27 September 2019

623.17170-L01-v0.2.docx

Department of State Development, Manufacturing, Infrastructure and Planning
PO box 15009
City East, Qld 4002

Attention: Phil Joyce

Dear Phil

Wilton Coking Coal
Soil and Strategic Cropping Land Assessment
Requirement Notice (RPI19/003 - Wilton Coking Coal)

We refer to your requirement notice, as identified above, dated 19 August 2019 and provide responses to the information required in Attachment A of the requirement notice.

1 Spatial Layer Defining the Area of SCL

The RFI letter requests supply of a spatial layer defining the area of SCL that is the subject of this application.

Although SLR has already provided a spatial layer defining the area of SCL that is the subject of this application, since conducting additional field work in relation to Section 3 below and having to work within cultural heritage clearance constraints, we attach a revised Figure 1 and spatial layer (refer to shape file accompanying this letter) defining the area of SCL.

The total area of SCL, as shown in Figure 1, that is the subject of this response letter to your requirement notice is approximately 192 ha.

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FIGURE 1
STRATEGIC CROPPING LAND THAT IS THE SUBJECT OF THIS APPLICATION

Legend

- Minor Watercourse
- Mining Lease (Application)
- Joint Investigation Area
- Strategic Cropping Land (within combined investigation area)
- Proposed Site Disturbance
- Base Cadastre

Data Sources:
Mining Lease (Application), Watercourse, Strategic Cropping Land, and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); Proposed Site Disturbance dataset: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 25-Sep-2019

N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

2 Detailed Method of Slope Analysis

The RFI letter requests provision of detail on the method of slope analysis that was undertaken and whether this was in accordance with Appendix 1 of the RPI Act Statutory Guideline 08/14. Additionally, it requested the supply of the results of this analysis in ArcGIS format for assessment.

The method of slope analysis performed by SLR was as follows:

1. DEM (UAV derived – supplied by client)
2. DEM clipped to MLA boundary
3. Raster slope analysis (in percent)
4. Raster slope raster reclassified (2 Classes: ≤3% and >3%)
5. Raster majority filter analysis (nearest neighbour)
6. Raster boundary clean analysis
7. Raster to vector (polygon) conversion
8. Vector dataset clipped to SCL layer
9. Vector dataset clipped to combined NRC and SLR study areas. This is the 'Pre-Aggregation' dataset (refer to Figure 2)
10. Polygon aggregation as per RPI Act Statutory Guideline 08/14 – 3 July 2017 where polygons are assessed against the map unit minimum area (<10 ha) and minimum width (<80 m) (refer to Figure 3). Following completion of assessment, the remaining SCL areas comprise the 'Post-Aggregation' dataset (refer to Figure 4).

Some manual processing was also required due to edge or fringing effects because of slight overlaps or mis-alignments in some of the input datasets (eg from conversion from raster to vector processing and clipping), but only so as to 'clean' the dataset. There were also some 'intermediate' datasets within steps 4 to 8 to refine each of the major steps.

The above slope analysis conducted by SLR was in accordance with the RPI Act Statutory Guideline 08/14 – 3 July 2017 and a copy of the dataset accompanies this letter.

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FIGURE 2
STRATEGIC CROPPING LAND SLOPE ASSESSMENT PRE-AGGREGATION

Legend

- <80m width polygon cut-line
- Mining Lease (Application)
- Joint Investigation
- Strategic Cropping Land
- Base Cadastre

SCL Slope Assessment (Pre-Aggregation) - Site Slope (%)

- ≤ 3
- > 3

Data Sources:
Strategic Cropping Land Trigger Area, Mining Lease (Application), and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); <80m width polygon cut-line, and SCL Slope Assessment (Pre-Aggregation) - Site Slope (%) datasets: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 25-Sep-2019

N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

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FIGURE 3
STRATEGIC CROPPING LAND AGGREGATION ASSESSMENT

Legend

- <80m width polygon cut-line
- Mining Lease (Application)
- Joint Investigation Area
- Strategic Cropping Land
- Base Cadastre

SCL Slope Assessment (Pre-Aggregation) - Site Slope (%)

- ≤ 3
- > 3

Data Sources:
Strategic Cropping Land Trigger Area, Mining Lease (Application), and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); <80m width polygon cut-line, and SCL Slope Assessment (Pre-Aggregation) - Site Slope (%) datasets: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 25-Sep-2019

N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

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FIGURE 4
STRATEGIC CROPPING LAND SLOPE ASSESSMENT POST-AGGREGATION

Legend

- Mining Lease (Application)
- Joint Investigation Area
- Strategic Cropping Land
- Base Cadastre

SCL Slope Assessment (Post-Aggregation) - Site Slope (%)

- ≤ 3
- > 3

Data Sources:
Strategic Cropping Land Trigger Area, and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); <80m width polygon cut-line, and SCL Slope Assessment (Post-Aggregation) - Site Slope (%) datasets: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 25-Sep-2019

N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

3 Additional Observation Sites to Better Represent SCL Assessment of ≤3 Slope Remaining

The RFI letter requests provision of additional observation sites assessing the remaining areas of SCL that are ≤3% slope (as per Figure 4 above).

3.1 Remaining Areas of SCL Requiring Additional Observation Sites

Based on the slope assessment undertaken in Section 2 above, the remaining areas of SCL requiring additional observation sites are identified in Figure 4 above by the site slope (≤3%) pale green polygons numbered 1 to 7.

Additional field observation sites were assessed within these remaining areas of SCL, as outlined in Table 1, in accordance with the RPI Act Statutory Guideline 08/14 requirements. All remaining areas of SCL are minor components of considerably larger contiguous areas of mapped soil units, which are mapped in the original "Wilton Coal Project: Soil and Strategic Cropping Land Assessment Report" (SLR, 2019) submitted with the RIDA application. As a supplementary assessment letter report to the SLR (2019) report, where the number of sites required to be compliant with the RPI Act Statutory Guideline 08/14 requirements was met, these additional observation sites in this letter report mean that the full survey more than meets the requirements of the RPI Act Statutory Guideline 08/14.

Each of the remaining areas of SCL within the Project site requires at least one observation site to meet the minimum 1 site per 50 ha requirement. For the larger areas less than 50 ha, more than one observation site was completed. For the smaller areas, only one observation site was completed. The number and distribution of observation sites within each of the remaining SCL areas is shown in Figure 5.

Table 1 Additional Observation Sites within Remaining Site Slope (≤3%) SCL Areas

SCL Polygon		Observations												Minimum Required per 50 ha	Completed
		Existing*				Additional				Total					
No.	Ha	A	P	C	E	A	P	C	E	A	P	C	E		
1	0.1893	-	-	-	-	W13	W13	W13	-	1	1	1	-	1	3
2	0.582	-	-	-	-	-	-	-	W12	-	-	-	1	1	1
3	2.394	-	-	-	-	W11	W11	W11	-	1	1	1	-	1	3
4	1.846	OB08	OB08	OB08	-	-	-	-	-	1	1	1	-	1	3
5	0.791	OB06	OB06	OB06	-	-	-	-	W09, W10	1	1	1	2	1	5
6	11.668	S4	S4	S4	-	W08	W08	W08	-	2	2	2	-	1	6
7	30.108	S6, S8	S6, S8	S6, S8	S8, O11C	W01, W03	W01, W03	W01, W03	W02, W04, W05, W06	4	4	4	6	1	18

Note:
* Data for existing sampling sites is to be referred to in the original SLR (2019) report submitted with the RIDA application

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FIGURE 5
EXISTING AND ADDITIONAL SOIL OBSERVATION SITES IN POST-AGGREGATION SCL ASSESSMENT AREAS

Legend

- Mining Lease (Application)
- Joint Investigation Area
- Strategic Cropping Land
- Base Cadastre

SCL Slope Assessment (Post-Aggregation) - Site Slope (%)

- ≤ 3
- > 3

SLR Soil Observations

- Analysed Profile Site
- Exclusion Site

NRC Soil Observations

- Check Site
- Analysed Profile Site

Data Sources:
Strategic Cropping Land Trigger Area, and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; NRC Soil Observation Sites dataset: Northern Resource Consultants (2017); Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); SCL Slope Assessment (Post-Aggregation) - Site Slope (%), and SLR Soil Observation Sites datasets: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
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N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

3.2 Field Survey

Field assessment of remaining areas of SCL across the Project site were described in detail in accordance with the following standards and guidelines using the standard "green sheet" (copies of original field sheets are provided in Appendix C):

- RPI Act Statutory Guideline 08/14: How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land (DILGP, 2017a)
- Australian Soil and Land Survey Field Handbook (NCST, 2009)
- Munsell Soil Color Charts (Munsell Color, 2009)
- Australian Soil Classification (ASC) system (Isbell & NCST, 2016).

Observation sites included surface check/exclusion sites, shallow subsurface check/exclusion sites and full soil profile descriptions to 1.0 m or refusal, whichever came first, with those soil profiles ≥0.6 m deep sampled and analysed. Subsurface observations were made using an 82 mm diameter hand auger.

3.3 Soil Sampling Methods

Field sampling procedures conformed to SLR's quality assurance/quality control (QA/QC) protocols, as outlined in Section 4.1.3 of the original SLR (2019) report submitted with the RIDA application, to minimise the potential for cross contamination and preserve sample integrity.

3.4 Laboratory Analysis

For agronomic soil physical and chemical characteristics, laboratory analyses were primarily selected from the following resources:

- Soil Chemical Methods – Australasia (Rayment & Lyons, 2011)
- Measuring soil cation exchange capacity and exchangeable cations (SSA, 2013).

A total of 21 soil samples were analysed from five sampled profiles. Descriptions of the 16 soil profiles, based on field logs and laboratory results, are provided in Appendix A, while chain of custody forms and laboratory certificates for the 21 samples analysed are provided in Appendix D. Original field green sheet logs are provided in Appendix C.

The five soil profile analyses undertaken for this assessment were performed by ALS Environmental, a laboratory with National Association of Testing Authorities (NATA) accreditation for most of the laboratory analyses required for this soil assessment. The soil profile analyses undertaken for this assessment included:

- $pH_{1:5\ H20}$
- Electrical conductivity ($EC_{1:5\ H20}$)
- Chloride (Cl^-)
- Exchangeable cations (Al^{3+}, Ca^{2+}, Mg^{2+}, Na^+, K^+) and cation exchange capacity plus exchangeable sodium percentage (ESP) and calcium/magnesium ratio (Ca:Mg)
- Particle size analysis (<2 µm (clay), 2-20 µm (silt), 0.02-0.2 mm (fine sand), 0.2-2.0 mm (coarse sand) and >2 mm (gravel))
- Emerson aggregate test, including colour, texture and Emerson class number.

3.5 Assessment of Remaining Areas of SCL

The criteria for assessment of the remaining SCL areas to be mapped as SCL are as shown in Table 2. Assessment of the soils in the remaining SCL areas against the criteria in Table 2 is made with reference to the breakdown of SCL criteria within the RPI Act Statutory Guideline 08/14. Data sources for the assessment of each observation site are also outlined in Table 2.

Table 2 RPI Guideline Criteria for the Western Cropping Zone and Data Sources for the SCL Assessment

Criteria	Thresholds for Western Cropping Zone	Data Sources
Slope	Equal to or less than 3%	Digital elevation model (refer to Figure 4 for post-aggregation slope assessment)
Rockiness	Equal to or less than 20% for rocks greater than 60 mm in diameter	Individual site observation descriptions (refer to Appendix A)
Gilgai	Less than 50% of land surface being gilgai of greater than 500 mm in depth	Individual site observation descriptions (refer to Appendix A)
Soil depth	Equal to or greater than 600 mm	Individual site observation descriptions (refer to Appendix A)
Soil wetness	Has favourable drainage	Individual site observation descriptions (refer to Appendix A)
Soil pH	For rigid soils, the soil at 300 mm and 600 mm soil depth must be within the range of $pH_{(1:5)}$ 5.1 to $pH_{(1:5)}$ 8.9 inclusive For non-rigid soils, the soil at 300 mm and 600 mm soil depth must be greater than $pH_{(1:5)}$ 5.0	Individual site observation laboratory data (refer to Appendix A and Appendix B)
Salinity	Chloride content is less than 800 mg/kg at 600 mm soil depth	Individual site observation laboratory data (refer to Appendix A and Appendix B)
Soil water storage (SWS)	Equal to or greater than 100 mm to a soil depth or physico-chemical limitation of equal to or less than 1000 mm	Individual site observation laboratory data (refer to Appendix B, soil water storage lookup table calculations)

Assessment of observation sites is shown in Table 3, grouped according to mapped soil units, and Figure 6. Data for existing sampling sites is to be referred to in the original SLR (2019) report submitted with the RIDA application.

