

Source & Notes
DER ASS Risk Mapping from DER.
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

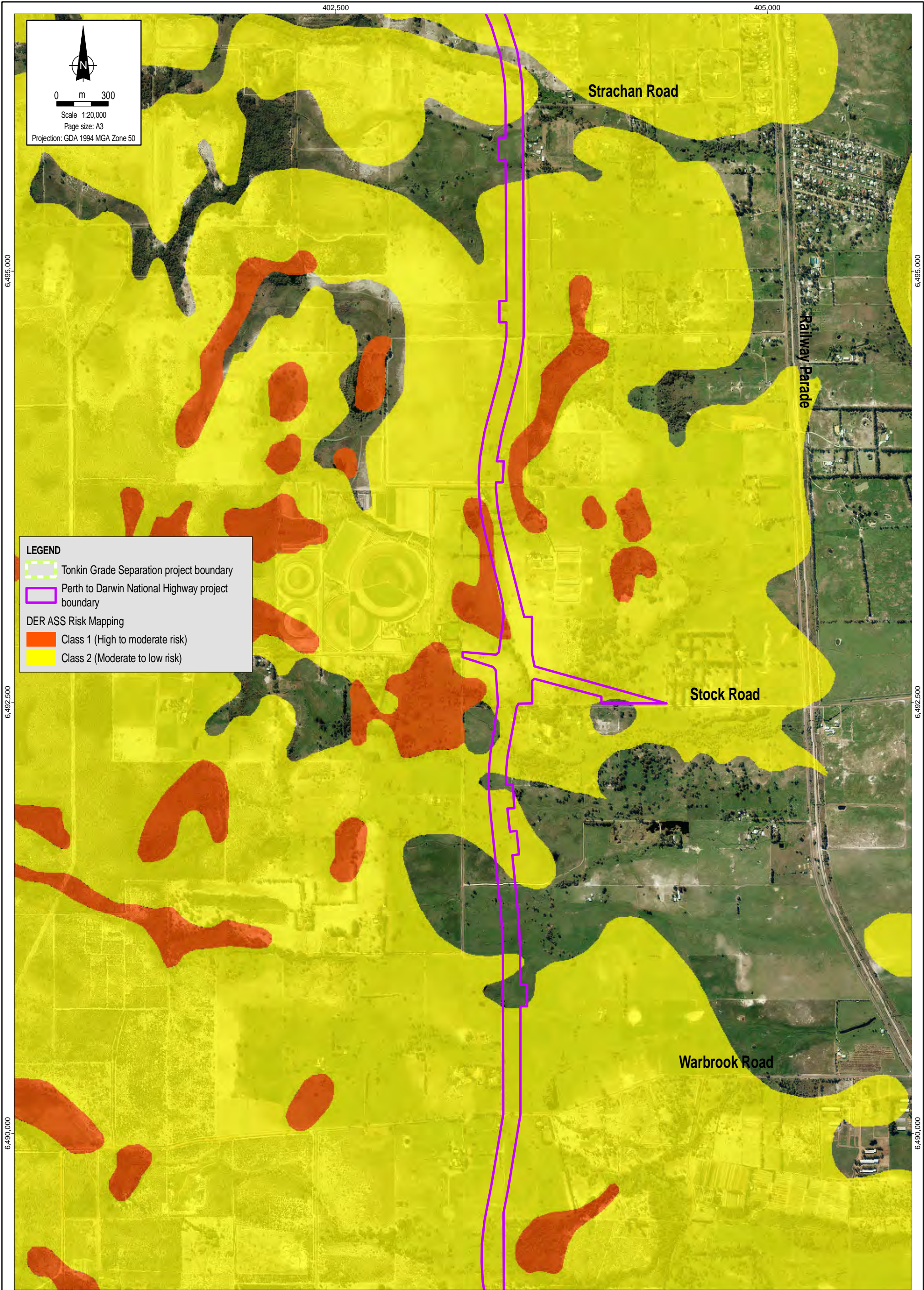
coffey

Date:
27.01.2015
MXT:
4483AA_18_GIS009_2
File Name:
4483AA_18_F005C_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

DER Acid Sulfate Soils
Risk Mapping

Figure No:
5C



LEGEND

- Tonkin Grade Separation project boundary
- Perth to Darwin National Highway project boundary
- DER ASS Risk Mapping**
 - Class 1 (High to moderate risk)
 - Class 2 (Moderate to low risk)

Source & Notes
DER ASS Risk Mapping from DER.
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

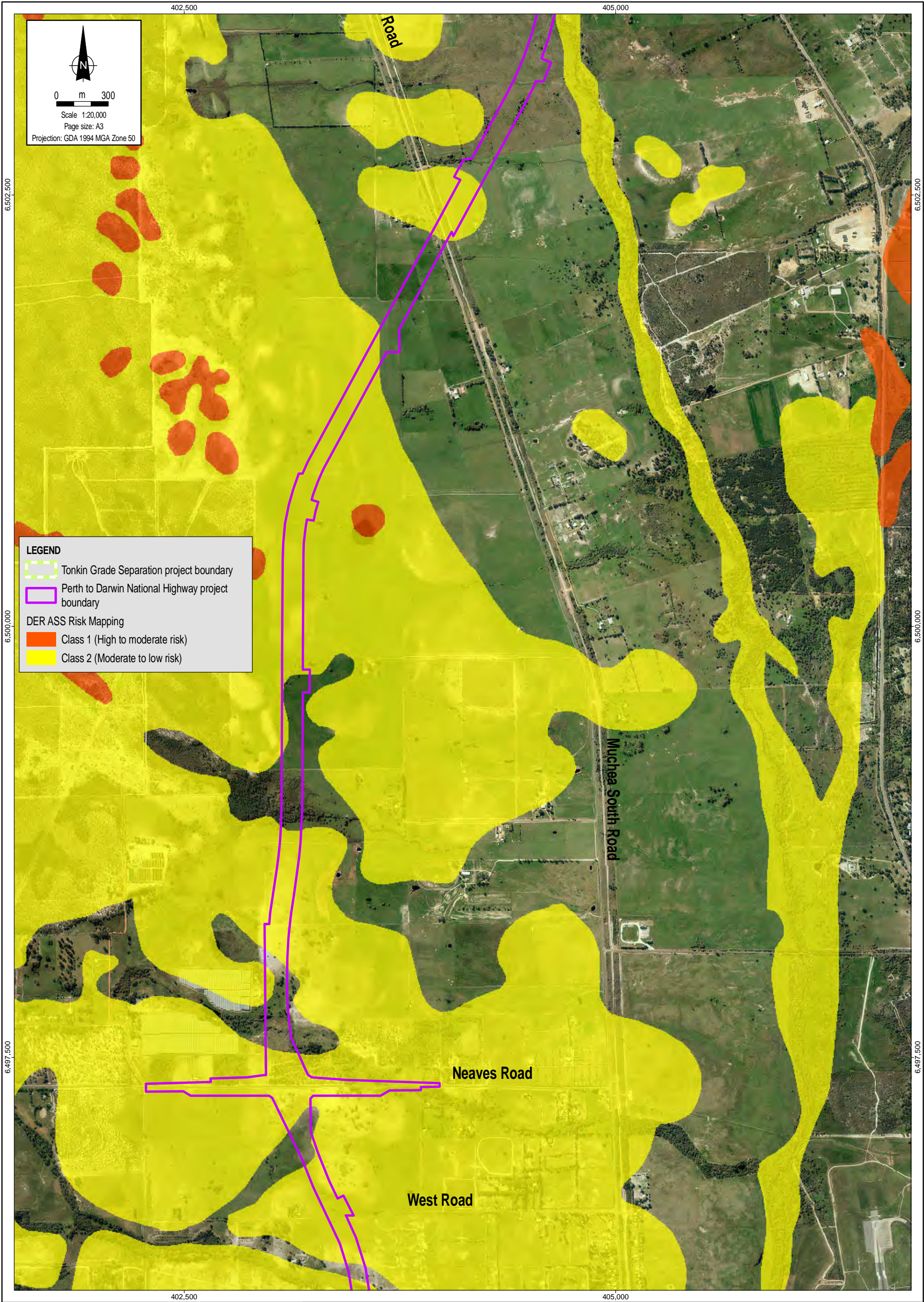
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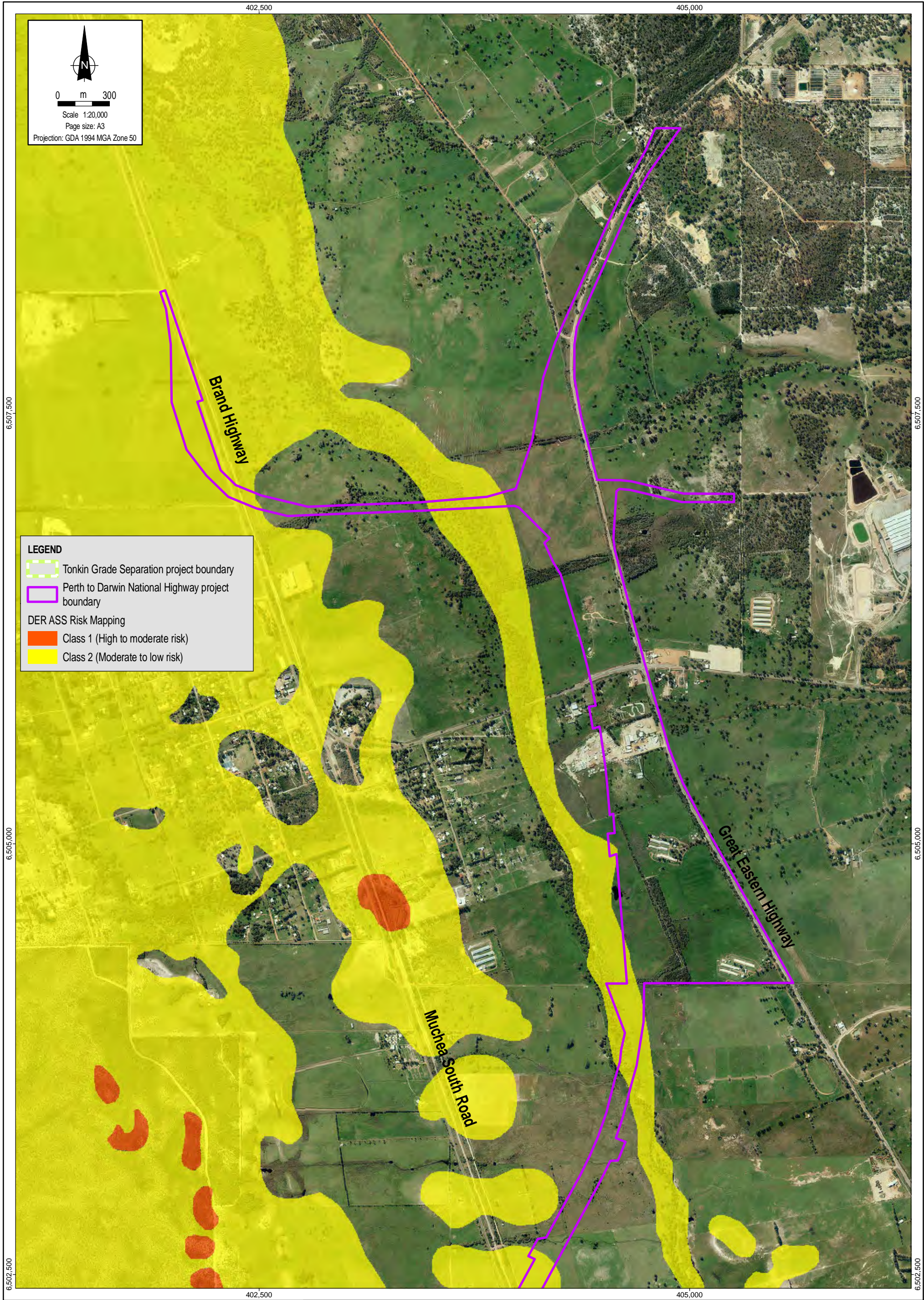
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File Name:
4483AA_18_F005D_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

