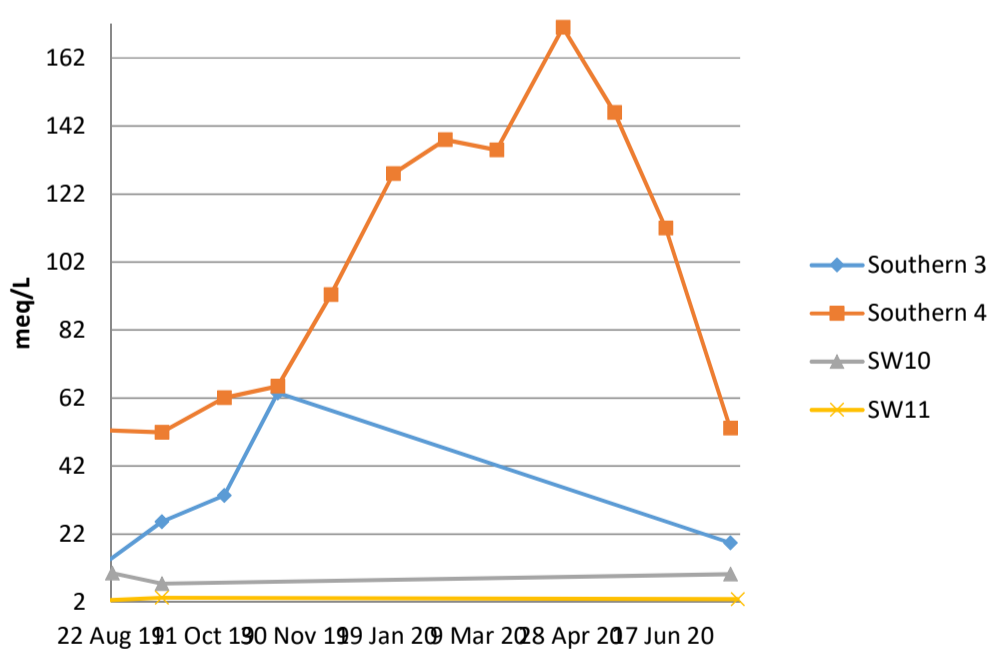
Azinphos methyl



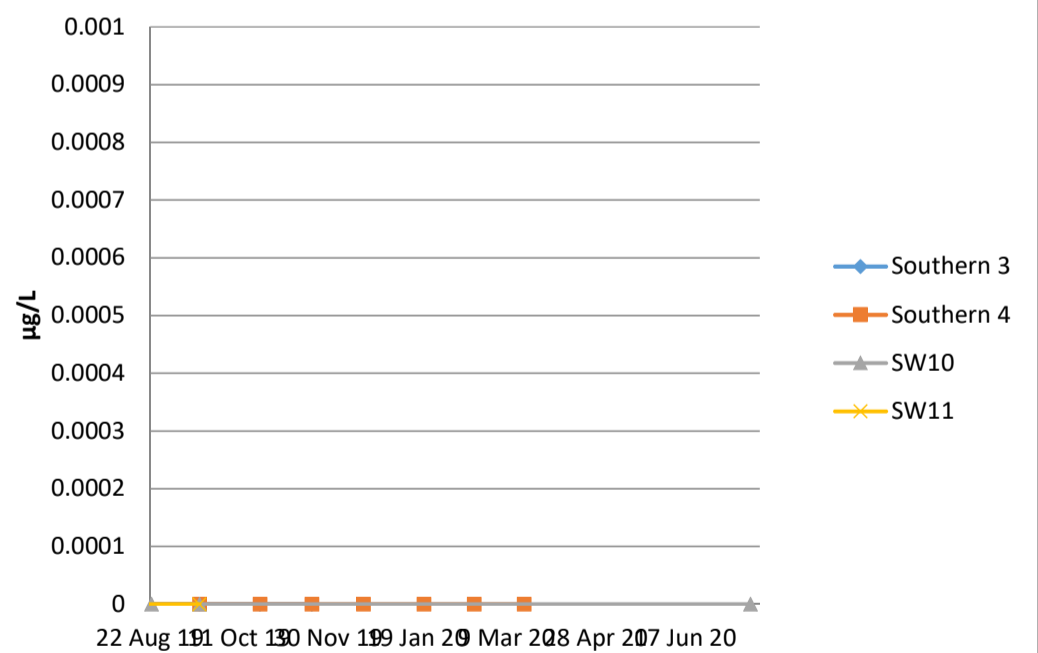