Table 3 Assessment of the Remaining Areas of SCL

Soil Unit			Strategic Cropping Land Assessment Criteria								SCL?
MSU	Site #	Site Type	Slope	Rockiness	Gilgai	Depth	Wetness	pH	Salinity	SWS	
Dermosols	W01	A, P, C	✓	✓	✓	✓	✓	✓	✓	×	×
	W02	E	✓	×							×
	W06	E	×	Excluded based on watercourse approximately 268 m long, ranging from 3-6 m wide and 2-3 m deep with precipitous (>100%) banks demonstrating high flow environment unsuitable for cropping even with laser levelling							×
Vertosols	W03	A, P, C	✓	✓	✓	✓	✓	✓	✓	✓	✓
	W04	E	✓	×							×
	W05	E	✓	×	×						×
	W08	A, P, C	✓	✓	✓	✓	✓	✓	×	✓	×
	W09	E	✓	✓	✓	×					×
	W12	E	✓	×							×
	W13	A, P, C	✓	✓	✓	✓	✓	✓	×	×	×
Rudosol (minor within Vertosols)	W10	E	✓	✓	✓	×					×
Sodosol (minor within Vertosols)	W11	A, P, C	✓	✓	✓	✓	✓?	✓	×	×	×

Notes: A – Analysed profile site, P – Detailed profile site, C – Check site, E – Exclusion site

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FIGURE 6 STRATEGIC CROPPING LAND LIMITATIONS

Legend

- Soil Sample Site
- Minor Watercourse
- <80m width polygon cut-line
- Mining Lease (Application)
- Waterbody
- Ground-truthed Watercourse with precipitous (>100%) Slope Embankment
- Joint Investigation Area
- Proposed Site Disturbance
- Remaining Area of Mapped Strategic Cropping Land
- Remaining Strategic Cropping Land Within the Investigation Area
- Base Cadastre

Data Sources:
Mining Lease (Application), Watercourse, and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); Proposed Site Disturbance, Soil Sample Site, Waterbody, Ground-truthed Watercourse with precipitous (>100%) Slope Embankment, Remaining Area of Mapped SCL, and Remaining Strategic Cropping Land Within the Investigation Area datasets: SLR Consulting (2019).
Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 27-Sep-2019

N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

3.6 Discussion

Based on the observation sites shown in Table 3 and on Figure 6, areas 1, 2, 3, 4, 5 and 6 have been proven to have limitations that prove these areas are not SCL and, therefore, can be excised from the SCL mapping.

Within area 7, the area around W02 and W06 is bisected by a watercourse with precipitous banks and obviously a considerable stream flow during wet weather as a consequence of the bank erosion. The two resultant small areas north and south of the watercourse at observation sites W02 and W06 are less than 80 m wide, as shown on Figure 6, and so can be excised from the SCL mapping.

With observation site W01 confirmed as not SCL because of its soil water storage limitation, the SCL area around W01 is also excised from the SCL mapping.

The waterbody identified near W01 and along the watercourse flowing past W02 and W06 is also not suitable for cropping and, therefore is excised from the SCL mapping.

The width of remaining SCL on either side of the waterbody is also less than 80 m wide and so is also excised from the SCL mapping.

Within the remaining SCL for area 7, observation sites S6, W05, S8, O11C and W04 demonstrate a range of limitations preventing the areas around these sites from remaining SCL and, therefore, are excised from the SCL mapping.

With W03 meeting the SCL criteria, this area between the waterbody and W04 remains mapped as SCL. Similarly the area between S8 and W04 remains mapped as SCL.

3.7 Conclusion

Based on the assessment results presented in Table 3 and on Figure 6, and discussion provided above, the majority of areas of SCL that were the subject of this response letter (as per Figure 1) are verified as not SCL. Of the total mapped SCL area of approximately 192 ha, approximately 187 ha can, therefore, be removed from the SCL Trigger Map, as shown in Figure 7.

3.8 References

Department of Infrastructure, Local Government and Planning (DILGP) 2017a, RPI Act Statutory Guideline 08/14: How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land, Queensland Government, Brisbane, Qld.

Hazelton, P and Murphy, B 2007, Interpreting Soil Test Results – What Do All The Numbers Mean?, CSIRO Publishing, Collingwood, VIC.

Isbell, RF and National Committee on Soil and Terrain (NCST) 2016, The Australian Soil Classification, 2nd Ed, CSIRO Publ., Collingwood, VIC.

McKenzie, NJ et al. 2008, Guidelines for Surveying Soil and Land Resources, 2nd Ed, CSIRO Publ., Collingwood, VIC.

Munsell Color 2009, Munsell Soil Color Charts, Munsell Color, Grand Rapids, Minnesota.

NCST 2009, Australian Soil and Land Survey Field Handbook, 3rd Ed, CSIRO Publishing, Collingwood, VIC.

Rayment, GE and Lyons, DJ 2011, Soil Chemical Methods – Australasia, CSIRO Publishing, Collingwood, VIC.

SLR Consulting Australia Pty Ltd (SLR) 2019, Wilton Coal Project: Soil and Strategic Cropping Land Assessment, SLR Consulting Australia Pty Ltd, Spring Hill, QLD.

Soil Science Australia (SSA) 2013, Measuring soil cation exchange capacity and exchangeable cations, Soil Science Australia, Queensland Branch, Brisbane, QLD.

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FIGURE 7
PROPOSED STRATEGIC CROPPING LAND MAPPING FOR THE PROJECT SITE

Legend

- Minor Watercourse
- Mining Lease (Application)
- Joint Investigation Area
- Remaining Strategic Cropping Land Within the Investigation Area
- Remaining Strategic Cropping Land Outside the Investigation Area
- Proposed Site Disturbance
- Base Cadastre

Data Sources:
Mining Lease (Application), Watercourse, and DCDB datasets: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019; Joint Investigation Area dataset: Northern Resource Consultants (2017), and SLR Consulting (2019); Proposed Site Disturbance, Remaining SCL Outside the Investigation Area, and Remaining SCL Within the Investigation Area datasets: SLR Consulting (2019). Imagery Source: 70cm Bowen Basin SISP PeriUrban 2012 Orthophoto Image Service: © State of Queensland (Department of Natural Resources, Mines, and Energy) 2019.

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 27-Sep-2019

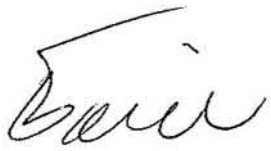
N

0 200 400 600 800
Metres

Scale: 1:15,000 at A3

SLR

Yours sincerely



CAMERON TRAILL
Principal - Soil Science

Checked/
Authorised by: RM

APPENDIX A

Representative Soil Profiles, Check Sites and Exclusion Sites

SLR Consulting Australia Pty Ltd Level 2, 15 Astor Terrace Spring Hill QLD 4000 Australia (PO Box 26 Spring Hill QLD 4004 Australia)
T: +61 7 3858 4800 E: brisbane@slrconsulting.com
www.slrconsulting.com ABN 29 001 584 612

SITE DESCRIPTION		ASC Soil Order:		Red Dermosol			Site #:	W01
Coordinates:	Easting:	661702	Northing:	7416150	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		215 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.1%)	Runoff:	Slow
Morphological type:	Simple slope	Permeability:	Slowly permeable
Landform element:	Riseslope	Drainage:	Imperfectly drained
Landform pattern:	Rises	Surface condition:	Firm, surface crusting
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Emerald Formation (Te(w))	Vegetation:	Brigalow, caesalpinia, carissa
Coarse fragments:	Very few (<2%), sub-rounded tabular, metamorphic cobbles (60-200 mm) and very few (<2%), angular tabular, medium, metamorphic pebbles (6-20 mm)		
Erosion:	Minor, active, sheet erosion		

Site W01 landscape, looking across slope (northwest) to drainage line

Site W01 landscape, looking southwest across slope to farm dam, centre left, behind trees

Site W01 surface condition, firm, surface crusting

Site W01 surface condition, very few medium pebbles and cobbles

LANDFORM

Site W01 profile 0.0-1.0 m deep

Site W01 profile, 0.0-0.4 m

Site W01 profile, 0.3-0.7 m

Site W01 profile, 0.5-1.0 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1	0.0-0.25	Very dark brown (7.5YR 2.5/3); weak, 2-5 mm, sub-angular blocky; clay loam, sandy; very few, sub-rounded, medium, metamorphic pebbles; pH 5.5; clear change to -
B21	0.25-0.6	Dark reddish brown (5YR 3/4); very few, fine faint, orange and very few, fine, faint, dark mottles; moderate, 20-50 mm, sub-angular blocky; fine, sandy, light medium clay; very few, sub-rounded, medium, metamorphic pebbles; pH 7.5; gradual change to -
B22	0.6-1.0	Reddish brown (5YR 4/4); few, fine, faint red mottles; moderate, 10-20 mm, sub-angular blocky; fine, sandy, light medium clay; very few, small, sub-rounded, metamorphic pebbles; few, medium, highly calcareous concretions; pH 8.5; abrupt change to -
C	1.0+	Refusal on sandstone

SOIL PROFILE CHEMISTRY DATA																			
Depth (m)	Adjusted particle size to remove gravel (%)*				SWS (mm/100 mm)	pH (H_2O)	EC (uS/cm)	EC Rating (VL, L, M, H, VH, E)	Cl- (mg/kg)	Exchangeable cations (meq/100 g)							ESP (%)	Sod-icity (NS, S, SS)	Emer-son class	Ca:Mg ratio
	Clay	Silt	Sand	Gravel						H^+	Al^{3+}	Ca^{2+}	Mg^{2+}	K^+	Na^+	CEC				
0.0-0.1	16	13	71	15	6	5.9	20	VL	<10	<0.1	<0.1	2.7	0.9	0.6	<0.1	4.2	1.1	NS	7	3.0
0.1-0.2	20	13	67	6	6	5.9	15	VL	<10	0.2	<0.1	2.4	0.8	0.4	0.1	3.9	3.5	NS	3	3.0
0.5-0.6	35	10	55	<1	10	7.5	285	M	370	-	-	2.6	3.2	<0.2	2.2	8.0	27.4	SS	2	0.8
0.9-1.0	28	14	58	<1	8	9.3	687	H	910	-	-	2.6	3.5	<0.2	4.2	10.3	41.2	SS	2	0.7

Notes:

* Gravel (>2 mm), Sand (0.02–2 mm), Silt (2-20 µm), Clay (<2 µm); VL – Very Low, L – Low, M – Moderate, H – High, VH – Very High, E – Extreme; NS – Non-Sodic, S – Sodic, SS – Strongly Sodic; ID – Indeterminable

SITE DESCRIPTION		ASC Soil Order:		Red Dermosol			Site #:	W02
Coordinates:	Easting:	661582	Northing:	7416060	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		217 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.5%)	Runoff:	Moderately rapid
Morphological type:	Simple slope	Permeability:	Moderately permeable
Landform element:	Riseslope	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Firm, surface flake
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Emerald Formation (Te(w))	Vegetation:	Brigalow, caesalpinia, carissa, poplar box
Coarse fragments:	Very few (<2%), angular tabular, metamorphic cobbles (60-200 mm) and many, medium, sub-angular tabular, metamorphic pebbles (6-20 mm)		
Erosion:	Minor, active, sheet erosion; severe, active, gully erosion (<1.5 m deep)		

Site W02 landscape, looking upslope (northwest)

Site W02 looking downslope (southeast) to watercourse with precipitous (>100%) banks

Site W02 surface condition, firm, surface flake

Site W02 surface condition, very few cobbles, many medium pebbles

LANDFORM

Site W02 watercourse bank profile, severe bank erosion, precipitous (>100%) bank approx. 1.5 m high

Site W02 landscape, looking west southwest upstream beside drainage line

Site W02 landscape, looking east downstream beside drainage line

SITE DESCRIPTION		ASC Soil Order:		Grey Vertosol			Site #:	W03
Coordinates:	Easting:	661782	Northing:	7415985	Zone:	55	Datum:	GDA94
Location:	Wilton	Describer:	C Traill		Elevation:		216 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.7%)	Runoff:	Moderately rapid
Morphological type:	Simple slope	Permeability:	Slowly permeable
Landform element:	Riseslope	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, surface crusting
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Crabhole gilgai, depression	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Brigalow, caesalpinia, carissa
Coarse fragments:	Common (10-20%), medium, sub-rounded, metamorphic pebbles (6-20 mm) and very few (<2%), sub-rounded, metamorphic cobbles (60-200 mm)		
Erosion:	Minor, active, sheet erosion		