DER Acid Sulfate Soils
Risk Mapping

Figure No:
5D





LEGEND

Tonkin Grade Separation project boundary

Perth to Darwin National Highway project boundary

DER ASS Risk Mapping

Class 1 (High to moderate risk)

Class 2 (Moderate to low risk)

Source & Notes
DER ASS Risk Mapping from DER.
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

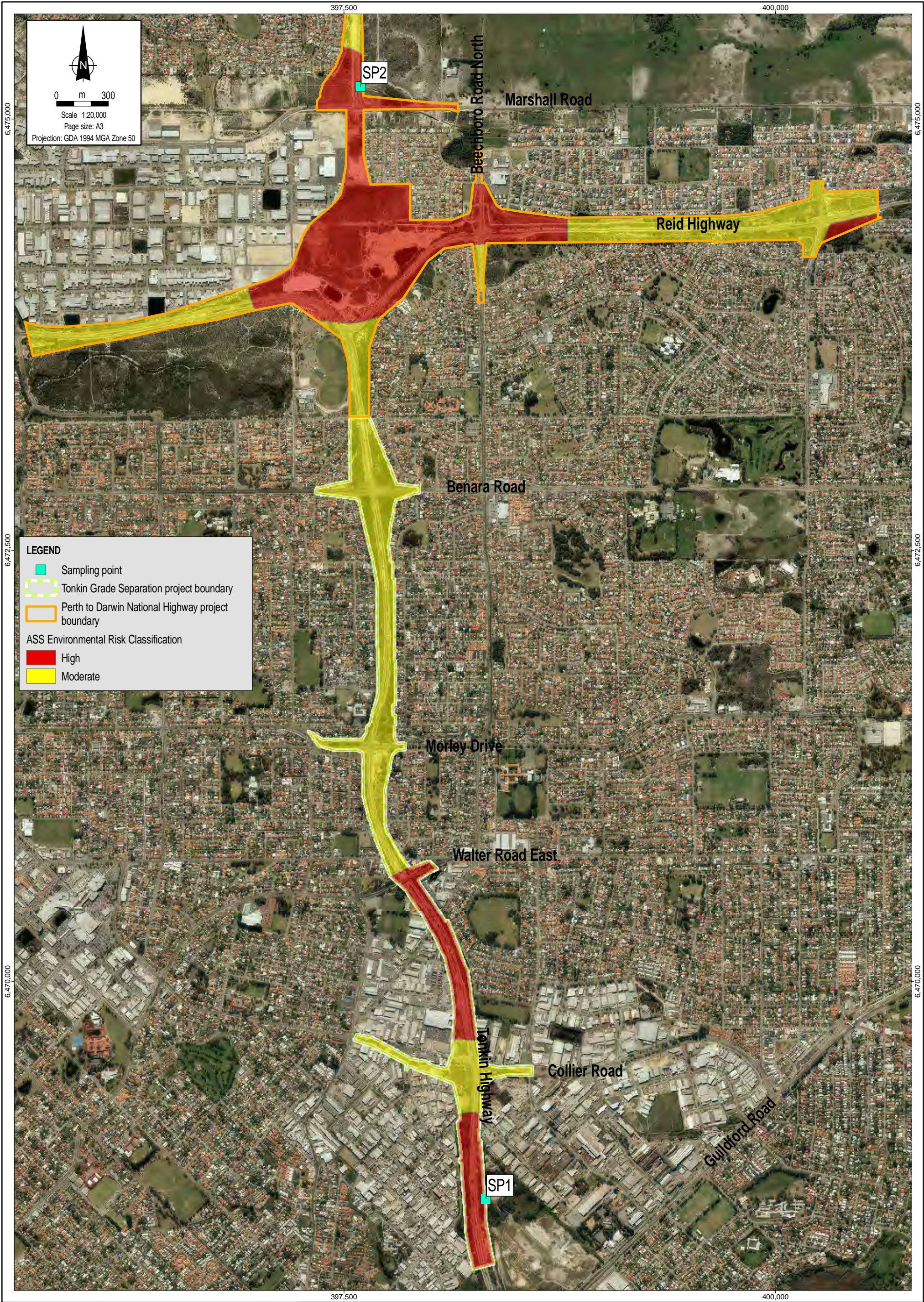
coffey

Date: 27.01.2015
MXT: 4483AA 18 GIS009 2
File Name: 4483AA 18 F005F GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