Benzene

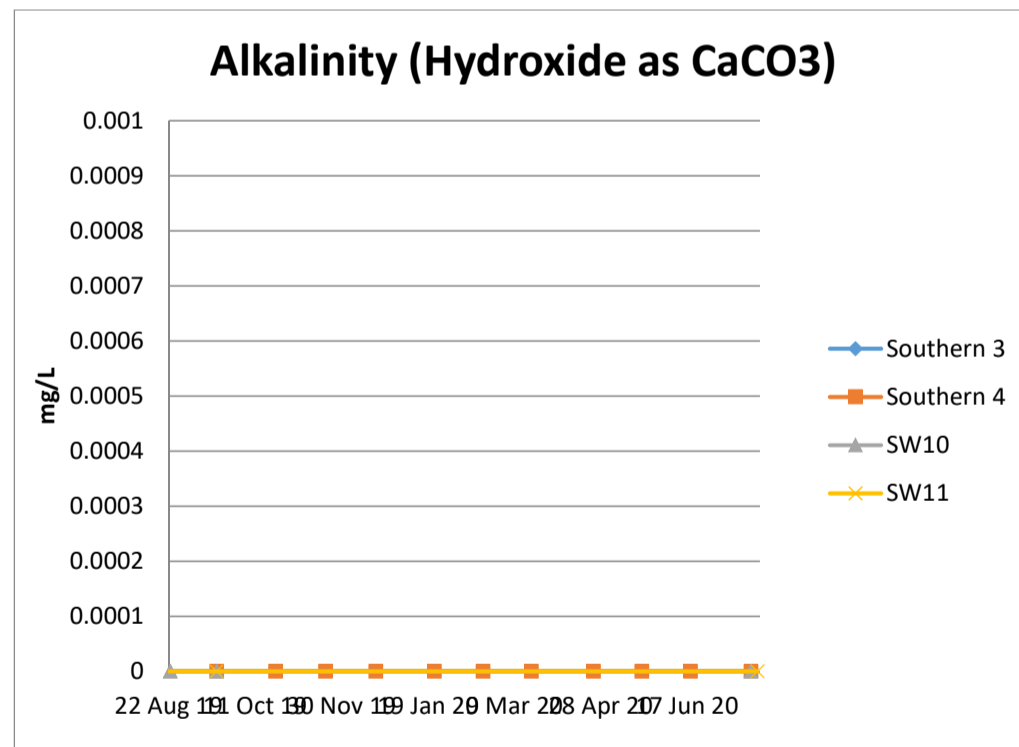
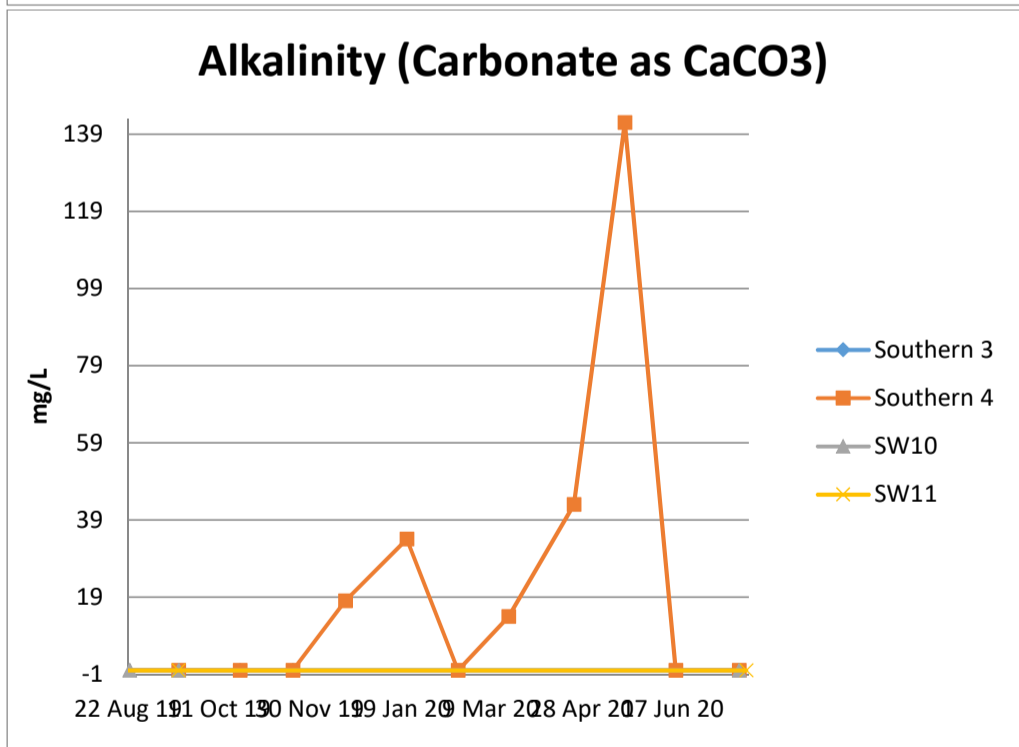