Site W03 landscape, looking southwest, upslope

Site W03 landscape, looking northeast, downslope towards dam

Site W03 surface condition, cracking, surface crusting

Site W03 surface condition, very few cobbles

LANDFORM

Site W03 profile 0.0-1.0 m deep

Site W03 profile, 0.0-0.35 m

Site W03 profile, 0.4-0.8 m

Site W03 profile, 0.6-1.0 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1/B21	0.0-0.15	Very dark greyish brown (10YR 3/2); moderate, 10-20 mm, sub-angular blocky; light medium clay; few, medium, sub-angular tabular, metamorphic pebbles; pH 7.0; gradual change to -
B22	0.15-0.5	Dark greyish brown (10YR 4/2); strong, 20-50 mm, sub-angular blocky; medium clay; few, fine, sub-angular tabular, metamorphic pebbles; few, medium, highly calcareous concretions; pH 8.0; gradual change to -
B23	0.5-0.75	Brown (10YR4/3); few, fine, faint pale mottles; strong, 10-20 mm, sub-angular blocky; light medium clay; few, fine, sub-angular tabular, metamorphic pebbles; common, fine, highly calcareous concretions; pH 8.5; gradual change to -
B24	0.75-1.0	Dark yellowish brown (10YR 4/4); strong, 10-20 mm, sub-angular blocky; fine, sandy, light medium clay; few, fine, sub-angular tabular, metamorphic pebbles; very few, fine, moderately calcareous concretions; pH 7.5

SOIL PROFILE CHEMISTRY DATA																			
Depth (m)	Adjusted particle size to remove gravel (%)*				SWS (mm/100 mm)	pH (H_2O)	EC (µS/cm)	EC Rating (VL, L, M, H, VH, E)	Cl- (mg/kg)	Exchangeable cations (meq/100 g)							ESP (%)	Sod-icity (NS, S, SS)	Emer-son class	Ca:Mg ratio
	Clay	Silt	Sand	Gravel						H^+	Al^{3+}	Ca^{2+}	Mg^{2+}	K^+	Na^+	CEC				
0.0-0.1	42	31	27	12	15	7.7	139	L	60	-	-	12.4	3.4	6.4	<0.2	22.2	<0.2	SS	4	3.6
0.2-0.3	53	26	21	5	35	8.6	416	M	410	-	-	17.7	4.5	1.3	2.2	25.7	8.7	S	4	3.9
0.5-0.6	53	19	28	6	25	8.8	605	H	710	-	-	13.0	5.5	0.3	4.6	23.4	19.8	SS	2	2.4
0.9-1.0	44	16	39	3	25	8.3	584	H	750	-	-	9.3	5.3	0.2	6.0	20.9	28.9	SS	2	1.8

Notes:
* Gravel (>2 mm), Sand (0.02–2 mm), Silt (2-20 µm), Clay (<2 µm); VL – Very Low, L – Low, M – Moderate, H – High, VH – Very High, E – Extreme; NS – Non-Sodic, S – Sodic, SS – Strongly Sodic; ID – Indeterminable

SITE DESCRIPTION		ASC Soil Order:		Grey Vertosol			Site #:	W04
Coordinates:	Easting:	661849	Northing:	7415890	Zone:	55	Datum:	GDA94
Location:	Wilton	Describer:	C Traill		Elevation:		216 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.2%)	Runoff:	Moderately rapid
Morphological type:	Simple slope	Permeability:	Slowly permeable
Landform element:	Riseslope	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, firm, surface flake
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Crabhole gilgai, mound	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Brigalow, caesalpinia, carissa
Coarse fragments:	Many (20-50%), sub-rounded tabular, metamorphic cobbles (60-200 mm) and common (10-20%), medium, metamorphic pebbles (6-20 mm)		
Erosion:	Minor, active, sheet erosion		

Site W04 landscape, looking upslope (southwest)

Site W04 landscape, looking across slope (southeast)

Site W04 surface condition, cracking, firm, surface flake

Site W04 surface condition, many cobbles

LANDFORM

Site W04 surface condition, many cobbles

Site W04 surface condition, many cobbles

Site W04 surface condition, many cobbles

SITE DESCRIPTION		ASC Soil Order:		Brown Vertosol			Site #:	W05
Coordinates:	Easting:	661646	Northing:	7415752	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		221.5 m AHD	

LANDFORM			
Slope:	Very gently inclined (1.8%)	Runoff:	Moderately rapid (mounds), none (depressions)
Morphological type:	Simple slope	Permeability:	Slowly permeable
Landform element:	Riseslope	Drainage:	Imperfectly drained
Landform pattern:	Rises	Surface condition:	Cracking, surface crust
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Melonhole gilgai	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Brigalow, carissa
Coarse fragments:	Many (20-50%), sub-rounded tabular, metamorphic cobbles (60-200 mm) and many (20-50%), medium, sub-rounded, metamorphic pebbles (6-20 mm)		
Erosion:	Minor, active, tunnel erosion		

Site W05 landscape, looking upslope (west)

Site W05 landscape, looking across slope (northwest)

Site W05 surface condition, firm, surface crusting, many cobbles

Site W05 surface condition, firm, surface crusting, many cobbles

LANDFORM

Site W05 tunnel erosion from side of mound into depression of Melonhole gilgai

Site W05 tunnel erosion in Melonhole gilgai

Site W05 scale of melonhole gilgai and proportion of mound, depression and shelf

Site W05 scale of melonhole gilgai and proportion of mound, depression and shelf

SITE DESCRIPTION		ASC Soil Order:		Brown Dermosol			Site #:	W06
Coordinates:	Easting:	661553	Northing:	7416013	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		218 m AHD	

LANDFORM			
Slope:	Precipitous (>100%)	Runoff:	Very rapid
Morphological type:	Open depression	Permeability:	Moderately permeable
Landform element:	Stream channel	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Hard-setting
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Emerald Formation (Te(w))	Vegetation:	Brigalow, wilga, caesalpinia, carissa
Coarse fragments:	Very few (<2%), sub-rounded, metamorphic cobbles (20-60 mm)		
Erosion:	Moderate, active, sheet erosion; moderate, active, gully erosion (<1.5 m deep); severe, active bank erosion		

Site W06 landscape, looking upstream (southwest) in gully

Site W06 landscape, looking downstream (northeast) in gully

Site W06 landscape, looking up bank (south) into active gully erosion

Site W06 landscape, looking up bank (northwest) into active sheet erosion

SITE DESCRIPTION		ASC Soil Order:		Bleached Crusty Black Vertosol			Site #:	W08
Coordinates:	Easting:	661649	Northing:	7416398	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		214 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.2%)	Runoff:	Moderately rapid
Morphological type:	Simple slope	Permeability:	Moderately permeable
Landform element:	Riseslope	Drainage:	Imperfectly drained
Landform pattern:	Rises	Surface condition:	Cracking, firm, surface flake
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Brigalow, carissa, poplar box
Coarse fragments:	Very few (<2%), sub-rounded, metamorphic cobbles (60-200 mm)		
Erosion:	Minor, active, sheet erosion		

Site W08 landscape, looking upslope (west)

Site W08 landscape, looking downslope (east)

Site W08 surface condition, cracking, firm, surface flake

Site W08 surface condition, very few cobbles

LANDFORM

Site W08 profile 0.0-1.0 m deep

Site W08 profile, 0.0-0.4 m

Site W08 profile, 0.3-0.7 m

Site W08 profile, 0.5-1.0 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1	0.0-0.1	Black (10YR 2/1); weak, 2-5 mm polyhedral; clay loam, sandy; pH 6.0; clear change to -
A2e	0.1-0.15	Very dark brown (10YR 2/2) (moist), grey (10YR 6/1) (dry); weak, 2-5 mm polyhedral; clay loam, sandy; few, large, sub-rounded tabular, metamorphic pebbles; pH 6.0; clear change to -
B21	0.15-0.4	Black (10YR 2/1); many, medium, distinct, brown mottles; strong, 5-10 mm, sub-angular blocky; light medium clay; few, fine, ferromanganiferous concretions; pH 7.0; gradual change to -
B22	0.4-0.8	Black (10YR 2/1); very few, fine, faint, brown mottles; strong, 20-50 mm, sub-angular blocky; medium clay; very few, small, angular tabular, metamorphic pebbles; common, medium, ferromanganiferous concretions; few, fine, very highly calcareous concretions; pH 8.0; gradual change to -
B23	0.8-1.0	Very dark greyish brown (2.5Y 3/2); few, medium, distinct, dark mottles; strong, 10-20 mm, sub-angular blocky; medium clay; few, medium, angular tabular, metamorphic pebbles; common, medium, ferromanganiferous concretions; common, medium, very highly calcareous concretions; pH 8.0

SOIL PROFILE CHEMISTRY DATA																			
Depth (m)	Adjusted particle size to remove gravel (%)*				SWS (mm/100 mm)	pH (H_2O)	EC (uS/cm)	EC Rating (VL, L, M, H, VH, E)	Cl- (mg/kg)	Exchangeable cations (meq/100 g)							ESP (%)	Sodicity (NS, S, SS)	Emerson class	Ca:Mg ratio
	Clay	Silt	Sand	Gravel						H^+	Al^{3+}	Ca^{2+}	Mg^{2+}	K^+	Na^+	CEC				
0.0-0.1	27	37	36	6	12	6.4	39	VL	10	-	-	10.6	3.8	0.9	0.2	15.6	1.2	NS	7	2.8
0.3-0.4	59	17	24	6	30	8.3	730	H	1,140	-	-	19.4	7.6	0.3	6.8	34.2	20.0	SS	2	2.5
0.5-0.6	67	15	18	5	48	8.6	782	H	1,120	-	-	19.4	7.4	0.3	7.3	34.5	21.3	SS	2	2.6
0.9-1.0	47	16	36	3	24	8.6	765	H	1,040	-	-	21.5	8.2	0.5	8.4	38.5	21.7	SS	2	2.6

Notes:

* Gravel (>2 mm), Sand (0.02–2 mm), Silt (2-20 µm), Clay (<2 µm); VL – Very Low, L – Low, M – Moderate, H – High, VH – Very High, E – Extreme; NS – Non-Sodic, S – Sodic, SS – Strongly Sodic; ID – Indeterminable

SITE DESCRIPTION		ASC Soil Order:		Grey Vertosol			Site #:	W09
Coordinates:	Easting:	661427	Northing:	7417051	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		210 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.5%)	Runoff:	Moderately rapid
Morphological type:	Ridge	Permeability:	Moderately permeable
Landform element:	Rise crest	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, firm, surface flake
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Silver-leaved ironbark, carissa, caesalpinia
Coarse fragments:	Few (2-10%), sub-angular tabular, metamorphic cobbles (60-200 mm)		
Erosion:			

Site W09 landscape, looking upslope (southwest) along ridge

Site W09 landscape, looking down slope (northeast) along ridge

Site W09 landscape, looking across slope (northwest)

Site W09 landscape, looking across slope (southeast)

LANDFORM	
	
Site W09 surface condition, cracking, firm, surface flake	Site W09 surface condition, cracking, firm, surface flake
	
Site W09 surface condition, cracking, firm, surface flake, few cobbles	Site W09 profile, 0.0-0.4 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1/B21	0.0-0.1	Black (10YR 2/1); strong, 10-20 mm, sub-angular blocky; sandy light medium clay; very few, medium, angular tabular, metamorphic pebbles; clear change to -
B22	0.1-0.3	Very dark grey (10YR 3/1); strong, 5-10 mm, sub-angular blocky; sandy light medium clay; common, large, sub-angular tabular, metamorphic pebbles; gradual change to -
B/C	0.3-0.4	Very dark grey (10YR 3/1); weak, <2 mm, sub-angular blocky; sandy light medium clay; abundant, large, angular tabular, metamorphic pebbles; common, medium, very highly calcareous laminae; abrupt change to -
C	0.4+	Refusal on sandstone

SITE DESCRIPTION		ASC Soil Order:		Grey Rudosol			Site #:	W10
Coordinates:	Easting:	661515	Northing:	7417010	Zone:	55	Datum:	GDA94
Location:	Wilton	Describer:	C Traill		Elevation:		210 m AHD	