**DER Acid Sulfate Soils
Risk Mapping**

Figure No:
5F



Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

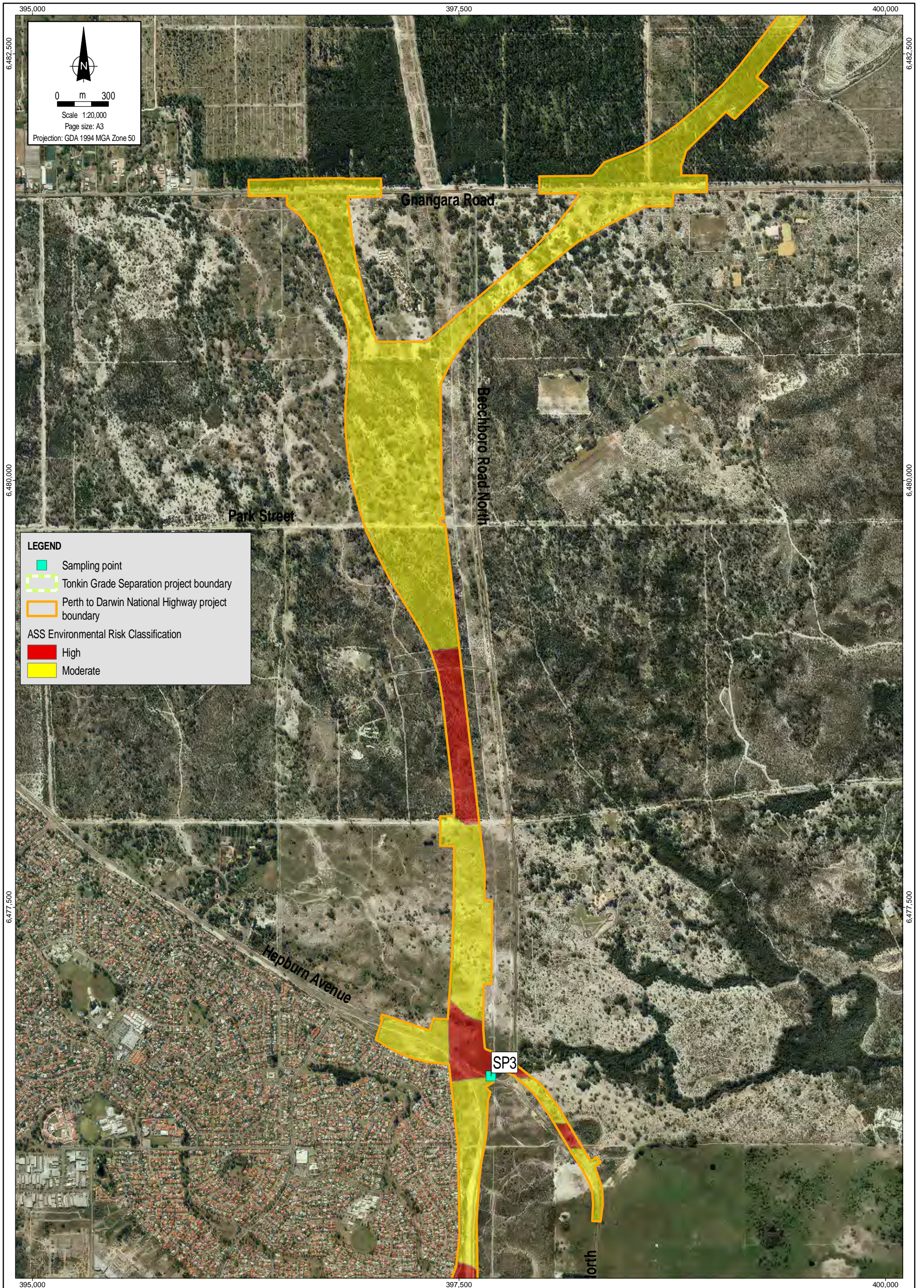
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Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006A_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

Sampling locations and
ASS environmental risk classification

Figure No:
6A



Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

coffey

Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006B_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