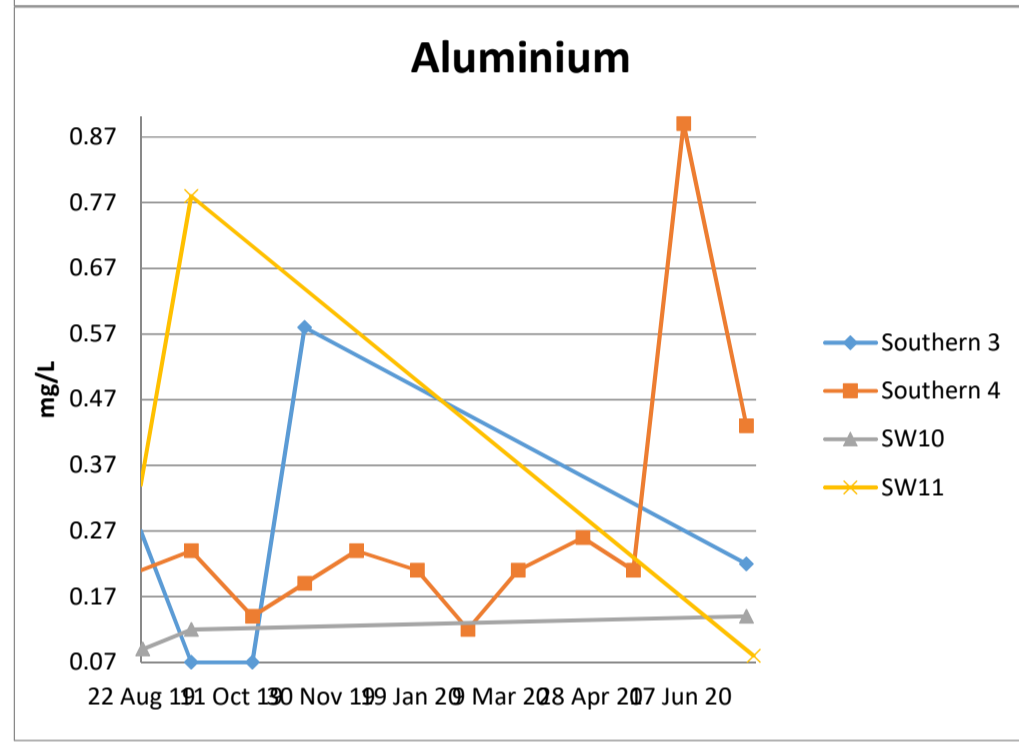
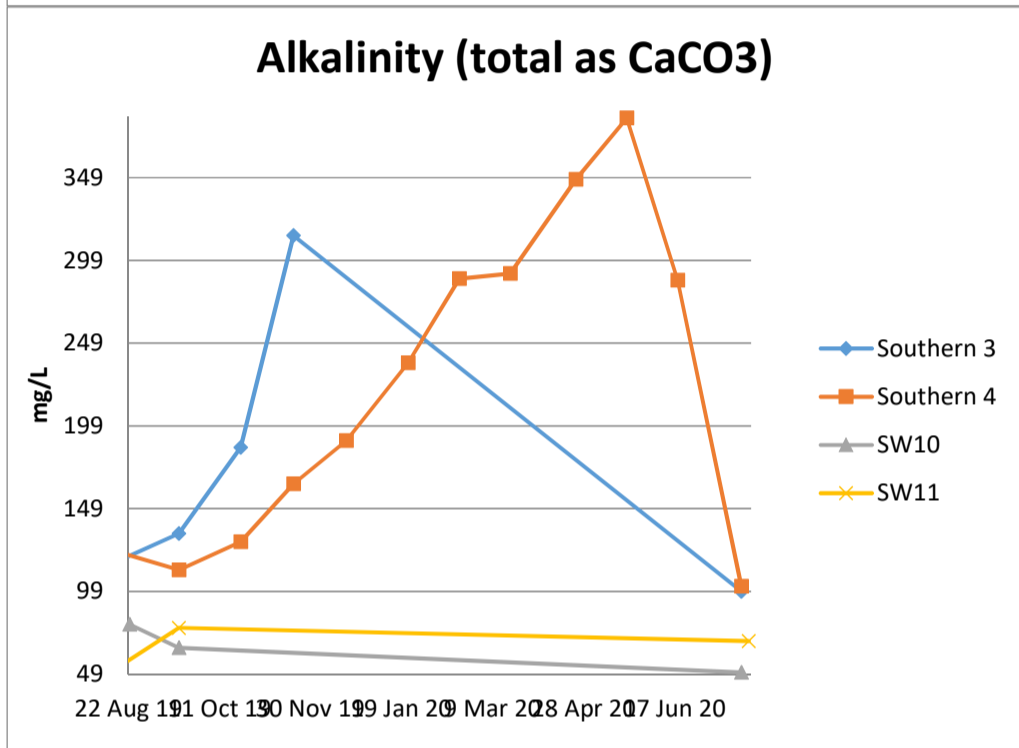
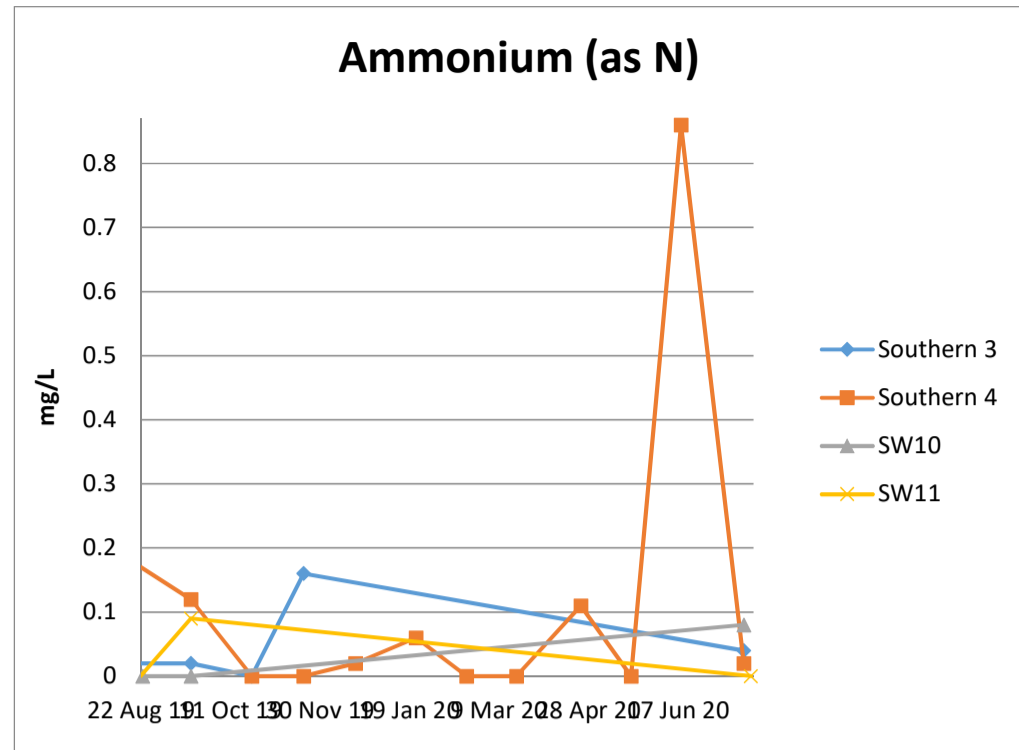