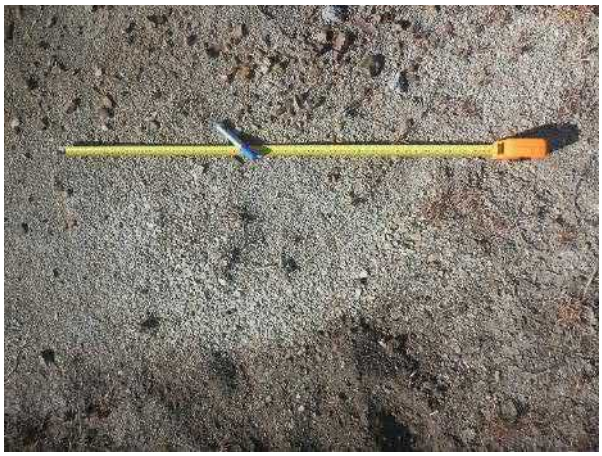
LANDFORM			
Slope:	Very gently inclined (1.1%)	Runoff:	Moderately rapid
Morphological type:	Simple slope	Permeability:	Moderately permeable
Landform element:	Riseslope	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, firm, surface crust
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Vegetation:	Silver-leaved ironbark, carissa, caesalpinia
Coarse fragments:	Many (20-50%), medium, sub-angular tabular, metamorphic pebbles (6-20 mm) and common (10-20%), sub-angular tabular, metamorphic cobbles (60-200 mm)		
Erosion:	Severe, active, sheet erosion; severe, active, gully erosion (<1.5 m deep)		

Site W10 landscape, looking down slope (southeast) to drainage line

Site W10 landscape, looking up slope (northwest) to ridge top

Site W10 landscape, looking across slope (northeast)

Site W10 landscape, looking up slope (southwest) along ridge

LANDFORM	
	
Site W10 surface condition, firm, surface crust, common cobbles	Site W10 surface condition, weathered parent material exposed, no A or B horizon evident
	
Site W10 surface condition, gully erosion, <0.4 m soil profile, exposed weathered parent material	Site W10 surface condition, gully erosion, <0.4 m soil profile, exposed weathered parent material
	
Site W10 surface condition, sheet and gully erosion, exposed weathered parent material	Site W10 surface condition, sheet and gully erosion, exposed weathered parent material

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1/B21	0.0-0.1	Minimal A and B horizon material
B/C	0.1-0.3	Weathered parent material
C	0.3+	Sandstone

SITE DESCRIPTION		ASC Soil Order:		Brown Sodosol			Site #:	W11
Coordinates:	Easting:	660527	Northing:	7417755	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		203 m AHD	

LANDFORM			
Slope:	Level (<1%)	Runoff:	Slow
Morphological type:	Flat	Permeability:	Moderately permeable
Landform element:	Plain	Drainage:	Imperfectly drained
Landform pattern:	Rises	Surface condition:	Firm, surface crust
Relief Modal Class:	Gently undulating rises	Disturbance:	Partially cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Coarse fragments:	Nil
Vegetation:	Bloodwood, silver-leaved ironbark, angophora, carissa		
Erosion:	Nil		

Site W11 landscape, looking down slope (north northeast) to drainage line

Site W11 landscape, looking across slope (south) to farm dam

Site W11 surface condition, firm, surface crusting

Site W11 surface condition, firm, surface crusting

LANDFORM

Site W11 profile 0.0-1.0 m deep

Site W11 profile, 0.0-0.4 m

Site W11 profile, 0.4-0.8 m

Site W11 profile, 0.6-1.0 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1	0.0-0.1	Black (10YR 2/1); weak, <2 mm, sub-angular blocky; clay loam, sandy; pH 5.5; clear change to -
A2e	0.1-0.3	Very dark grey (10YR 3/1) (moist), grey (10YR 6/1) (dry); weak, <2 mm sub-angular blocky; clay loam, sandy; pH 5.0; clear change to
B21	0.3-0.65	Dark yellowish brown (10YR 4/4); common, fine, distinct, grey mottles; moderate, 10-20 mm, sub-angular blocky; light medium clay; pH 7.5; gradual change to -
B22	0.65-1.0	Brown (7.5YR 4/4); common, medium, distinct, orange mottles; weak, 10-20 mm, sub-angular blocky; fine sandy light clay; few, medium, very highly calcareous concretions; pH 8.0

SOIL PROFILE CHEMISTRY DATA																			
Depth (m)	Adjusted particle size to remove gravel (%)*				SWS (mm/ 100 mm)	pH (H_2O)	EC (uS/ cm)	EC Rating (VL, L, M, H, VH, E)	Cl- (mg/ kg)	Exchangeable cations (meq/100 g)							ESP (%)	Sod-icity (NS, S, SS)	Emer-son class	Ca:Mg ratio
	Clay	Silt	Sand	Gravel						H^+	Al^{3+}	Ca^{2+}	Mg^{2+}	K^+	Na^+	CEC				
0.0-0.1	27	47	25	1	8	6.7	55	VL	30	-	-	12.5	5.7	1.2	0.5	20.0	2.6	NS	4	2.2
0.2-0.3	23	33	43	1	12	6.1	43	VL	50	-	-	4.3	2.2	0.4	0.7	7.5	9.4	S	2	2.0
0.5-0.6	52	23	25	<1	42	7.6	576	H	960	-	-	9.6	4.5	0.5	2.4	17.0	14.1	S	2	2.1
0.9-1.0	34	18	48	3	28	8.5	581	H	800	-	-	7.2	3.2	0.4	1.5	12.3	12.2	S	2	2.2

Notes:
* Gravel (>2 mm), Sand (0.02–2 mm), Silt (2-20 µm), Clay (<2 µm); VL – Very Low, L – Low, M – Moderate, H – High, VH – Very High, E – Extreme; NS – Non-Sodic, S – Sodic, SS – Strongly Sodic; ID – Indeterminable

SITE DESCRIPTION		ASC Soil Order:		Brown Vertosol			Site #:	W12
Coordinates:	Easting:	660392	Northing:	7417906	Zone:	55	Datum:	GDA94
Location:	Wilton		Describer:	C Traill	Elevation:		208 m AHD	

LANDFORM			
Slope:	Very gently inclined (2.2%)	Runoff:	Slow
Morphological type:	Ridge	Permeability:	Slowly permeable
Landform element:	Rise crest	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, firm, surface crusting
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Erosion:	Moderate, active, sheet erosion
Coarse fragments:	Many (20-50%), rounded tabular, metamorphic cobbles (60-200 mm) and many (20-50%), large, rounded tabular, metamorphic pebbles (20-60 mm)		
Vegetation:	Silver-leaved ironbark, eramophila, carissa, brigalow		

Site W12 landscape, looking up hill, along ridge (southwest)

Site W12 landscape, looking down hill, along ridge (northeast)

Site W12 landscape, looking down slope (southeast) to drainage depression

Site W12 landscape, looking down slope (northwest) to drainage depression

LANDFORM	
	
Site W12 surface condition, many cobbles	Site W12 surface condition, many cobbles
	
Site W12 surface condition, cracking, firm, surface crusting	

SITE DESCRIPTION		ASC Soil Order:		Grey Vertosol			Site #:	W13
Coordinates:	Easting:	661502	Northing:	7417036	Zone:	55	Datum:	GDA94
Location:	Wilton	Describer:	C Traill		Elevation:		212.5 m AHD	

LANDFORM			
Slope:	Level (<1%)	Runoff:	Slow
Morphological type:	Ridge	Permeability:	Slowly
Landform element:	Rise crest	Drainage:	Moderately well-drained
Landform pattern:	Rises	Surface condition:	Cracking, surface crusting
Relief Modal Class:	Gently undulating rises	Disturbance:	Cleared
Microrelief:	Nil	Rock outcrop:	Nil
Geology:	Burngrove Formation (Pwg)	Erosion:	Minor, active, sheet erosion
Coarse fragments:	Few (2-10%), large, sub-rounded platy, metamorphic pebbles (20-60 mm) and very few (<2%), sub-rounded platy, metamorphic cobbles (60-200 mm)		
Vegetation:	Brigalow, silver-leaved ironbark, caesalpinia		

Site W13 landscape, looking up hill, along ridge (southwest)

Site W13 landscape, looking down slope (east)

Site W13 surface condition, cracking, surface crusting

Site W13 surface condition, cracking, surface crusting

LANDFORM

Site W13 profile 0.0-0.8 m deep

Site W13 profile, 0.0-0.4 m

Site W13 profile, 0.2-0.6 m

Site W13 profile, 0.4-0.8 m

SOIL DESCRIPTION		
Horizon	Depth (m)	Description
A1/B21	0.0-0.2	Black (10YR 2/1); strong, 5-10 mm, sub-angular blocky; medium clay; very few, medium, angular platy, metamorphic pebbles; pH 7.0; clear change to -
B22	0.2-0.7	Very dark grey (10YR 3/1); strong, 20-50 mm, sub-angular blocky; medium clay; very few, large, angular platy, metamorphic pebbles; pH 8.5; gradual change to -
B/C	0.7-0.8	Dark grey (10YR 4/1); moderate, 2-5 mm, sub-angular blocky; light medium clay; many, medium, angular platy, metamorphic pebbles; pH 7.0; abrupt change to -
C	0.8+	Refusal on sandstone

SOIL PROFILE CHEMISTRY DATA																			
Depth (m)	Adjusted particle size to remove gravel (%)*				SWS (mm/100 mm)	pH (H_2O)	EC (uS/cm)	EC Rating (VL, L, M, H, VH, E)	Cl- (mg/kg)	Exchangeable cations (meq/100 g)							ESP (%)	Sodicity (NS, S, SS)	Emerson class	Ca:Mg ratio
	Clay	Silt	Sand	Gravel						H^+	Al^{3+}	Ca^{2+}	Mg^{2+}	K^+	Na^+	CEC				
0.0-0.1	55	25	20	4	12	7.3	541	M	800	-	-	10.5	10.9	1.0	1.4	24.4	5.8	NS	2	1.0
0.1-0.2	54	27	19	9	12	7.1	488	M	690	-	-	10.6	10.7	0.8	1.4	23.6	6.1	S	2	1.0
0.2-0.3	63	23	14	5	12	8.3	619	M	930	-	-	9.6	8.1	0.6	3.7	22.1	16.8	SS	2	1.2
0.5-0.6	55	36	9	2	12	8.0	572	H	850	-	-	9.0	7.9	0.6	5.2	22.8	22.7	SS	2	1.1
0.7-0.8	39	39	22	10	8	6.6	451	H	670	-	-	7.9	8.6	0.5	4.1	21.3	19.5	SS	2	0.9

Notes:
* Gravel (>2 mm), Sand (0.02–2 mm), Silt (2-20 µm), Clay (<2 µm); VL – Very Low, L – Low, M – Moderate, H – High, VH – Very High, E – Extreme; NS – Non-Sodic, S – Sodic, SS – Strongly Sodic; ID – Indeterminable

APPENDIX B

Laboratory Data by Analysed Site

SLR Consulting Australia Pty Ltd Level 2, 15 Astor Terrace Spring Hill QLD 4000 Australia (PO Box 26 Spring Hill QLD 4004 Australia)
T: +61 7 3858 4800 E: brisbane@slrconsulting.com
www.slrconsulting.com ABN 29 001 584 612