Sampling locations and
ASS environmental risk classification

Figure No:
6B



Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

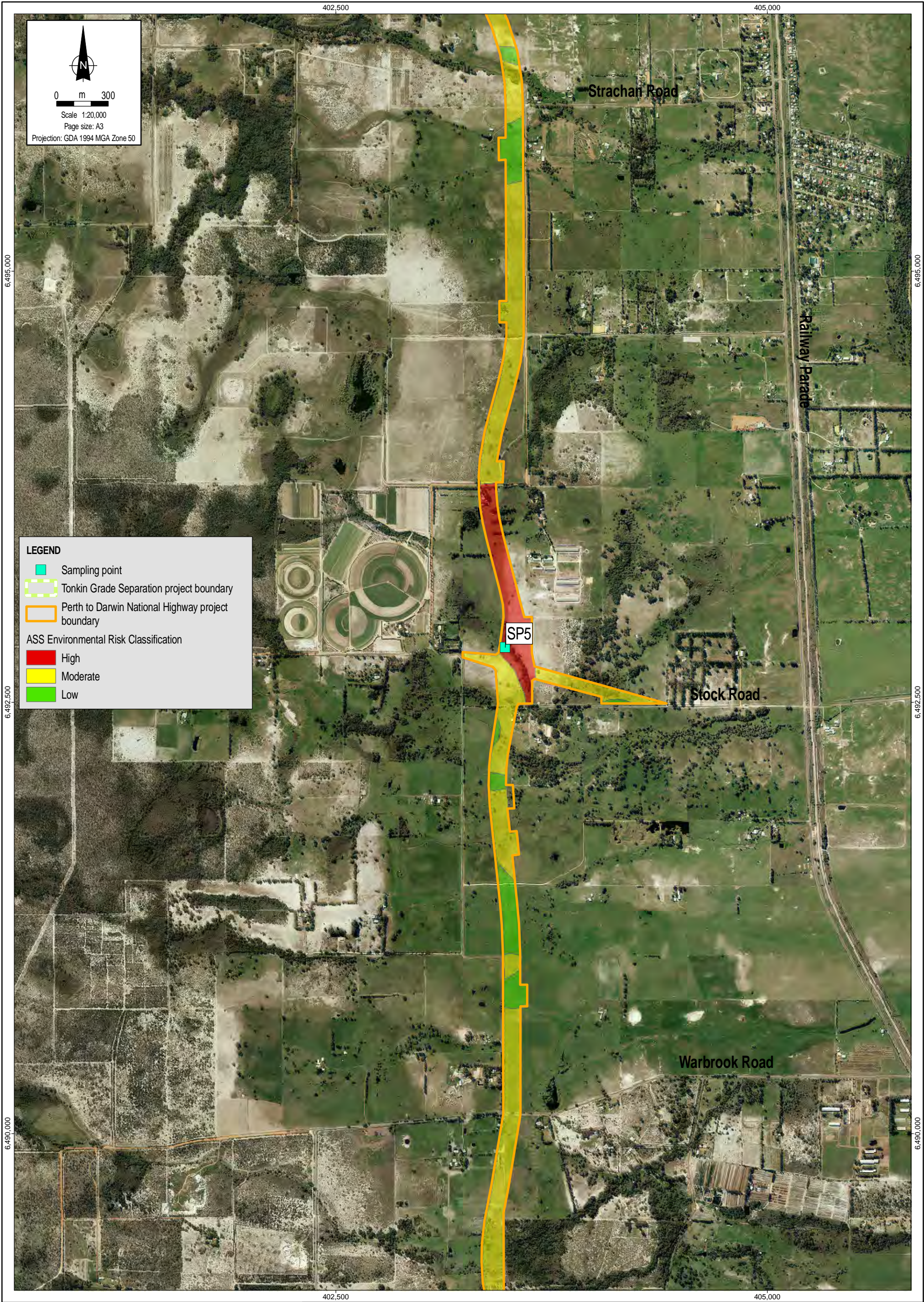
coffey

Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006C_GIS


Main Roads WA
Preliminary Acid Sulfate Soils Investigation


Sampling locations and
ASS environmental risk classification


Figure No:
6C




LEGEND


 Sampling point


 Tonkin Grade Separation project boundary

 Perth to Darwin National Highway project boundary

ASS Environmental Risk Classification

 High

 Moderate

 Low

Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

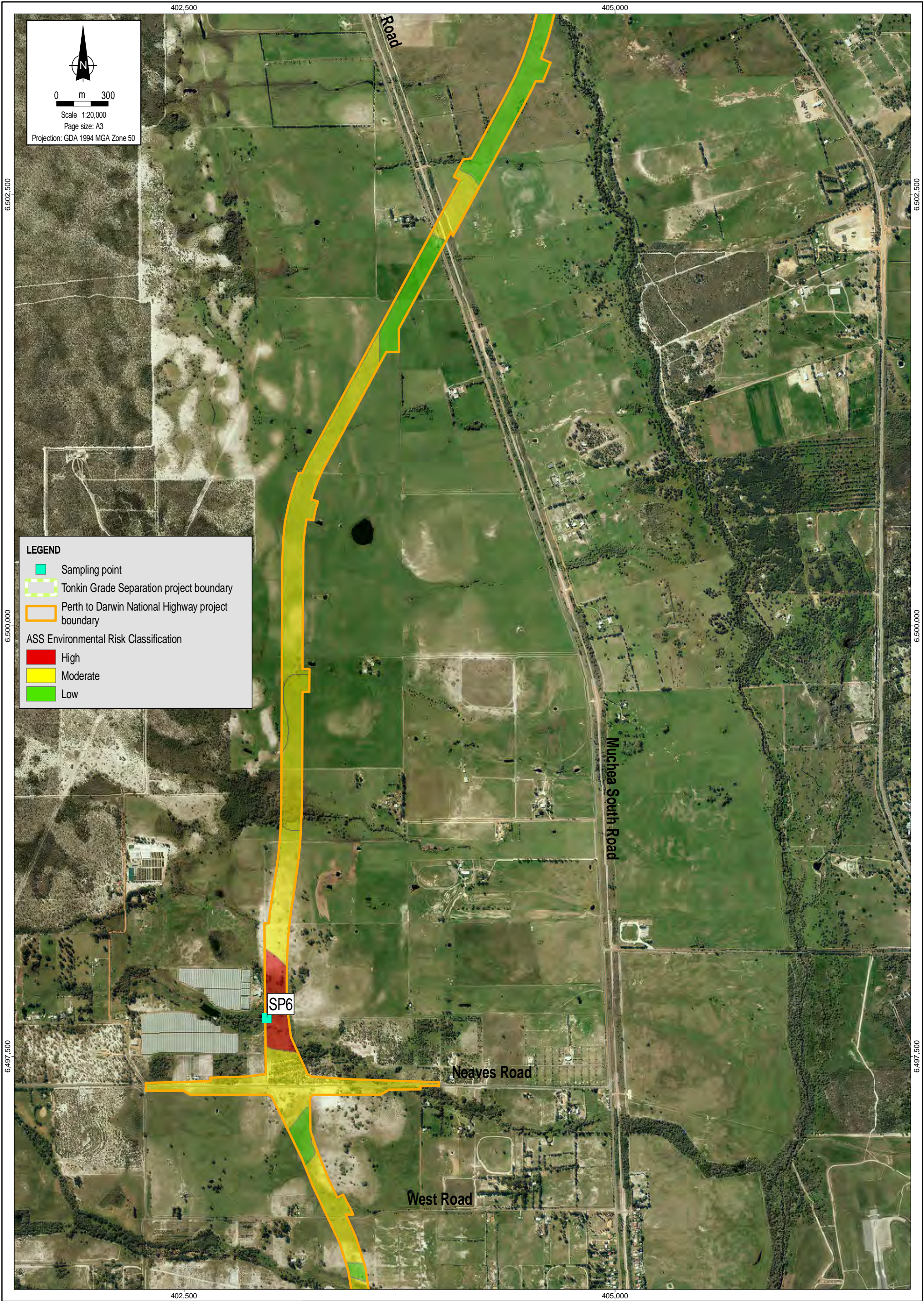
coffey

Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006D_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

Sampling locations and
ASS environmental risk classification

Figure No:
6D



Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)

NorthLinkWA

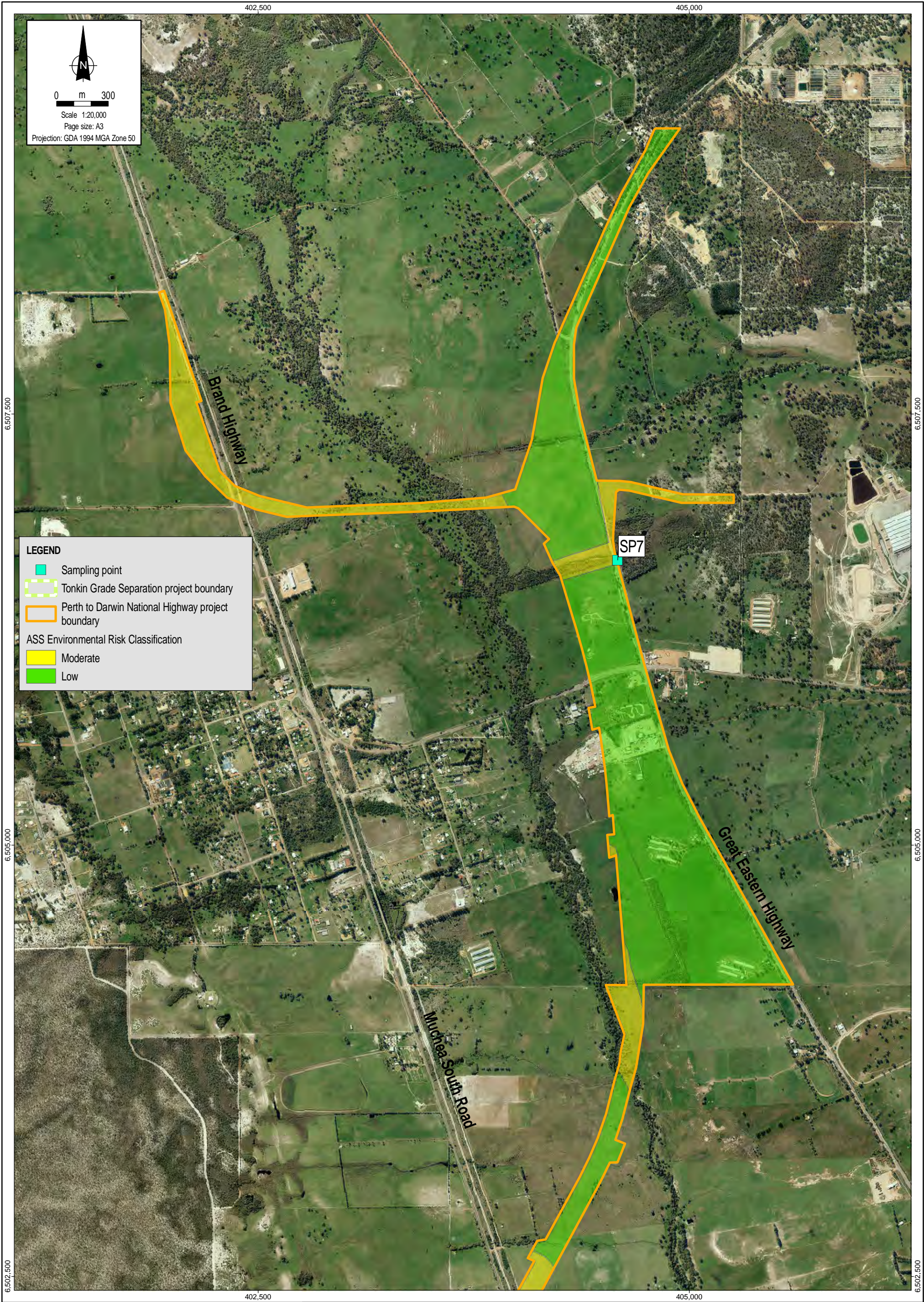
coffey

Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006E_GIS

Main Roads WA
Preliminary Acid Sulfate Soils Investigation

Sampling locations and
ASS environmental risk classification

Figure No:
6E



LEGEND

- Sampling point
- Tonkin Grade Separation project boundary
- Perth to Darwin National Highway project boundary
- ASS Environmental Risk Classification
 - Moderate
 - Low

Source & Notes
Preliminary sampling locations and
Acid sulfate soils risk mapping from Coffey (October 2014)
Cadastral from MRWA (August 2014)
Aerial imagery from Landgate (August 2014)



Date:
27.01.2015
MXT:
4483AA_18_GIS012_1
File Name:
4483AA_18_F006F_GIS

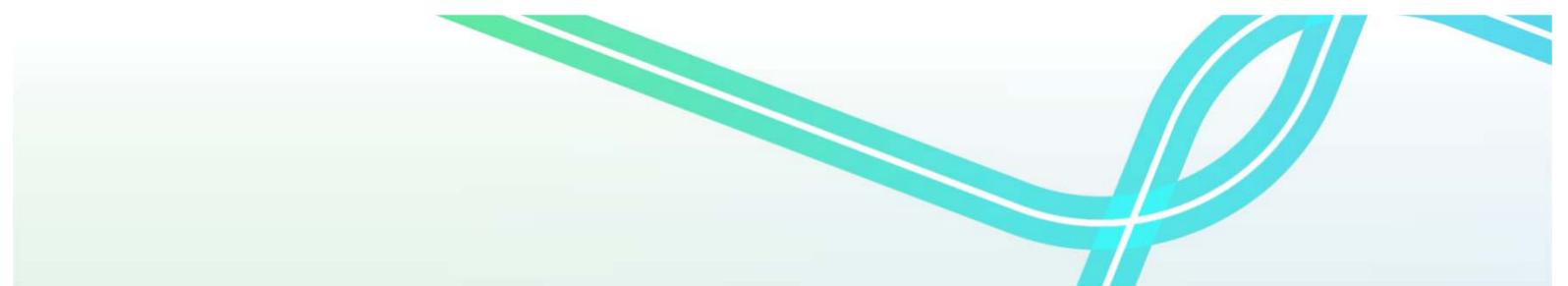
Main Roads WA
Preliminary Acid Sulfate Soils Investigation