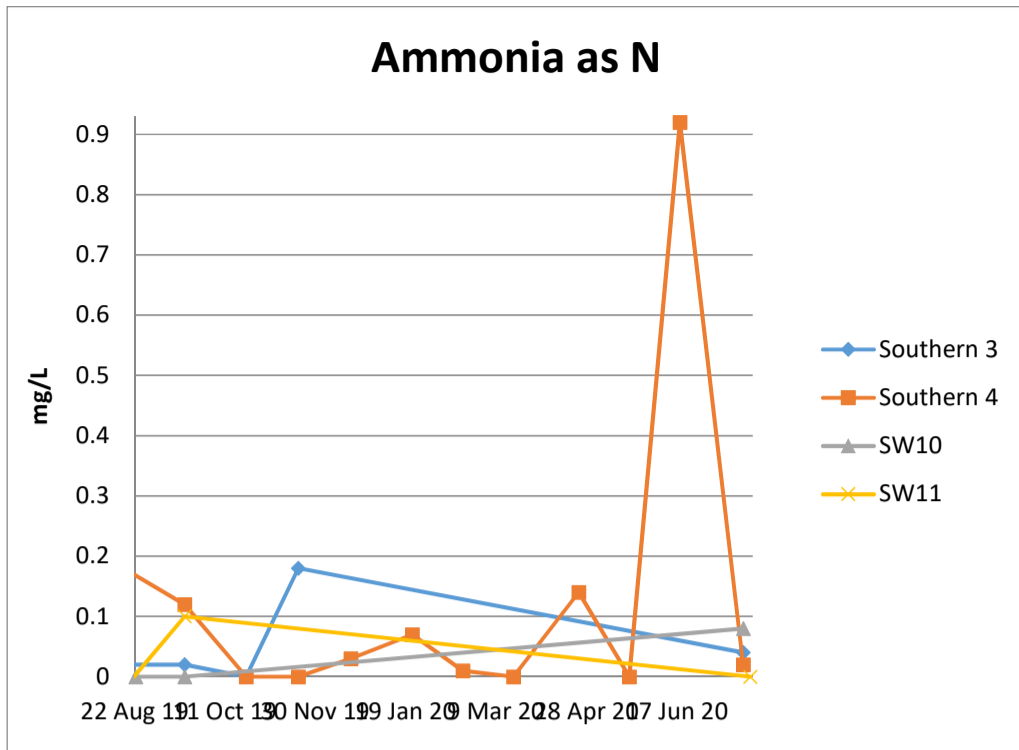


Anions Total

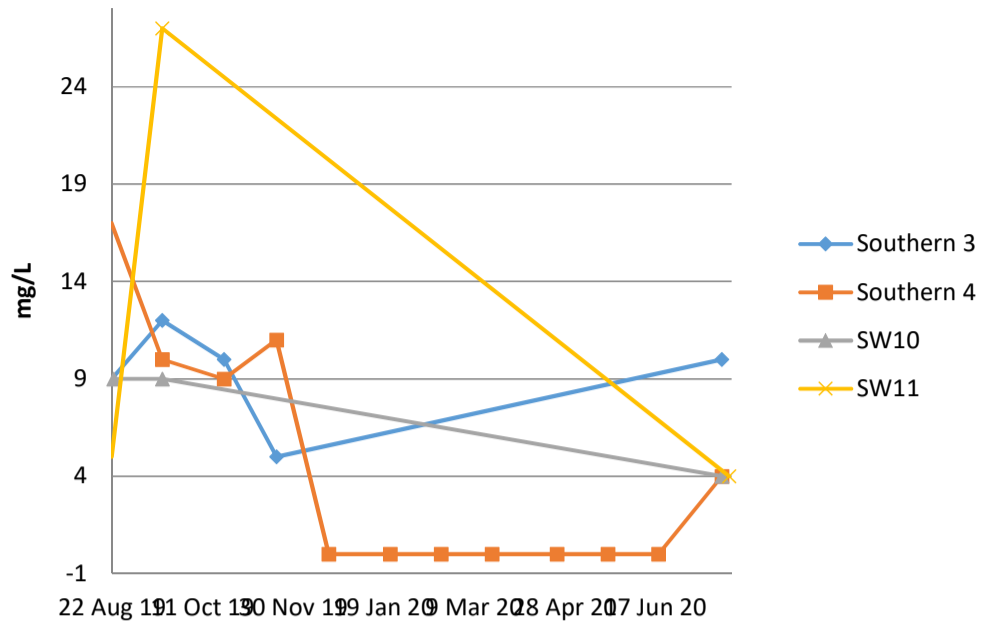