Table 4 Laboratory Data by Analysed Site

Sample site	ASC	Land system, facet & soil (CSIRO)	AMU (DPI)	Depth (m)	Approximated and adjusted particle size to remove gravel (%)					Soil Water Storage				pH (H_2O)		EC (uS/cm)	Salinity rating	Cl (mg/kg)	Emerson aggregate test			
					Clay	Silt	Fine sand	Coarse sand	Gravel	Soil Texture	Lookup Table		Total mm/ 1000 mm	pH units	Rating				Munsell colour		Texture	Emerson Class
											mm/100 mm	By Horizon							Code	Colour		
W01	Red Dermosol	Durrandella, foot slopes terrain, no suitable soil family	4, no suitable AMU	0.0-0.1	16	13	29	41	15	L	6	15	82	5.9	MAC	20	VL	<10	7.5YR 2.5/3	Very Dark Brown	SL	7
				0.1-0.2	20	13	29	38	6	L	6			5.9	MAC	15	VL	<10	7.5YR 3/3	Dark Brown	SL	3
				0.5-0.6	35	10	24	31	<1	C	10	35		7.5	SLAL	285	M	370	5YR 3/4	Dark Reddish Brown	SC	2
				0.9-1.0	28	14	26	32	<1	CL	8	32		9.3	VSAL	687	H	910	7.5yr 3/3	Dark Brown	ZCL	2
W03	Grey Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	42	31	17	10	12	ZC	10	15	100	7.7	SLAL	139	L	60	10YR 2/1	Black	CL	4
				0.2-0.3	53	26	8	13	5	ZC	10	35		8.6	STAL	416	M	410	2.5Y 3/1	Very Dark Grey	CL	4
				0.5-0.6	53	19	11	17	6	C	10	25		8.8	STAL	605	H	710	10YR 2/2	Very Dark Brown	CL	2
				0.9-1.0	44	16	26	13	3	C	10	25		8.3	MAL	584	H	750	7.5YR 4/2	Brown	CL	2
W08	Black Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	27	37	22	14	6	ZCL	8	12	114	6.4	SLAC	39	VL	10	10YR 2/1	Black	CL	7
				0.3-0.4	59	17	19	5	6	C	12	30		8.3	MAL	730	H	1,140	10YR 3/1	Very Dark Grey	CL	2
				0.5-0.6	67	15	9	8	5	C	12	48		8.6	STAL	782	H	1,120	10YR 2/1	Black	CL	2
				0.9-1.0	47	16	29	7	3	C	12	24		8.6	STAL	765	H	1,040	2.5Y 3/1	Very Dark Grey	CL	2
W11	Brown Sodosol	Girrah, lowlands and low rises terrain, no suitable soil family (minor within Bruce)	4, minor part of Kia-Ora	0.0-0.1	27	47	14	11	1	ZCL	8	8	90	6.7	NEU	55	VL	30	10YR 2/1	Black	SC	4
				0.2-0.3	23	33	24	19	1	ZL	6	12		6.1	SLAC	43	VL	50	10YR 2/1	Black	SC	2
				0.5-0.6	52	23	14	11	<1	C	12	42		7.6	SLAL	576	H	960	2.5Y 3/2	Very Dark Greyish Brown	CL	2
				0.9-1.0	34	18	22	27	3	CL	8	28		8.5	STAL	581	H	800	10YR 3/4	Dark Yellowish Brown	CL	2
W13	Grey Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	55	25	11	8	4	C	12	24	92	7.3	NEU	541	M	800	10YR3/1	Very Dark Grey	CL	2
				0.1-0.2	54	27	12	7	9	ZC	12			7.1	NEU	488	M	690	10YR3/1	Very Dark Grey	SC	2
				0.2-0.3	63	23	8	5	5	C	12	60		8.3	MAL	619	M	930	2.5Y 2.5/1	Black	CL	2
				0.5-0.6	55	36	3	6	2	ZC	12			8.0	MAL	572	H	850	10YR 2/1	Black	CL	2
				0.7-0.8	39	39	1	21	10	ZCL	8	8		6.6	NEU	451	H	670	10YR 4/1	Dark Grey	CL	2

Sample site	ASC	Land system, facet & soil (CSIRO)	AMU (DPI)	Depth (m)	Exchangeable cations (meq/100 g)											Sum of Bases	ECP (%)	EMP (%)	EKP (%)	ESP (%)	Sodicity rating	Ca:Mg ratio	Mg:K ratio
					H	Al	Ca	Ex. Ca rating	Mg	Ex. Mg rating	K	Ex. K rating	Na	Ex. Na rating	CEC								
W01	Red Dermosol	Durrandella, foot slopes terrain, no suitable soil family	4, no suitable AMU	0.0-0.1	<0.1	<0.1	2.7	L	0.9	L	0.6	M	<0.1	VL	4.2	100%	64.3	21.4	14.3	1.1	NS	3.0	1.5
				0.1-0.2	0.2	<0.1	2.4	L	0.8	L	0.4	M	0.1	L	3.9	100%	61.5	20.5	10.3	3.5	NS	3.0	2.0
				0.5-0.6	-	-	2.6	L	3.2	H	<0.2	VH	2.2	VH	8.0	100%	32.5	40.0	ID	27.4	SS	0.8	ID
				0.9-1.0	-	-	2.6	L	3.5	H	<0.2	VH	4.2	VH	10.3	100%	25.2	34.0	ID	41.2	SS	0.7	ID
W03	Grey Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	-	-	12.4	H	3.4	H	6.4	VH	<0.2	VH	22.2	100%	55.9	15.3	28.8	<0.2	NS	3.6	0.5
				0.2-0.3	-	-	17.7	H	4.5	H	1.3	H	2.2	VH	25.7	100%	68.9	17.5	5.1	8.7	S	3.9	3.4
				0.5-0.6	-	-	13.0	H	5.5	H	0.3	L	4.6	VH	23.4	100%	55.6	23.5	1.3	19.8	SS	2.4	21.1
				0.9-1.0	-	-	9.3	M	5.3	H	0.2	VL	6.0	VH	20.9	100%	44.5	25.4	1.0	28.9	SS	1.8	25.4
W08	Black Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	-	-	10.6	H	3.8	H	0.9	H	0.2	L	15.6	99%	67.9	24.4	5.8	1.2	NS	2.8	4.2
				0.3-0.4	-	-	19.4	H	7.6	H	0.3	L	6.8	VH	34.2	100%	56.7	22.2	0.9	20.0	SS	2.5	23.7
				0.5-0.6	-	-	19.4	H	7.4	H	0.3	L	7.3	VH	34.5	100%	56.2	21.4	0.9	21.3	SS	2.6	23.4
				0.9-1.0	-	-	21.5	VH	8.2	VH	0.5	M	8.4	VH	38.5	100%	55.8	21.3	1.3	21.7	SS	2.6	17.4
W11	Brown Sodosol	Girrah, lowlands and low rises terrain, no suitable soil family (minor within Bruce)	4, minor part of Kia-Ora	0.0-0.1	-	-	12.5	H	5.7	H	1.2	H	0.5	M	20.0	100%	62.5	28.5	6.0	2.6	NS	2.2	4.6
				0.2-0.3	-	-	4.3	L	2.2	M	0.4	M	0.7	M	7.5	101%	57.3	29.3	5.3	9.4	S	2.0	5.9
				0.5-0.6	-	-	9.6	M	4.5	H	0.5	M	2.4	VH	17.0	100%	56.5	26.5	2.9	14.1	S	2.1	9.4
				0.9-1.0	-	-	7.2	M	3.2	H	0.4	M	1.5	H	12.3	100%	58.5	26.0	3.3	12.2	S	2.2	8.7
W13	Grey Vertosol	Girrah, lowlands and low rises terrain, Bruce	4, Kia-Ora	0.0-0.1	-	-	10.5	H	10.9	VH	1.0	H	1.4	H	24.4	98%	43.0	44.7	4.1	5.8	NS	1.0	11.4
				0.1-0.2	-	-	10.6	H	10.7	VH	0.8	H	1.4	H	23.6	100%	44.9	45.3	3.4	6.1	S	1.0	13.1
				0.2-0.3	-	-	9.6	M	8.1	VH	0.6	M	3.7	VH	22.1	100%	43.4	36.7	2.7	16.8	SS	1.2	12.6
				0.5-0.6	-	-	9.0	M	7.9	H	0.6	M	5.2	VH	22.8	100%	39.5	34.6	2.6	22.7	SS	1.1	12.4
				0.7-0.8	-	-	7.9	M	8.6	VH	0.5	M	4.1	VH	21.3	99%	37.1	40.4	2.3	19.5	SS	0.9	17.2

APPENDIX C

Field Green Sheets of SCL Observation Sites

SLR Consulting Australia Pty Ltd Level 2, 15 Astor Terrace Spring Hill QLD 4000 Australia (PO Box 26 Spring Hill QLD 4004 Australia)
T: +61 7 3858 4800 E: brisbane@slrconsulting.com
www.slrconsulting.com ABN 29 001 584 612

SITE DESCRIPTION

Geology	Slope: Eval	Slope: Percent	Slope: Class	Slope: MT	Slope: Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Te(w)			VG	S		RES					RIS			GR				CT	170919 (8:10)	WILCTON	W01		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Tax Unit: Code	Map Unit: Type	Map Unit: Code	Air Photos: Film No	Run No	Frame No

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	ASC: Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition
	55	661702	7416150		DE	RE												FC

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
—						1	4	UT	ME			—	
						1	2	AT					

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
S	A	1		1		BRIGOLOW, CAESALPINIA, CARISSA
				2		
				3		

Community 1 Details: Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth Upper	Depth Lower	Confid	Bound Dsct	Bound Shape	Field Texture	Qual	SWS	Colour Hue	V	C	Moist
1	A1	0	25		C		CLS			7.5YR	2.5	3	M
2	B21	25	60		G		FSLMC			5YR	3	4	M
3	B22	60	100		A		FSLMC			5YR	4	4	M
4	C	100	+										
5													
6													
7													

Number	Mottles Type	Abun	Size	Contr	Col	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist
1	—					1	2	UT	ME			
2	M	1	1	F	O	1	2	UT	ME			
2	M	1	1	F	D							
3	M	2	1	F	R	1	1	UT	ME			
4												
5												
6												
7												

Number	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Cons	Fabric	Cutans Kind	Abund.	Distinct	Pans Type	Cmnt	Cont	Str	Samples
1	W	2	SB		—																0-10
2	M	5	SB		—																10-20
3	M	4	SB		2	K	C	2	5												30-40
4																					50-60
5																					70-80
6																					90-100
7																					

Test	Meth			
		0-10	50-60	90-100
pH - RP		5.5	7.5	8.5
EC				
Disp				

NOTES:

SITE DESCRIPTION

Geology	Slope: Eval	Percent	Class	MT	Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Te(W)			NGS			RES					RIS			GR				CT	170919	WILTON	WOZ		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Code	Map Unit: Type	Code	Air Photos: Film No	Run No	Frame No
											J					

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG: aff	Disturb	Surface Condition
	55	661582	7416060	D	ERE												FX

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
—						1	4	AT	ME			—	

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
S	A	2		1		BRIGALOW, CAESALPINIA, CARISA
G	A	3	1	2		POPLAR BOX
				3		

Community 1 Details: 42 ST ME

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Lower	Confid	Bound: Dist	Shape	Field Texture	Qual	SWS	Colour: Book	Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist	Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Cutans: Fabric	Kind	Abund.	Distinct	Pans: Type	Cmnt	Cont.	Str	Samples
1																																															
2																																															
3																																															
4																																															
5																																															
6																																															
7																																															

Test	Meth																																															
pH - RP																																																
EC																																																
Disp																																															

NOTES:

SITE DESCRIPTION

Geology	Slope Eval	Slope Percent	Slope Class	MT	Incl	Landform Element Type	Loc	Height	Width	Length	Landform Pattern	Class	Modal	RMS	Land Use LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Pwg			VG	S		RES					RIS			GR				CT	9:50 170919	WILTON	W03		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit Type	Tax Unit Code	Map Unit Type	Map Unit Code	Air Photos Film No	Run No	Frame No	Substrate OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Datum	Zone	Easting / Latitude	Northing / Longitude	ASC Conf	Ord	Sub Ord	GG/Or2	SG/SO2	F1	F2	F3	F4	F5	PPF	GSG aff	Disturb	Surface Condition	Microrelief Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Outcrop Abun	Lith
	55	661782	7415985		VE	GR											GC	C	O	D	D			3 (1)	2 (4)	U (U)	ME (ME)			—	

Profile Diagram

Erosion Type	State	Deg	GD	No	Ref No	Community Name	Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
S	A	M		1		Brigalow, Caesalpinia, Carissa	T											
				2			M											
				3			L											

Number	Horizon	Depth Upper	Depth Lower	Confid	Bound Dsct	Shape	Field Texture	Qual	SWS	Colour Hue	V	C	Moist	Mottles Type	Abun	Size	Contr	Col	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Cons	Fabric	Cutans Kind	Abund.	Distinct	Pans Type	Cmnt	Cont	Str	Samples
1	A1/B21	0	15		G		LMC			10YR	3	2	M	—					2	2	ST	ME				M	4	SB		—																0-10
2	B22	15	50		G		MC			10YR	4	2	m	—					2	1	ST	ME				S	5	SB		2	K	C	2	5												20-30
3	B23	50	75		G		LMC			10YR	4	3	m	M	2	1	F	P	2	1	ST	ME				S	4	SB		3	K	C	1	5												50-60
4	B24	75	100				FSLMC			7.5YR	4	4	m	—					2	1	ST	ME				S	4	SB		1	K	C	1	3												90-100
5																																														
6																																														
7																																														

Test	Meth					
		0-10	20-30	40-50	50-60	90-100
pH - RP		7.0	8.0	8.0	8.5	9.5
EC						
Disp						

NOTES:

SITE DESCRIPTION

Geology	Slope: Eval	Slope: Percent	Slope: Class	Slope: MT	Slope: Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWg			VG	S		RES					RIS			GR				CT	170919	WILTON	WO4		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Tax Unit: Code	Map Unit: Type	Map Unit: Code	Air Photos: Film No	Run No	Frame No

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/Or2	SG/SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition
	55	661849	7415890		VE	GR												GFX

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
C	O	M	D			4	4	VT	ME				
						3	2	VT	ME				

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
S	A	1		1		Brigalow, carisa, caesalpinea
				2		
				3		

Community 1 Details

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Depth: Lower	Confid	Bound: Dsct	Bound: Shape	Field Texture	Qual	SWS	Colour: Book	Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist	Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Fabric	Cutans: Kind	Abund.	Distinct	Pans: Type	Cmnt	Cont	Str	Samples
1																																															
2																																															
3																																															
4																																															
5																																															
6																																															
7																																															

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

Geology	Slope: Eval	Percent	Class	MT	Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Pwg			VG	5		RES					RIS			GR				CK	170919	WILTON	W05		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Code	Map Unit: Type	Code	Air Photos: Film No	Run No	Frame No

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition
	55	661646	7415752		VE	BR												GC

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
MO	MA			1.5	10-20	4	4	UT	ME				
						a	2	U	ME				

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
T	A	1		1		Brigalow, carisa
				2		
				3		

Community 1 Details

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Lower	Confid	Bound: Dsct	Shape	Field Texture	Qual	SWS	Colour (Book): Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist	Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Fabric	Cutans: Kind	Abund.	Dstinct	Pans: Type	Cmnt	Cont	Str	Samples
1																																														
2																																														
3																																														
4																																														
5																																														
6																																														
7																																														

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

12:15pm

Geology	Slope: Eval	Slope: Percent	Slope: Class	Slope: MT	Slope: Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Te(W)			PR	V		STC					RIS			GR				CK	170919	WILTON	4106		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Tax Unit: Code	Map Unit: Type	Map Unit: Code	Air Photos: Film No	Run No	Frame No

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/Or2	SG/SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition
	55	661553	7416013		DE	BR												H

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
—						1	4	V	ME			—	

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
D	A	3		1		BRIGALOW, WILGA, CAESALPINIA,
S	A	2		2		CARISSA
G	A	2	1	3		

Community 1 Details

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Depth: Lower	Confid	Bound: Dsct	Bound: Shape	Field Texture	Qual	SWS	Colour (Book): Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist	Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Fabric	Cutans: Kind	Abund.	Distinct	Pans: Type	Cmnt	Cont	Str	Samples
1																																														
2																																														
3																																														
4																																														
5																																														
6																																														
7																																														

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

12:40

Geology	Slope Eval	Slope Percent	Slope Class	Slope MT	Slope Incl	Landform Element Type	Loc	Height	Width	Length	Landform Pattern	Class	Modal	RMS	Land Use LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWg			VGS			RES					RIS			GR				CT	170919	WILTON	W08		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit Type	Tax Unit Code	Map Unit Type	Map Unit Code	Air Photos Film No	Run No	Frame No	Substrate OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Datum	Zone	Easting / Latitude	Northing / Longitude	Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG aff	Disturb	Surface Condition	Microrelief Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Outcrop Abun	Lith	Profile Diagram
	55	661649	7416398		VE	BL											FXG	–						1	4	U	ME					

Erosion Type	State	Deg	GD	Community No	Ref No	Name
S	A	1		1		Brigalow, Carisa, poplar box
				2		
				3		

Community 1 Details Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth Upper	Depth Lower	Confid	Bound Dsct	Bound Shape	Field Texture	Qual	SWS	Colour Hue	V	C	Moist	Mottles Type	Abun	Size	Contr	Col
1	A1	0	10		C		CLS			10YR	2	1	M	–				
2	A2e	10	15		C		CLS			10YR	2	2	M	–				
										10YR	6	1	D					
3	B21	15	40		G		LMC			10YR	2	1	M	M	4	2	D	B
4	B22	40	E80		G		MC			10YR	2	1	M	M	1	1	F	B
5	B23	80	100				MC			2.5Y	3	2	M	M	2	2	D	D
6																		
7																		

Number	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Cons	Fabric	Cutans Kind	Abund.	Dstinct	Pans Type	Cmnt	Cont	Str	Samples
1	–							W	2	PO		–																0-10
2	2	3	UT	ME				W	2	PO		–																30-40
3	–							S	3	SB		2	N	C	1													50-60
4	1	1	AT	ME				S	5	SB		3	N	C	2													90-100
												2	K	C	1	S												
5	2	2	AT	ME				S	4	SB		3	N	C	2													
												3	K	C	2	S												
6																												
7																												

Test	Meth					
		0-10	10-20	30-40	50-60	90-100
pH - RP		6.8	6.0	7.0	8.0	8.0
EC						
Disp						

NOTES:

SITE DESCRIPTION

Geology	Slope Eval	Slope Percent	Slope Class	MT	Incl	Landform Element Type	Loc	Height	Width	Length	Landform Pattern	Class	Modal	RMS	Land Use LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWg			VG	R		REC					RIS			GR				CK	2:10 170919	WILTON	W09		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit Type	Tax Unit Code	Map Unit Type	Map Unit Code	Air Photos Film No	Run No	Frame No	Substrate OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Datum	Zone	Easting / Latitude	Northing / Longitude	Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition	Microrelief Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Outcrop Abun	Lith
	55	661427	7417051		VE	GR												GFX							Z	4	ST	ME				

Profile Diagram

Erosion Type	State	Deg	GD	Community No	Ref No	Name
				1		SL Car, sa, Caesalpinia, ironbark
				2		
				3		

Community 1 Details

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth Upper	Depth Lower	Confid	Bound Dsct	Bound Shape	Field Texture	Qual	SWS	Colour Hue	V	C	Moist	Mottles Type	Abun	Size	Contr	Col	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Cons	Fabric	Cutans Kind	Abund.	Distinct	Pans Type	Cmnt	Cont	Str	Samples
1	A1/B21	0	10		C		SLMC			10YR	2	1		—					1	2	AT	ME				S	4	SB		—																
2	B22	10	30		G		SLMC			10YR	3	1		—					3	3	ST	ME				S	3	SB		—																
3	B/C	30	40		A		SLMC			10YR	3	1		—					5	3	AT	ME				W	1	SB		3	K	C	2	5												
4	C	40+																																												
5																																														
6																																														
7																																														

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

Geology	Slope Eval	Slope Percent	Slope Class	Slope MT	Slope Incl	Landform Element Type	Loc	Height	Width	Length	Landform Pattern	Class	Modal	RMS	Land Use LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWg			VG	S		RES					RIS			LR				CK	170919	WILTON	W10		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit Type	Tax Unit Code	Map Unit Type	Map Unit Code	Air Photos Film No	Run No	Frame No	Substrate OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Datum	Zone	Easting / Latitude	Northing / Longitude	Conf	Ord	Sub Ord	GG/Or2	SG/SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition	Microrelief Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Outcrop Abun	Lith
	55	661515	7417010		RU	GR												GFC	—						4	2	ST	ME				
																									3	4	ST	ME				

Erosion Type	State	Deg	GD	No	Ref No	Community Name	Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
S	A	3	1	1		SL IRONBARK, CARISSA, CAESALPINIA	T											
S	A	3		2			M											
				3			L											

Profile Diagram

Number	Horizon	Depth (cm) Upper	Lower	Confid	Bound Dsct	Shape	Field Texture	Qual	SWS	Colour Book Hue	V	C	Moist	Mottles Type	Abun	Size	Contr	Col	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Cons	Fabric	Cutans Kind	Abund.	Distinct	Pans Type	Cmnt	Cont	Str	Samples
1	A1/B21	0	10																																											
2	B/C	10	30																																											
3	C	30+																																												
4																																														
5																																														
6																																														
7																																														

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

Geology	Slope: Eval	Percent	Class	MT	Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
Pwg			LE	E		PLA					RLS			9R				CR	170819	WILTON	WL1		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Code	Map Unit: Type	Code	Air Photos: Film No	Run No	Frame No
											J					

Substrate

OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location

Datum	Zone	Easting / Latitude	Northing / Longitude
	55	660527	7611755

Australian Soil Classification

Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5
	SO	BR							

PPF	GSG aff	Disturb	Surface Condition
			FC

Microrelief

Type	Agent	Cmpt	Prop	VI	HI
—	—				

Surface Coarse Fragments

Abun	Size	Shape	Lith	Str	Alt
—					

Outcrop

Abun	Lith
—	

Profile Diagram

Erosion

Type	State	Deg	GD
—			

Community

No	Ref No	Name
1		Carissa, Bloodwood, Ironbark Angophora
2		
3		

Community 1 Details

Stratum	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth Upper	Depth Lower	Confid	Bound Dist	Bound Shape	Field Texture	Field Texture Qual	SWS	Book	Colour Hue	V	C	Moist	Mottles Type	Abun	Size	Contr	Col	Coarse Fragments Abun	Size	Shape	Lith	Str	Alt	Dist	Structure Grade	Size	Type	Cmpd	Segregations Abun	Nat	Form	Size	Eff	Cracks	Strgth SWS	Strgth Cons	Fabric	Cutans Kind	Cutans Abund	Cutans Distinct	Pans Type	Pans Cmnt	Pans Cont	Pans Str	Samples
1	A1	0	10		C		CLS				10YR2/1			M	—					—							W	1	SA		—																0-10
																																														10-20
2	A2e	10	30		C		CLS				10YR3/1			M	—					—							W	1	SB		—																20-30
											10YR6/1	D																																		
3	B21	30	65		G		LMC				10YR4/4			M	M	3	1	D	G	—							M	4	SB		—																50-60
4	B22	65	100				FSLC				7.5YR4/4			M	M	3	2	D	D	—							W	4	SB		2	K	C	2	S												90-100
5																																														
6																																														
7																																														

Test	Meth	0-10	20-30	50-60	70-80	90-100
pH - RP		5.5	5.0	7.5	8.0	8.0
EC						
Disp						

NOTES:

SITE DESCRIPTION

Geology	Slope: Eval	Slope: Percent	Slope: Class	Slope: MT	Slope: Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWg			VG	R		REC					RIS							CT	170919	WILTON	WI2		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Tax Unit: Code	Map Unit: Type	Map Unit: Code	Air Photos: Film No	Run No	Frame No

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG	aff	Disturb	Surface Condition
	55	660392	7417906		VE	BR												GCF

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith	Profile Diagram
—	—	—				4	4	RT	ME					
						4	3	RT	ME					

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
S	A	2		1		Ironbark, Eramophila
				2		carisa, brigalow
				3		

Community 1 Details

Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Depth: Lower	Confid	Bound: Dsct	Bound: Shape	Field Texture	Qual	SWS	Colour (Book): Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist	Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Fabric	Cutans: Kind	Abund.	Distinct	Pans: Type	Cmnt	Cont	Str	Samples
1																																														
2																																														
3																																														
4																																														
5																																														
6																																														
7																																														

Test	Meth	
pH - RP		
EC		
Disp		

NOTES:

SITE DESCRIPTION

U20

Geology	Slope: Eval	Percent	Class	MT	Incl	Landform Element: Type	Loc	Height	Width	Length	Landform Pattern: Pattern	Class	Modal	RMS	Land Use: LU1	Mgt1	Mgt2	Described By	Date (ddmmyy)	Project	Site	Obs	S Type
PWG			LER			REC					RIS			GR				CT	170919	WILTON	SW3		

TSO	M Type	L Meas	Obs Reas	Runoff	Perm	Drainage	M Samp	Aggredn	Depth R Horiz	Tax Unit: Type	Code	Map Unit: Type	Code	Air Photos: Film No	Run No	Frame No
											.j					

Substrate: OT	Distance	Conf	Depth	Gr S	Str	Por	Sp F	Alt	Str	Lith	Gen T	Text	Mass Str	MDS	MC1	MC2

Location: Datum	Zone	Easting / Latitude	Northing / Longitude	Australian Soil Classification: Conf	Ord	Sub Ord	GG/ Or2	SG/ SO2	F1	F2	F3	F4	F5	PPF	GSG: aff	Disturb	Surface Condition
	55	661502	7417036		VE	GR											CG

Microrelief: Type	Agent	Cmpt	Prop	VI	HI	Surface Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Outcrop: Abun	Lith
						2	3	VP	ME				

Profile Diagram

Erosion: Type	State	Deg	GD	Community: No	Ref No	Name
S	A	1		1		SL caesalpinia, frangipani, bougainvillea
				2		
				3		