Sampling locations and
ASS environmental risk classification

Figure No:
6F



Appendices



APPENDIX A

Geomorphic wetlands

Unique feature identifier	Wetland type	Management category	Consanguineous suite	Location (inside/outside)
8416	Palusplain	Conservation category	Bennett Brook	Inside
8429	Sumpland	Conservation category	Bennett Brook	Inside
8773	Palusplain	Conservation category	Ellenbrook	Inside
8792	Dampland	Conservation category	Jandakot	Inside
8800	Sumpland	Conservation category	Muchea	Inside
8914	Palusplain	Conservation category	Ellenbrook	Inside
15028	Sumpland	Conservation category	Jandakot	Inside
15033	Sumpland	Conservation category	Jandakot	Inside
15260	Palusplain	Conservation category	Bennett Brook	Inside
8541	Dampland	Resource enhancement	Jandakot	Inside
8554	Sumpland	Resource enhancement	Jandakot	Inside
8779	Sumpland	Resource enhancement	Muchea	Inside
8783	Sumpland	Resource enhancement	Ellenbrook	Inside
15752	Palusplain	Resource enhancement	Bennett Brook	Inside
15757	Sumpland	Resource enhancement	Jandakot	Inside
8254	Dampland	Multiple use	Bennett Brook	Inside
8411	Dampland	Multiple use	Bennett Brook	Inside
8438	Dampland	Multiple use	Bennett Brook	Inside
8447	Dampland	Multiple use	Jandakot	Inside
8449	Dampland	Multiple use	Jandakot	Inside
8464	Sumpland	Multiple use	Jandakot	Inside
8730	Dampland	Multiple use	Jandakot	Inside
8784	Floodplain	Multiple use	Ellenbrook	Inside
8785	Floodplain	Multiple use	Ellenbrook	Inside
8936	Sumpland	Multiple use	Muchea	Inside
13096	Sumpland	Multiple use	Jandakot	Inside
15029	Palusplain	Multiple use	Bennett Brook	Inside
15030	Sumpland	Multiple use	Jandakot	Inside
15175	Palusplain	Multiple use	Bennett Brook	Inside
15200	Sumpland	Multiple use	Jandakot	Inside
15732	Palusplain	Multiple use	Muchea/Ellenbrook	Inside



APPENDIX B

Site photographs



Plate 1 **Soil lithology at borehole SP1**



Plate 2 **Soil lithology at borehole SP2**



Plate 3 **Creek line running through grazing land**



Plate 4 **Typical grazing paddock**



Plate 5 **Low lying bushland/sedges**



Plate 6 **Low lying paddock with surface water**



Plate 8 **Chicken farm within the PDNH alignment**



Plate 9 **Ephemeral water course**



APPENDIX C

Soil borelogs



Drilling Log

Hand Auger Hole **SP1**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 2.0 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 1.4 m. Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0					SP SM	Silty SAND: fine grained, grey/black, well sorted, dry
					SW	SAND: medium grained, grey, poorly sorted, dry
						Becoming medium/coarse grained
1						Silty SAND: fine grained, grey/black, well sorted, moist
▽					SP SM	Wet
2						Hole terminated @ 2m below ground surface
3						



Drilling Log

Hand Auger Hole **SP2**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 2.0 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 1.5 m. Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
					SP SM	Silty SAND: fine to medium grained, dark grey, well sorted, some organics present, dry
						SAND: fine to medium grained, grey, dry
1						Moist
					SW	Becoming medium/coarse grained, wet
2						Hole terminated @ 2m below ground surface
3						



Drilling Log

Hand Auger Hole **SP4**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 1.8 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 1.4 m. Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
					SP SM	Silty SAND: fine grained, black, well sorted, some organics present, moist
						SAND: medium grained, grey, well sorted, moist
						Wet
1					SP	
						Becoming fine to coarse grained
2						Hole terminated @1.75m below ground surface



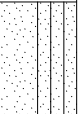
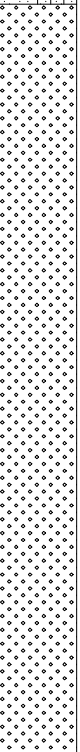
Drilling Log

Hand Auger Hole **SP5**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 1.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0					SP SM	Silty SAND: fine to medium grained, dark grey, well sorted, some organics present, dry
						SAND: fine to medium grained, grey, some silt fines present, dry
					SW	Moist
1						Wet
2						Hole terminated @ 1.5m below ground surface



Drilling Log

Hand Auger Hole **SP6**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 1.3 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 0.3 m. Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
					SW SM	Silty SAND: fine grained, black, poorly sorted, high organic content, moist
					SW	SAND: medium grained, grey/brown, poorly sorted, some organics present, wet
1						
						Hole terminated @1.25m below ground surface
2						



Drilling Log

Hand Auger Hole **SP7**

Page: 1 of 1

Project Northlink Owner BG&E
Location Perth - Darwin National Highway Proj. No. ENAUPERT04483AA
Surface Elev. NA Total Hole Depth 0.8 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 0.3 m. Static NA Diameter 0.075 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material Backfill Rig/Core _____
Drill Co. _____ Method Hand auger
Driller _____ Log By WA Date 16/9/14 Permit # NA
Checked By RM License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0					SW SM	Silty SAND: high organic content, wet
▽						Clayey SAND: medium grained, light brown/yellow, well sorted, not plastic, wet
						Becoming light brown
1					SP SC	
						Hole terminated @1.25m below ground surface
2						

Chain of custody and sample receipt documentation

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EP1407514**

Client : **COFFEY ENVIRONMENTS PTY LTD**
 Contact : **WESLEY ALPORT**
 Address : **SUITE 2**
53 BURSWOOD ROAD
BURSWOOD WA, AUSTRALIA 6100

Laboratory : Environmental Division Perth
 Contact : Scott James
 Address : 10 Hod Way Malaga WA Australia 6090

E-mail : wesley.alport@coffey.com
 Telephone : +61 08 6462 7900
 Facsimile : +61 08 6462 7936

E-mail : perth.enviro.services@alsglobal.com
 Telephone : +61-8-9209 7655
 Facsimile : +61-8-9209 7600

Project : ENAUPERT04483AA Northlink ASS Investigation

Page : 1 of 3

Order number : ----
 C-O-C number : ----
 Site : ----
 Sampler : ----

Quote number : EP2014COFENVWA0134 (EN/007/14)

QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received : 17-SEP-2014
 Client Requested Due Date : 18-SEP-2014

Issue Date : 17-SEP-2014 20:25
 Scheduled Reporting Date : **18-SEP-2014**

Delivery Details

Mode of Delivery : Carrier
 No. of coolers/boxes : 1 Medium Hard Eskies
 Security Seal : Intact.

Temperature : Frozen - Ice present
 No. of samples received : 37
 No. of samples analysed : 37

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- **Samples received in appropriately pretreated and preserved containers.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA037 ASS Field Screening Analysis
EP1407514-001	16-SEP-2014 15:00	SP1/0.0	✓
EP1407514-002	16-SEP-2014 15:00	SP1/0.25	✓
EP1407514-003	16-SEP-2014 15:00	SP1/0.5	✓
EP1407514-004	16-SEP-2014 15:00	SP1/0.75	✓
EP1407514-005	16-SEP-2014 15:00	SP1/1.0	✓
EP1407514-006	16-SEP-2014 15:00	SP1/1.25	✓
EP1407514-007	16-SEP-2014 15:00	SP1/1.5	✓
EP1407514-008	16-SEP-2014 15:00	SP1/1.75	✓
EP1407514-009	16-SEP-2014 15:00	SP2/0.0	✓
EP1407514-010	16-SEP-2014 15:00	SP2/0.25	✓
EP1407514-011	16-SEP-2014 15:00	SP2/0.5	✓
EP1407514-012	16-SEP-2014 15:00	SP2/0.75	✓
EP1407514-013	16-SEP-2014 15:00	SP2/1.0	✓
EP1407514-014	16-SEP-2014 15:00	SP2/1.25	✓
EP1407514-015	16-SEP-2014 15:00	SP4/0.0	✓
EP1407514-016	16-SEP-2014 15:00	SP4/0.25	✓
EP1407514-017	16-SEP-2014 15:00	SP4/0.5	✓
EP1407514-018	16-SEP-2014 15:00	SP4/0.75	✓
EP1407514-019	16-SEP-2014 15:00	SP4/1.0	✓
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EP1407514-022	[17-SEP-2014]	SP5/0.0	✓
EP1407514-023	[17-SEP-2014]	SP5/0.25	✓
EP1407514-024	[17-SEP-2014]	SP5/0.5	✓
EP1407514-025	[17-SEP-2014]	SP5/0.75	✓
EP1407514-026	[17-SEP-2014]	SP5/1.0	✓
EP1407514-027	[17-SEP-2014]	SP5/1.25	✓
EP1407514-028	16-SEP-2014 15:00	SP6/0.0	✓
EP1407514-029	16-SEP-2014 15:00	SP6/0.25	✓
EP1407514-030	16-SEP-2014 15:00	SP6/0.5	✓
EP1407514-031	16-SEP-2014 15:00	SP6/0.75	✓
EP1407514-032	16-SEP-2014 15:00	SP6/1.0	✓
EP1407514-033	[17-SEP-2014]	SP7/0.00	✓
EP1407514-034	[17-SEP-2014]	SP7/0.25	✓
EP1407514-035	[17-SEP-2014]	SP7/0.50	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS PAYABLE (BURSWOOD)