Azinphos Ethyl

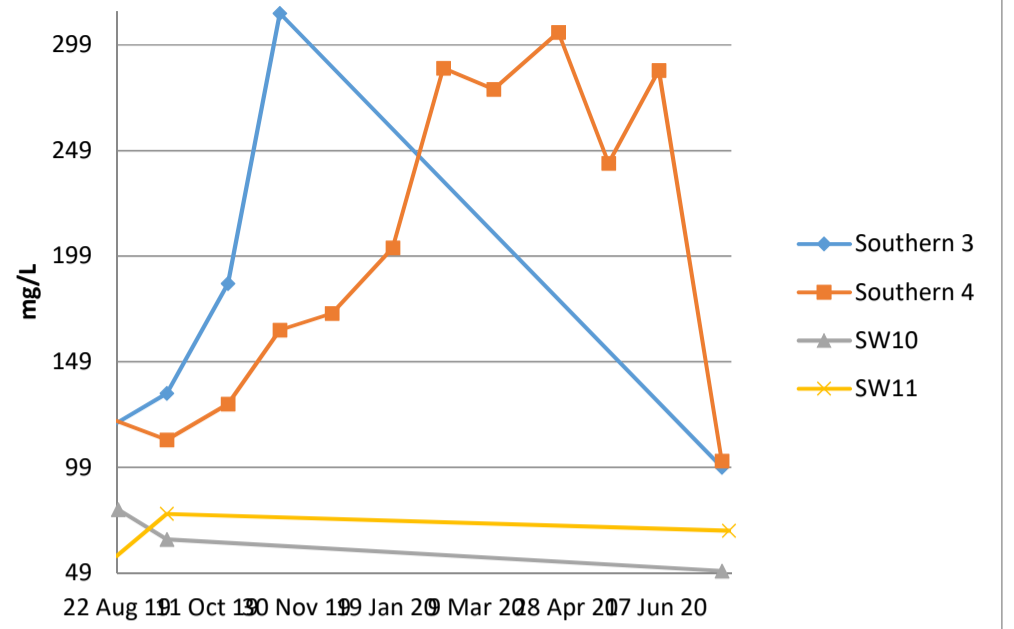




Acidity (as CaCO3)



Alkalinity (Bicarbonate as CaCO3)





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