1 4 UP ME

Community 1 Details: Strata	Form	Ht Cl	Cov Cl	Height	Cover	Species 1	Prop	Species 2	Prop	Species 3	Prop
T											
M											
L											

Number	Horizon	Depth: Upper	Lower	Confid	Bound: Dsct	Shape	Field Texture: Field Texture	Qual	SWS	Book	Colour: Hue	V	C	Moist	Mottles: Type	Abun	Size	Contr	Col	Coarse Fragments: Abun	Size	Shape	Lith	Str	Alt	Dist
1	A1/B21	0	20		C		MC				10YR	2	1	m	—					1	2	AP	ME			
2	B22	20	70		G		MC				10YR	3	1	m	—					1	3	AP	ME			
3	B/C	70	80		A		LMC				10YR	4	1	m	—					4	2	AP	ME			
4	C	80	+																							
5																										
6																										
7																										

Structure: Grade	Size	Type	Cmpd	Segregations: Abun	Nat	Form	Size	Eff	Cracks	Strgth: SWS	Cons	Fabric	Cutans: Kind	Abund.	Distinct	Pans: Type	Cmnt	Cont	Str	Samples
S	3	SB		—																0-10
S	5	SB		—																10-20
M	2	SB		—																20-30 50-60
																				70-80

Test	Meth	0-10	20-30	70-80
pH - RP		7.0	6.5	7.0
EC				
Disp				

NOTES:

APPENDIX D

Laboratory Reports for SCL Analysed Profiles

SLR Consulting Australia Pty Ltd Level 2, 15 Astor Terrace Spring Hill QLD 4000 Australia (PO Box 26 Spring Hill QLD 4004 Australia)
T: +61 7 3858 4800 E: brisbane@slrconsulting.com
www.slrconsulting.com ABN 29 001 584 612

26/9.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: SLR Consulting	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	✓ Standard TAT (List due date): 25/09/2019	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 15 Astor Terrace, Spring Hill, Qld 4000		☐ Fast TAT – no surcharge for CEC check	Custody Seal Intact? Yes No N/A
PROJECT: Wilton Coking Coal PROJECT NO.: 623.17170	**ALS QUOTE NO.: EN/032/18**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: PURCHASE ORDER NO.:	**COUNTRY OF ORIGIN: Australia**	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Damien Taylor CONTACT PH: 0429 110 858		OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Cameron Traill	**SAMPLER MOBILE: 0403 837 811**	**RELINQUISHED BY: C Traill**	**RECEIVED BY:** JBolin	**RELINQUISHED BY:** D. Stewart	**RECEIVED BY:**
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**	DATE/TIME: 17/09/2019 19:00	DATE/TIME: 19/9 9:10	DATE/TIME: 18-9-19@16:00	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): ctraill@slrconsulting.com					
Email Invoice to (will default to PM if no other addresses are listed): dtaylor@slrconsulting.com					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).													Additional Information
						TOPSOIL ONLY					TOPSOIL AND SUBSOIL						SUBSOIL		
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Nitrogen, nitrite, nitrate, NOx, total Kjeldahl nitrogen (TKN) as N and Total N (ALS code NT-6S)	Bicarbonate extractable P (Colwell) and Total P (ALS code EK080/EK067)	Organic Carbon (Calc from Organic Matter) - Walkley Black (ALS code EP004)	Boron - CaCl2 Extractable (ALS code ED091)	DTPA Extractable micronutrients (Cu, Fe, Mn, Zn) (ALS code ED092)	pH Plus EC (1:5 soil/water leach) (ALS code IN-4S)	Cl- [1:5] Soluble (ALS code ED045G)	Exch Cations and CEC or ECEC (ALS code ED006 (alkaline soils) or ED007 (no pre wash) or ED008 (prewash))	Sulfur – Total as S (LECO) (ALS code ED042T)	Carbonate - ANC (ALS code EA013)	PSD + Hydrometer for ranges <2µm, 2-20µm, 20-200µm, 0.2-2.0mm (ALS code EA150-H-Y)	Emerson Dispersion (ALS code EA058)	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	W01 / 0.0-0.1	17/09/2019 / 08:10am	S								✓	✓	✓			✓	✓		
2	W01 / 0.1-0.2	17/09/2019 / 08:10am	S								✓	✓	✓			✓	✓		
3	W01 / 0.3-0.4	17/09/2019 / 08:10am	S															✓	
4	W01 / 0.5-0.6	17/09/2019 / 08:10am	S								✓	✓	✓			✓	✓		
5	W01 / 0.7-0.8	17/09/2019 / 08:10am	S															✓	
6	W01 / 0.9.1.0	17/09/2019 / 08:10am	S								✓	✓	✓			✓	✓		
				TOTAL		0	0	0	0	0	4	4	4	0	0	4	4	2	

litric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
hate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
ttles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental Division
Brisbane
Work Order Reference
EB1924756

Telephone : + 61-7-3243 7222

Approved Date: 27/09/2013

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

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☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

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☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: SLR Consulting	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	✓ Standard TAT (List due date): **25/09/2019**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 15 Astor Terrace, Spring Hill, Qld 4000		☐ Fast TAT – no surcharge for CEC check	Custody Seal Intact? Yes No N/A
PROJECT: Wilton Coking Coal **PROJECT NO.: 623.17170**	**ALS QUOTE NO.: EN/032/18**	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN: Australia**	OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Damien Taylor	**CONTACT PH: 0429 110 858**		Other comment:
SAMPLER: Cameron Traill	**SAMPLER MOBILE: 0403 837 811**	**RELINQUISHED BY: C Traill**	**RECEIVED BY:** JBotha
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**		**RELINQUISHED BY:** D. Stewart
Email Reports to (will default to PM if no other addresses are listed): ctraill@slrconsulting.com		DATE/TIME: 17/09/2019 19:00	DATE/TIME: 19/9 9:10
Email Invoice to (will default to PM if no other addresses are listed): dtaylor@slrconsulting.com			DATE/TIME: 18-9-19@ 1600

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).													Additional Information
						TOPSOIL ONLY					TOPSOIL AND SUBSOIL						SUBSOIL		
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Nitrogen, nitrite, nitrate, NOx, total Kjeldahl nitrogen (TKN) as N and Total N (ALS code NT-6S)	Bicarbonate extractable P (Colwell) and Total P (ALS code EK080/EK067)	Organic Carbon (Calc from Organic Matter) - Walkley Black (ALS code EP004)	Boron - CaCl2 Extractable (ALS code ED091)	DTPA Extractable micronutrients (Cu, Fe, Mn, Zn) (ALS code ED092)	pH Plus EC (1:5 soil/water leach) (ALS code iN-4S)	Cl- [1:5] Soluble (ALS code ED045G)	Exch Cations and CEC or ECEC (ALS code ED006 (alkaline soils) or ED007 (no pre-wash)) or ED008 (prewash))	Sulfur – Total as S (LECO) (ALS code ED042T)	Carbonate - ANC (ALS code EA013)	PSD + Hydrometer for ranges <2µm, 2-20µm, 20-200µm, 0.2-2.0mm (ALS code EA150-H-Y)	Emerson Dispersion (ALS code EA058)	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
7	W03 / 0.0-0.1	17/09/2019 / 09:50am	S								✓	✓	✓			✓	✓		
8	W03 / 0.2-0.3	17/09/2019 / 09:50am	S								✓	✓	✓			✓	✓		
9	W03 / 0.5-0.6	17/09/2019 / 09:50am	S								✓	✓	✓			✓	✓		
10	W03 / 0.9-1.0	17/09/2019 / 09:50am	S								✓	✓	✓			✓	✓		
			TOTAL			0	0	0	0	0	4	4	4	0	0	4	4	0	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: SLR Consulting	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	✓ Standard TAT (**List due date**): **25/09/2019**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 15 Astor Terrace, Spring Hill, Qld 4000		☐ Fast TAT – no surcharge for CEC check	Custody Seal Intact? Yes No N/A
PROJECT: Wilton Coking Coal **PROJECT NO.: 623.17170**	**ALS QUOTE NO.: EN/032/18**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN: Australia**	COC: 1 2 **3** 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Damien Taylor	**CONTACT PH: 0429 110 858**	OF: 1 2 3 4 **5** 6 7	Other comment:

SAMPLER: Cameron Traill	**SAMPLER MOBILE: 0403 837 811**	**RELINQUISHED BY: C Traill**	**RECEIVED BY:** D JBotha	**RELINQUISHED BY:** D. Stenc	**RECEIVED BY:**
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**				
Email Reports to (will default to PM if no other addresses are listed): ctraill@slrconsulting.com		DATE/TIME: 17/09/2019 19:00	DATE/TIME: 19/9 9:10	DATE/TIME: 19-9-19@16:00	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): dtaylor@slrconsulting.com					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).													Additional Information
						TOPSOIL ONLY					TOPSOIL AND SUBSOIL						SUBSOIL		
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Nitrogen, nitrite, nitrate, NOx, total Kjeldahl nitrogen (TKN) as N and Total N (ALS code NT-6S)	Bicarbonate extractable P (Colwell) and Total P (ALS code EK080/EK067)	Organic Carbon (Calc from Organic Matter) - Walkley Black (ALS code EP004)	Boron - CaCl2 Extractable (ALS code ED091)	DTPA Extractable micronutrients (Cu, Fe, Mn, Zn) (ALS code ED092)	pH Plus EC (1:5 soil/water leach) (ALS code IN-4S)	Cl- [1:5] Soluble (ALS code ED045G)	Exch Cations and CEC or ECEC (ALS code ED006 (alkaline soils) or ED007 (no pre-wash) or ED008 (prewash))	Sulfur – Total as S (LECO) (ALS code ED042T)	Carbonate - ANC (ALS code EA013)	PSD + Hydrometer for ranges <2µm, 2-20µm, 20-200µm, 0.2-2.0mm (ALS code EA150-H-Y)	Emerson Dispersion (ALS code EA058)	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
11	W03 / 0.0-0.1	17/09/2019 / 12:40pm	S								✓	✓	✓			✓	✓		
12	W03 / 0.3-0.4	17/09/2019 / 12:40pm	S								✓	✓	✓			✓	✓		
13	W03 / 0.5-0.6	17/09/2019 / 12:40pm	S								✓	✓	✓			✓	✓		
14	W03 / 0.9-1.0	17/09/2019 / 12:40pm	S								✓	✓	✓			✓	✓		
				TOTAL		0	0	0	0	0	4	4	4	0	0	4	4	0	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

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CLIENT: SLR Consulting	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	✓ Standard TAT (List due date): 25/09/2019 ☐ Fast TAT – no surcharge for CEC check	**FOR LABORATORY USE ONLY (Circle)** Custody Seal Intact? Yes No N/A Free ice / frozen ice bricks present upon receipt? Yes No N/A Random Sample Temperature on Receipt: °C Other comment:
OFFICE: 15 Astor Terrace, Spring Hill, Qld 4000			
PROJECT: Wilton Coking Coal PROJECT NO.: 623.17170	**ALS QUOTE NO.: EN/032/18**	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
ORDER NUMBER: **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN: Australia**		
PROJECT MANAGER: Damien Taylor	**CONTACT PH: 0429 110 858**		

SAMPLER: Cameron Traill	**SAMPLER MOBILE: 0403 837 811**	**RELINQUISHED BY: C Traill**	**RECEIVED BY:**	**RELINQUISHED BY:** D. Stevens
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**			**RECEIVED BY:**
Email Reports to (will default to PM if no other addresses are listed): ctraill@slrconsulting.com		DATE/TIME: 17/09/2019 19:00	DATE/TIME: 19/9 9:10	DATE/TIME: 18-9-19@16:00
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15	W11 / 0.0-0.1	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
16	W11 / 0.1-0.2	17/09/2019 / 3:00pm	S															✓	
17	W11 / 0.2-0.3	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
18	W11 / 0.5-0.6	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
19	W11 / 0.9-1.0	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
				TOTAL		0	0	0	0	0	4	4	4	0	0	4	4	1	

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PROJECT MANAGER: Damien Taylor	**CONTACT PH: 0429 110 858**	OF: 1 2 3 4 **5** 6 7	Other comment:

SAMPLER: Cameron Traill	**SAMPLER MOBILE: 0403 837 811**	**RELINQUISHED BY: C Traill**	**RECEIVED BY:** J Butler	**RELINQUISHED BY:** D. Stewart	**RECEIVED BY:**
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**	DATE/TIME: 17/09/2019 19:00	DATE/TIME: 14/9 9:10	DATE/TIME: 18-9-19@1600	DATE/TIME:
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COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).												Additional Information
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20	W13 / 0.0-0.1	17/09/2019 / 4:20pm	S								✓	✓	✓			✓	✓		
21	W13 / 0.1-0.2	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
22	W13 / 0.2-0.3	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
23	W13 / 0.5-0.6	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
24	W13 / 0.7-0.8	17/09/2019 / 3:00pm	S								✓	✓	✓			✓	✓		
				TOTAL		0	0	0	0	0	5	5	5	0	0	5	5	0	