- A4 - AU Tax Invoice (INV)

Email Mary_Selby@coffey.com

RORY MACLEAOD

- *AU Certificate of Analysis - NATA
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA
- A4 - AU Sample Receipt Notification - Environmental HT
- A4 - AU Tax Invoice
- Chain of Custody (CoC)
- EDI Format - ENMRG
- EDI Format - ESDAT
- EDI Format - XTab

[illegible]

WESLEY ALPORT

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

[illegible]



Suite 2
53 Burswood Rd
BURSWOOD WA 6100
Telephone: 08 9355 7100
Facsimile: 08 9355 7111
Page 1 of _

LABORATORY ANALYSIS & CHAIN OF CUSTODY RECORD

To: ALS
Address: 10 Hod Way
Malaga, WA 6090
Attention: Sample Receipt
Telephone: (08) 9209 7655
Facsimile: (08) 9209 7600
Received by: R. Goss
Date received: 17/9

Project No. ENAUPERT04483AA
Project: Northlink ASS
Investigation

Sent By: R. Macleod
Date Delivered: 17/9/14

Lab Job No. : _____

Sample Type:

Soil



Groundwater



Other: _____

Project-Specific Instructions:

- On receipt of samples, Please email **Sample Receipt Advice** and signed COC to: rory.macleod@coffey.com and wesley.alport@coffey.com
- If any additional or missing bags please contact Rory on 0419316353.
- Please provide all results in esdat format

Sample ID	Date Sampled	Container	Turn Around Time	Analyses				
				Field Screen (pHf & pHfox)				
SP1/0.0	1	16-Sep-14	1 x soil bag	*				
SP1/0.25	2	16-Sep-14	1 x soil bag	*				
SP1/0.5	3	16-Sep-14	1 x soil bag	*				
SP1/0.75	4	16-Sep-14	1 x soil bag	*				
SP1/1.0	5	16-Sep-14	1 x soil bag	*				
SP1/1.25	6	16-Sep-14	1 x soil bag	*				
SP1/1.5	7	16-Sep-14	1 x soil bag	*				
SP1/1.75	8	16-Sep-14	1 x soil bag	*				
SP2/0.0	9	16-Sep-14	1 x soil bag	*				
SP2/0.25	10	16-Sep-14	1 x soil bag	*				
SP2/0.5	11	16-Sep-14	1 x soil bag	*				
SP2/0.75	12	16-Sep-14	1 x soil bag	*				
SP2/1.0	13	16-Sep-14	1 x soil bag	*				
SP2/1.25	14	16-Sep-14	1 x soil bag	*				
SP4/0.0	15	16-Sep-14	1 x soil bag	*				
SP4/0.25	16	16-Sep-14	1 x soil bag	*				
SP4/0.5	17	16-Sep-14	1 x soil bag	*				
SP4/0.75	18	16-Sep-14	1 x soil bag	*				
SP4/1.0	19	16-Sep-14	1 x soil bag	*				
SP4/1.25	20	16-Sep-14	1 x soil bag	*				
SP4/1.5	21	16-Sep-14	1 x soil bag	*				
SP5/0.0	22	17-Sep-14	1 x soil bag	*				
SP5/0.25	23	17-Sep-14	1 x soil bag	*				
SP5/0.5	24	17-Sep-14	1 x soil bag	*				
SP5/0.75	25	17-Sep-14	1 x soil bag	*				
SP5/1.0	26	17-Sep-14	1 x soil bag	*				
SP5/1.25	27	17-Sep-14	1 x soil bag	*				
SP6/0.0	28	16-Sep-14	1 x soil bag	*				
SP6/0.25	29	16-Sep-14	1 x soil bag	*				
SP6/0.5	30	16-Sep-14	1 x soil bag	*				
SP6/0.75	31	16-Sep-14	1 x soil bag	*				
SP6/1.0	32	16-Sep-14	1 x soil bag	*				
SP7/0.0	33	17-Sep-14	1 x soil bag	*				
SP7/0.25	34	17-Sep-14	1 x soil bag	*				
SP7/0.5	35	17-Sep-14	1 x soil bag	*				
QC1	36	17-Sep-14	1 x soil bag	*				
QC2	37	17-Sep-14	1 x soil bag	*				

Environmental Division
Perth

Work Order

EP1407514



Telephone : +61-8-9209 7655

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EP1407699**

Client : **COFFEY ENVIRONMENTS PTY LTD**
 Contact : **WESLEY ALPORT**
 Address : **SUITE 2**
53 BURSWOOD ROAD
BURSWOOD WA, AUSTRALIA 6100

Laboratory : Environmental Division Perth
 Contact : Scott James
 Address : 10 Hod Way Malaga WA Australia 6090

E-mail : wesley.alport@coffey.com
 Telephone : +61 08 6462 7900
 Facsimile : +61 08 6462 7936

E-mail : perth.enviro.services@alsglobal.com
 Telephone : +61-8-9209 7655
 Facsimile : +61-8-9209 7600

Project : Ex EP1407514 ENAUPERT04483AA
 Northlink ASS Investigation

Page : 1 of 2

Order number : ----
 C-O-C number : ----
 Site : ----
 Sampler : ----

Quote number : EP2014COFENVWA0134 (EN/007/14)

QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received : 23-SEP-2014
 Client Requested Due Date : 01-OCT-2014

Issue Date : 23-SEP-2014 18:15
 Scheduled Reporting Date : **01-OCT-2014**

Delivery Details

Mode of Delivery : Samples on hand
 No. of coolers/boxes : N/A
 Security Seal : N/A

Temperature : Ambient
 No. of samples received : 12
 No. of samples analysed : 12

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- **Samples received in appropriately pretreated and preserved containers.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EPA WA - SP
EP1407699-001	16-SEP-2014 15:00	SP1/0.5	✓
EP1407699-002	16-SEP-2014 15:00	SP1/1.25	✓
EP1407699-003	16-SEP-2014 15:00	SP2/0.25	✓
EP1407699-004	16-SEP-2014 15:00	SP2/1.25	✓
EP1407699-005	16-SEP-2014 15:00	SP4/1.0	✓
EP1407699-006	16-SEP-2014 15:00	SP4/1.5	✓
EP1407699-007	17-SEP-2014 15:00	SP5/0.0	✓
EP1407699-008	17-SEP-2014 15:00	SP5/0.5	✓
EP1407699-009	16-SEP-2014 15:00	SP6/0.0	✓
EP1407699-010	16-SEP-2014 15:00	SP6/0.25	✓
EP1407699-011	17-SEP-2014 15:00	SP7/0.0	✓
EP1407699-012	17-SEP-2014 15:00	SP7/0.25	✓

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS PAYABLE (BURSWOOD)

- A4 - AU Tax Invoice (INV)

Email Receptionist burb@coffey.com

RORY MACLEAOD

- *AU Certificate of Analysis - NATA
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA
- A4 - AU Sample Receipt Notification - Environmental HT
- A4 - AU Tax Invoice
- Chain of Custody (CoC)
- EDI Format - ENMRG
- EDI Format - ESDAT
- EDI Format - XTab

[illegible]

WESLEY ALPORT

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

[illegible]



APPENDIX E

Laboratory certificates of analysis

CERTIFICATE OF ANALYSIS

Work Order	: EP1407514	Page	: 1 of 10
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 17-SEP-2014
C-O-C number	: ----	Issue Date	: 18-SEP-2014
Sampler	: ----	No. of samples received	: 37
Site	: ----	No. of samples analysed	: 37
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Leanne Carey	Acid Sulfate Soils Supervisor	Perth ASS



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme**
- **EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.**



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP1/0.0	SP1/0.25	SP1/0.5	SP1/0.75	SP1/1.0
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407514-001	EP1407514-002	EP1407514-003	EP1407514-004	EP1407514-005
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.5	5.9	5.6	6.1	6.8
pH (Fox)	----	0.1	pH Unit	3.6	3.7	3.1	5.0	5.0
Reaction Rate	----	1	-	Slight	Moderate	Moderate	Slight	Slight



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP1/1.25	SP1/1.5	SP1/1.75	SP2/0.0	SP2/0.25
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407514-006	EP1407514-007	EP1407514-008	EP1407514-009	EP1407514-010
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.9	7.0	7.0	5.9	5.4
pH (Fox)	----	0.1	pH Unit	5.0	5.3	5.0	4.1	3.6
Reaction Rate	----	1	-	Slight	Slight	Slight	Moderate	Moderate



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP2/0.5	SP2/0.75	SP2/1.0	SP2/1.25	SP4/0.0
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407514-011	EP1407514-012	EP1407514-013	EP1407514-014	EP1407514-015
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.3	5.2	5.3	5.3	5.3
pH (Fox)	----	0.1	pH Unit	3.9	4.1	4.7	4.6	3.4
Reaction Rate	----	1	-	Moderate	Moderate	Slight	Slight	Moderate



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP4/0.25	SP4/0.5	SP4/0.75	SP4/1.0	SP4/1.25
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407514-016	EP1407514-017	EP1407514-018	EP1407514-019	EP1407514-020
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.7	4.5	4.2	3.9	4.2
pH (Fox)	----	0.1	pH Unit	3.1	3.3	3.2	2.9	3.4
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP4/1.5	SP5/0.0	SP5/0.25	SP5/0.5	SP5/0.75
Client sampling date / time				16-SEP-2014 15:00	[17-SEP-2014]	[17-SEP-2014]	[17-SEP-2014]	[17-SEP-2014]
Compound	CAS Number	LOR	Unit	EP1407514-021	EP1407514-022	EP1407514-023	EP1407514-024	EP1407514-025
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.1	6.4	5.8	5.2	4.7
pH (Fox)	----	0.1	pH Unit	2.6	4.4	4.1	3.7	3.6
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP5/1.0	SP5/1.25	SP6/0.0	SP6/0.25	SP6/0.5
Client sampling date / time				[17-SEP-2014]	[17-SEP-2014]	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407514-026	EP1407514-027	EP1407514-028	EP1407514-029	EP1407514-030
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.6	4.4	4.9	4.7	4.8
pH (Fox)	----	0.1	pH Unit	3.7	3.8	2.8	3.0	3.2
Reaction Rate	----	1	-	Slight	Slight	Moderate	Moderate	Slight



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP6/0.75	SP6/1.0	SP7/0.00	SP7/0.25	SP7/0.50
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	[17-SEP-2014]	[17-SEP-2014]	[17-SEP-2014]
Compound	CAS Number	LOR	Unit	EP1407514-031	EP1407514-032	EP1407514-033	EP1407514-034	EP1407514-035
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.8	4.8	6.4	5.6	5.1
pH (Fox)	----	0.1	pH Unit	3.4	3.5	2.8	2.4	2.7
Reaction Rate	----	1	-	Slight	Slight	Extreme	Strong	Moderate



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				QC1	QC2	----	----	----
				[17-SEP-2014]	[17-SEP-2014]	----	----	----
Compound	CAS Number	LOR	Unit	EP1407514-036	EP1407514-037	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.5	4.6	----	----	----
pH (Fox)	----	0.1	pH Unit	3.0	3.5	----	----	----
Reaction Rate	----	1	-	Extreme	Slight	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EP1407699	Page	: 1 of 8
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: Ex EP1407514 ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 23-SEP-2014
C-O-C number	: ----	Issue Date	: 30-SEP-2014
Sampler	: ----	No. of samples received	: 12
Site	: ----	No. of samples analysed	: 12
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Leanne Carey	Acid Sulfate Soils Supervisor	Perth ASS



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **ASS: EA029 (SPOCAS): Excess ANC not required because pH OX less than 6.5.**
- **ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.**
- **ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5**



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				SP1/0.5	SP1/1.25	SP2/0.25	SP2/1.25	SP4/1.0
				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407699-001	EP1407699-002	EP1407699-003	EP1407699-004	EP1407699-005
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	7.6	6.6	5.4	6.2	6.4
pH OX (23B)	----	0.1	pH Unit	6.3	5.1	3.0	4.0	3.7
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	11	2	<2
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	69	<2	<2
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	58	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	<0.005	0.02	<0.005	<0.005
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	<0.005	0.11	<0.005	<0.005
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	<0.005	0.09	<0.005	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
Peroxide Sulfur (23De)	----	0.005	% S	0.009	0.01	0.02	0.007	0.006
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.008	0.01	0.01	0.006	<0.005
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	7	9	<5	<5
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.02	0.03	0.02	0.008	0.005
Peroxide Calcium (23Wh)	----	0.005	% Ca	0.03	0.04	0.03	0.01	0.008
Acid Reacted Calcium (23X)	----	0.005	% Ca	0.007	0.01	0.008	<0.005	<0.005
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	6	<5	<5	<5
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	0.006	0.009	0.006	<0.005	<0.005
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	<0.005	<0.005	<0.005	<0.005	<0.005
Peroxide Magnesium (23Tm)	----	0.005	% Mg	<0.005	<0.005	0.006	<0.005	<0.005
Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	<0.005	<0.005	<0.005	<0.005
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	<5	<5	<5	<5
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	20	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	1	<1	<1



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP1/0.5	SP1/1.25	SP2/0.25	SP2/1.25	SP4/1.0
Client sampling date / time				16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407699-001	EP1407699-002	EP1407699-003	EP1407699-004	EP1407699-005
EA029-H: Acid Base Accounting - Continued								
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	20	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	1	1	<1	<1



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				SP4/1.5	SP5/0.0	SP5/0.5	SP6/0.0	SP6/0.25
				16-SEP-2014 15:00	17-SEP-2014 15:00	17-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407699-006	EP1407699-007	EP1407699-008	EP1407699-009	EP1407699-010
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.3	6.2	6.4	4.9	5.0
pH OX (23B)	----	0.1	pH Unit	3.7	3.0	3.4	2.5	2.5
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	4	<2	53	27
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	98	<2	675	273
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	94	<2	622	246
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	0.006	<0.005	0.08	0.04
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	0.16	<0.005	1.08	0.44
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	0.15	<0.005	1.00	0.39
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
Peroxide Sulfur (23De)	----	0.005	% S	<0.005	0.01	<0.005	0.04	0.02
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	<0.005	0.008	<0.005	0.04	0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	5	<5	27	10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	<0.005	0.05	0.009	0.06	0.03
Peroxide Calcium (23Wh)	----	0.005	% Ca	<0.005	0.06	0.01	0.07	0.04
Acid Reacted Calcium (23X)	----	0.005	% Ca	<0.005	<0.005	<0.005	0.01	0.007
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	<5	<5	6	<5
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	<0.005	<0.005	<0.005	0.009	0.005
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	<0.005	0.008	<0.005	0.01	0.007
Peroxide Magnesium (23Tm)	----	0.005	% Mg	<0.005	0.007	<0.005	0.01	0.008
Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	<0.005	<0.005	<0.005	<0.005
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	<5	<5	<5	<5
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	0.13	0.06
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	80	38
Liming Rate	----	1	kg CaCO3/t	<1	1	<1	6	3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP4/1.5	SP5/0.0	SP5/0.5	SP6/0.0	SP6/0.25
Client sampling date / time				16-SEP-2014 15:00	17-SEP-2014 15:00	17-SEP-2014 15:00	16-SEP-2014 15:00	16-SEP-2014 15:00
Compound	CAS Number	LOR	Unit	EP1407699-006	EP1407699-007	EP1407699-008	EP1407699-009	EP1407699-010
EA029-H: Acid Base Accounting - Continued								
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	0.13	0.06
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	80	38
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	1	<1	6	3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				SP7/0.0	SP7/0.25	----	----	----
				17-SEP-2014 15:00	17-SEP-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EP1407699-011	EP1407699-012	----	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	5.6	6.4	----	----	----
pH OX (23B)	----	0.1	pH Unit	3.3	3.6	----	----	----
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	22	2	----	----	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	131	8	----	----	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	109	6	----	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.005	% pyrite S	0.04	<0.005	----	----	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	0.21	0.01	----	----	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	0.17	0.01	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.009	0.006	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	0.05	0.02	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.04	0.01	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	26	6	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.03	0.01	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	0.03	0.01	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	<0.005	<0.005	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	<5	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	<0.005	<0.005	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.03	0.01	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	0.03	0.01	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	<0.005	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	<5	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	<0.005	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	0.08	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	49	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	4	1	----	----	----

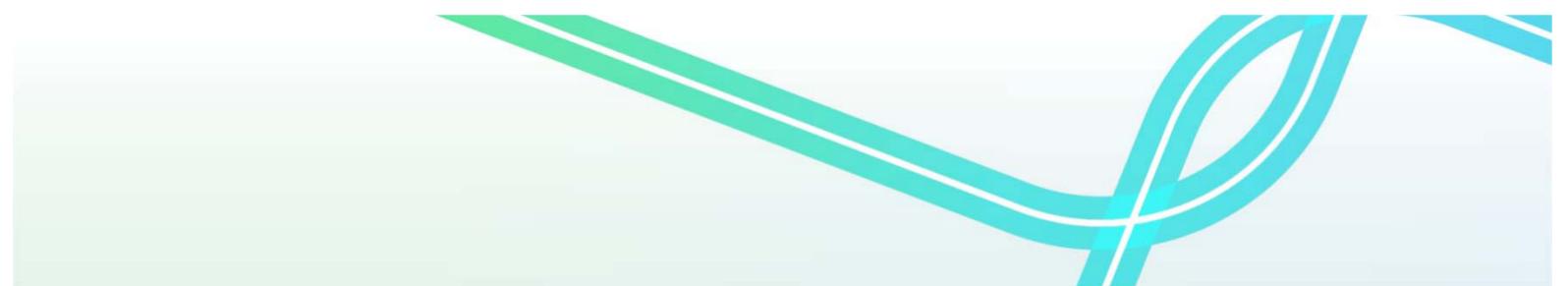


Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SP7/0.0	SP7/0.25	----	----	----
Client sampling date / time				17-SEP-2014 15:00	17-SEP-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EP1407699-011	EP1407699-012	----	----	----
EA029-H: Acid Base Accounting - Continued								
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	4	1	----	----	----



APPENDIX F

Sample QA/QC report

QUALITY CONTROL REPORT

Work Order	: EP1407514	Page	: 1 of 4
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 17-SEP-2014
C-O-C number	: ----	Issue Date	: 18-SEP-2014
Sampler	: ----	No. of samples received	: 37
Order number	: ----	No. of samples analysed	: 37
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Leanne Carey	Acid Sulfate Soils Supervisor	Perth ASS



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA037: Ass Field Screening Analysis (QC Lot: 3638716)									
EP1407514-001	SP1/0.0	EA037: pH (F)	----	0.1	pH Unit	5.5	5.8	4.6	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.6	0.0	0% - 20%
EP1407514-010	SP2/0.25	EA037: pH (F)	----	0.1	pH Unit	5.4	5.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.5	3.1	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3638717)									
EP1407514-021	SP4/1.5	EA037: pH (F)	----	0.1	pH Unit	4.1	4.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.6	2.6	0.0	0% - 20%
EP1407514-030	SP6/0.5	EA037: pH (F)	----	0.1	pH Unit	4.8	4.7	2.1	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.2	3.2	0.0	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP1407514	Page	: 1 of 5
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 17-SEP-2014
C-O-C number	: ----	Issue Date	: 18-SEP-2014
Sampler	: ----	No. of samples received	: 37
Order number	: ----	No. of samples analysed	: 37
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (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 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: **SOIL** 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	
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)	16-SEP-2014	17-SEP-2014	15-MAR-2015	✓	18-SEP-2014	15-MAR-2015	✓	
SP1/0.0,								SP1/0.25,
SP1/0.5,								SP1/0.75,
SP1/1.0,								SP1/1.25,
SP1/1.5,								SP1/1.75,
SP2/0.0,								SP2/0.25,
SP2/0.5,								SP2/0.75,
SP2/1.0,								SP2/1.25,
SP4/0.0,								SP4/0.25,
SP4/0.5,								SP4/0.75,
SP4/1.0,								SP4/1.25,
SP4/1.5,								SP6/0.0,
SP6/0.25,								SP6/0.5,
SP6/0.75,								SP6/1.0
Snap Lock Bag - frozen (EA037)	17-SEP-2014	17-SEP-2014	16-MAR-2015	✓	18-SEP-2014	16-MAR-2015	✓	
SP5/0.0,								SP5/0.25,
SP5/0.5,								SP5/0.75,
SP5/1.0,								SP5/1.25,
SP7/0.00,								SP7/0.25,
SP7/0.50,								QC1,
QC2								



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(where) 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: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	37	10.8	10.0	✔	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



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
ASS Field Screening Analysis	EA037	SOIL	Acid Sulfate Soils Laboratory Methods Guidelines, version 2.1 June 2004. As received samples are tested for pH field and pH fox and assessed for a reaction rating.



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

QUALITY CONTROL REPORT

Work Order	: EP1407699	Page	: 1 of 6
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: Ex EP1407514 ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 23-SEP-2014
C-O-C number	: ----	Issue Date	: 30-SEP-2014
Sampler	: ----	No. of samples received	: 12
Order number	: ----	No. of samples analysed	: 12
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Leanne Carey	Acid Sulfate Soils Supervisor	Perth ASS



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-A: pH Measurements (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: pH KCl (23A)	----	0.1	pH Unit	7.6	7.3	3.4	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	6.3	6.2	0.0	0% - 20%
EP1407699-011	SP7/0.0	EA029: pH KCl (23A)	----	0.1	pH Unit	5.6	5.5	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	3.3	3.4	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EP1407699-011	SP7/0.0	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	0.04	0.04	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	0.21	0.21	0.0	0% - 20%
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	0.17	0.17	0.0	0% - 20%
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	22	24	6.2	0% - 50%
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	131	130	0.9	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	109	106	2.4	0% - 20%
EA029-C: Sulfur Trail (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.005	% S	0.009	0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.008	0.01	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	9	57.0	No Limit
EP1407699-011	SP7/0.0	EA029: KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.009	0.009	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.005	% S	0.05	0.05	0.0	0% - 50%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.04	0.04	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	26	28	6.0	No Limit
EA029-D: Calcium Values (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.02	0.02	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.005	% Ca	0.03	0.04	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.005	% Ca	0.007	0.01	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-D: Calcium Values (QC Lot: 3647019) - continued									
EP1407699-001	SP1/0.5	EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	0.006	0.009	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	6	0.0	No Limit
EP1407699-011	SP7/0.0	EA029: KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.03	0.03	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.005	% Ca	0.03	0.03	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.005	% Ca	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	<5	0.0	No Limit
EA029-E: Magnesium Values (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	<0.005	<0.005	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.005	% Mg	<0.005	<0.005	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	<5	0.0	No Limit
EP1407699-011	SP7/0.0	EA029: KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.03	0.03	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.005	% Mg	0.03	0.03	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	<5	0.0	No Limit
EA029-H: Acid Base Accounting (QC Lot: 3647019)									
EP1407699-001	SP1/0.5	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	1	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP1407699-011	SP7/0.0	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	0.08	0.08	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	0.08	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	4	4	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	4	4	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	49	52	5.9	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	52	5.9	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-A: pH Measurements (QCLot: 3647019)								
EA029: pH KCl (23A)	----	0.1	pH Unit	----	4.4858 pH Unit	98.5	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	----	3.5615 pH Unit	103	70	130
EA029-B: Acidity Trail (QCLot: 3647019)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	73.0756 mole H+ / t	96.7	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	73.7217 mole H+ / t	105	70	130
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 3647019)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	.0646 % S	100	70	130
EA029: Peroxide Sulfur (23De)	----	0.005	% S	<0.005	.2391 % S	99.6	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	<0.005	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	----	----	----	----
EA029-D: Calcium Values (QCLot: 3647019)								
EA029: KCl Extractable Calcium (23Vh)	----	0.005	% Ca	<0.005	.3347 % Ca	101	70	130
EA029: Peroxide Calcium (23Wh)	----	0.005	% Ca	<0.005	.5825 % Ca	99.1	70	130
EA029: Acid Reacted Calcium (23X)	----	0.005	% Ca	<0.005	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	<5	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	<0.005	----	----	----	----
EA029-E: Magnesium Values (QCLot: 3647019)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	<0.005	.0408 % Mg	101	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.005	% Mg	<0.005	.0529 % Mg	99.4	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.005	% Mg	<0.005	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	<5	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	<0.005	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report



The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP1407699	Page	: 1 of 7
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Scott James
Address	: SUITE 2 53 BURSWOOD ROAD BURSWOOD WA, AUSTRALIA 6100	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: wesley.alport@coffey.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 6462 7900	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 6462 7936	Facsimile	: +61-8-9209 7600
Project	: Ex EP1407514 ENAUPERT04483AA Northlink ASS Investigation	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 23-SEP-2014
C-O-C number	: ----	Issue Date	: 30-SEP-2014
Sampler	: ----	No. of samples received	: 12
Order number	: ----	No. of samples analysed	: 12
Quote number	: EN/007/14		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (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 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.

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	
EA029-H: Acid Base Accounting								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
EA029-B: Acidity Trail								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
EA029-D: Calcium Values								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓



Matrix: **SOIL**

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
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
EA029-E: Magnesium Values								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
EA029-A: pH Measurements								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
EA029-G: Retained Acidity								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,	SP1/1.25, SP2/1.25, SP4/1.5, SP6/0.25	16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,	SP5/0.5, SP7/0.25	17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓

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
EA029-C: Sulfur Trail								
80* dried soil (EA029) SP1/0.5, SP2/0.25, SP4/1.0, SP6/0.0,		16-SEP-2014	23-SEP-2014	16-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓
80* dried soil (EA029) SP5/0.0, SP7/0.0,		17-SEP-2014	23-SEP-2014	17-SEP-2015	✓	30-SEP-2014	22-DEC-2014	✓



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(where) 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: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	12	16.7	10.0	✔	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	12	8.3	5.0	✔	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	12	8.3	5.0	✔	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



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
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

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WESTERN AUSTRALIA



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