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Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; L = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1924756**

Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: Damien Taylor	Contact	: Tyler Cachia
Address	:	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: djtaylor@slrconsulting.com	E-mail	: Tyler.Cachia@ALSGlobal.com
Telephone	: ----	Telephone	: +61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: 623.17170 Wilton Coking Coal	Page	: 1 of 3
Order number	: ----	Quote number	: EM2018HEGAUS0001 (EN/032/18 Primary work only BQ)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CAMERON TRAILL		

Dates

Date Samples Received	: 19-Sep-2019 09:10	Issue Date	: 19-Sep-2019
Client Requested Due Date	: 25-Sep-2019	Scheduled Reporting Date	: **26-Sep-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 18.9°C; 20.4°C
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 24 / 21

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised, sample ID's on page 3 of the Chain of Custody do not match sample ID's on sample bags (W03 on chain of custody, W08 on sample bags). ALS has used the sample ID's on the sample bags for this work order. For further information please contact Client Services at ALSEnviro.Brisbane@ALSGlobal.com**
- **Plesae be advised, the requested turn around time can not be accomodated. A message has been left with Damien Taylor and Cameron Traill. For further information please contact Client Services at ALSEnviro.Brisbane@ALSGlobal.com**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - AG-1 EB Only Agricultural Soil Suite 1 EB Only	SOIL - EA055-103 Moisture Content	SOIL - EA058 Emerson Aggregate Test	SOIL - EA150H-Y Particle Size Analysis by Hydrometer: Yellow	SOIL - ED045G (solids) Chloride Soluble by Discrete Analyser
EB1924756-001	17-Sep-2019 08:10	W01 / 0.0-0.1		✓	✓	✓	✓	✓
EB1924756-002	17-Sep-2019 08:10	W01 / 0.1-0.2		✓	✓	✓	✓	✓
EB1924756-003	17-Sep-2019 08:10	W01 / 0.3-0.4	✓					
EB1924756-004	17-Sep-2019 08:10	W01 / 0.5-0.6		✓	✓	✓	✓	✓
EB1924756-005	17-Sep-2019 08:10	W01 / 0.7-0.8	✓					
EB1924756-006	17-Sep-2019 08:10	W01 / 0.9-1.0		✓	✓	✓	✓	✓
EB1924756-007	17-Sep-2019 09:50	W03 / 0.0-0.1		✓	✓	✓	✓	✓
EB1924756-008	17-Sep-2019 09:50	W03 / 0.2-0.3		✓	✓	✓	✓	✓
EB1924756-009	17-Sep-2019 09:50	W03 / 0.5-0.6		✓	✓	✓	✓	✓
EB1924756-010	17-Sep-2019 09:50	W03 / 0.9-1.0		✓	✓	✓	✓	✓
EB1924756-011	17-Sep-2019 12:40	W08 / 0.0-0.1		✓	✓	✓	✓	✓
EB1924756-012	17-Sep-2019 12:40	W08 / 0.3-0.4		✓	✓	✓	✓	✓
EB1924756-013	17-Sep-2019 12:40	W08 / 0.5-0.6		✓	✓	✓	✓	✓
EB1924756-014	17-Sep-2019 12:40	W08 / 0.9-1.0		✓	✓	✓	✓	✓
EB1924756-015	17-Sep-2019 15:00	W11 / 0.0-0.1		✓	✓	✓	✓	✓
EB1924756-016	17-Sep-2019 15:00	W11 / 0.1-0.2	✓					
EB1924756-017	17-Sep-2019 15:00	W11 / 0.2-0.3		✓	✓	✓	✓	✓
EB1924756-018	17-Sep-2019 15:00	W11 / 0.5-0.6		✓	✓	✓	✓	✓
EB1924756-019	17-Sep-2019 15:00	W11 / 0.9-1.0		✓	✓	✓	✓	✓
EB1924756-020	17-Sep-2019 16:20	W13 / 0.0-0.1		✓	✓	✓	✓	✓
EB1924756-021	17-Sep-2019 15:00	W13 / 0.1-0.2		✓	✓	✓	✓	✓
EB1924756-022	17-Sep-2019 15:00	W13 / 0.2-0.3		✓	✓	✓	✓	✓
EB1924756-023	17-Sep-2019 15:00	W13 / 0.5-0.6		✓	✓	✓	✓	✓
EB1924756-024	17-Sep-2019 15:00	W13 / 0.7-0.8		✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE AU

- A4 - AU Tax Invoice (INV)	Email	accountspayableau@slrconsulting.com

CAMERON TRAILL

- *AU Certificate of Analysis - NATA (COA)	Email	ctraill@slrconsulting.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ctraill@slrconsulting.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ctraill@slrconsulting.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ctraill@slrconsulting.com
- Attachment - Report (SUBCO)	Email	ctraill@slrconsulting.com
- Chain of Custody (CoC) (COC)	Email	ctraill@slrconsulting.com
- EDI Format - ENMRG (ENMRG)	Email	ctraill@slrconsulting.com
- EDI Format - ESDAT (ESDAT)	Email	ctraill@slrconsulting.com

Damien Taylor

- A4 - AU Tax Invoice (INV)	Email	djtaylor@slrconsulting.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1924756**	Page	: 1 of 11
Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: Damien Taylor	Contact	: Tyler Cachia
Address	:	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 623.17170 Wilton Coking Coal	Date Samples Received	: 19-Sep-2019 09:10
Order number	: ----	Date Analysis Commenced	: 19-Sep-2019
C-O-C number	: ----	Issue Date	: 26-Sep-2019 16:45
Sampler	: CAMERON TRAILL		
Site	: ----		
Quote number	: EN/032/18 Primary work only BQ		
No. of samples received	: 24		
No. of samples analysed	: 21		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED006 (Exchangeable Cations on Alkaline Soils): Unable to calculate Magnesium/Potassium Ratio for some samples as the required results for Magnesium/Potassium are below LOR.
- ALS is not NATA accredited for the analysis of Exchangeable Aluminium and Exchange Acidity in soils when performed under ALS Method ED005.
- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- EA058 Emerson: V. = Very, D. = Dark, L. = Light, VD. = Very Dark
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	W01 / 0.0-0.1	W01 / 0.1-0.2	W01 / 0.5-0.6	W01 / 0.9-1.0	W03 / 0.0-0.1
			Client sampling date / time	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 09:50
Compound	CAS Number	LOR	Unit	EB1924756-001	EB1924756-002	EB1924756-004	EB1924756-006	EB1924756-007
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	5.9	5.9	7.5	9.3	7.7
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	20	15	285	687	139
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.0	2.5	6.1	6.3	7.2
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Very Dark Brown (7.5YR 2.5/3)	Dark Brown (7.5YR 3/3)	Dark Reddish Brown (5YR 3/4)	Dark Brown (7.5YR 3/3)	Black (10YR 2/1)
Texture	----	-	-	Sandy Loam	Sandy Loam	Sandy Clay	Silty Clay Loam	Clay Loam
Emerson Class Number	EC/TC	-	-	7	3	2	2	4
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	14	19	35	28	37
Silt (2-20 µm)	----	1	%	11	12	10	14	27
Fine Sand (0.02-0.2 mm)	----	1	%	25	27	24	26	15
Coarse Sand (0.2-2.0 mm)	----	1	%	35	36	31	32	9
Gravel (>2mm)	----	1	%	15	6	<1	<1	12
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.44	2.48	2.73	2.63	2.36
ED005: Exchange Acidity								
ø Exchange Acidity	----	0.1	meq/100g	<0.1	0.2	----	----	----
ø Exchangeable Aluminium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
ED006: Exchangeable Cations on Alkaline Soils								
ø Exchangeable Calcium	----	0.2	meq/100g	----	----	2.6	2.6	12.4
ø Exchangeable Magnesium	----	0.2	meq/100g	----	----	3.2	3.5	3.4
ø Exchangeable Potassium	----	0.2	meq/100g	----	----	<0.2	<0.2	6.4
ø Exchangeable Sodium	----	0.2	meq/100g	----	----	2.2	4.2	<0.2
ø Cation Exchange Capacity	----	0.2	meq/100g	----	----	8.0	10.3	22.2
ø Exchangeable Sodium Percent	----	0.2	%	----	----	27.4	41.2	<0.2
ø Calcium/Magnesium Ratio	----	0.2	-	----	----	0.8	0.7	3.6
ø Magnesium/Potassium Ratio	----	0.2	-	----	----	----	----	0.5
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.7	2.4	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	0.9	0.8	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.6	0.4	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	W01 / 0.0-0.1	W01 / 0.1-0.2	W01 / 0.5-0.6	W01 / 0.9-1.0	W03 / 0.0-0.1
				Client sampling date / time	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 08:10	17-Sep-2019 09:50
Compound	CAS Number	LOR	Unit		EB1924756-001	EB1924756-002	EB1924756-004	EB1924756-006	EB1924756-007
					Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued									
Exchangeable Sodium	----	0.1	meq/100g		<0.1	**0.1**	**----**	**----**	**----**
Cation Exchange Capacity	----	0.1	meq/100g		**4.2**	**3.9**	**----**	**----**	**----**
Exchangeable Sodium Percent	----	0.1	%		**1.1**	**3.5**	**----**	**----**	**----**
Calcium/Magnesium Ratio	----	0.1	-		**3.0**	**3.0**	**----**	**----**	**----**
Magnesium/Potassium Ratio	----	0.1	-		**1.5**	**2.0**	**----**	**----**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	<10	**370**	**910**	**60**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	W03 / 0.2-0.3	W03 / 0.5-0.6	W03 / 0.9-1.0	W08 / 0.0-0.1	W08 / 0.3-0.4
			Client sampling date / time	17-Sep-2019 09:50	17-Sep-2019 09:50	17-Sep-2019 09:50	17-Sep-2019 12:40	17-Sep-2019 12:40
Compound	CAS Number	LOR	Unit	EB1924756-008	EB1924756-009	EB1924756-010	EB1924756-011	EB1924756-012
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.6	8.8	8.3	6.4	8.3
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	416	605	584	39	730
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	10.1	9.4	10.2	2.4	13.1
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Very Dark Gray (2.5Y 3/1)	Very Dark Brown (10YR 2/2)	Brown (7.5YR 4/2)	Black (10YR 2/1)	Very Dark Gray (10YR 3/1)
Texture	----	-	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam
Emerson Class Number	EC/TC	-	-	4	2	2	7	2
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	50	50	43	25	55
Silt (2-20 µm)	----	1	%	25	18	16	35	16
Fine Sand (0.02-0.2 mm)	----	1	%	8	10	25	21	18
Coarse Sand (0.2-2.0 mm)	----	1	%	12	16	13	13	5
Gravel (>2mm)	----	1	%	5	6	3	6	6
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.57	2.55	2.75	2.18	2.51
ED006: Exchangeable Cations on Alkaline Soils								
ø Exchangeable Calcium	----	0.2	meq/100g	17.7	13.0	9.3	----	19.4
ø Exchangeable Magnesium	----	0.2	meq/100g	4.5	5.5	5.3	----	7.6
ø Exchangeable Potassium	----	0.2	meq/100g	1.3	0.3	0.2	----	0.3
ø Exchangeable Sodium	----	0.2	meq/100g	2.2	4.6	6.0	----	6.8
ø Cation Exchange Capacity	----	0.2	meq/100g	25.7	23.4	20.9	----	34.2
ø Exchangeable Sodium Percent	----	0.2	%	8.7	19.8	28.9	----	20.0
ø Calcium/Magnesium Ratio	----	0.2	-	3.9	2.4	1.8	----	2.5
ø Magnesium/Potassium Ratio	----	0.2	-	3.4	21.1	25.4	----	23.7
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	10.6	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	3.8	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	0.9	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	0.2	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	15.6	----
Exchangeable Sodium Percent	----	0.1	%	----	----	----	1.2	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	W03 / 0.2-0.3	W03 / 0.5-0.6	W03 / 0.9-1.0	W08 / 0.0-0.1	W08 / 0.3-0.4
				Client sampling date / time	17-Sep-2019 09:50	17-Sep-2019 09:50	17-Sep-2019 09:50	17-Sep-2019 12:40	17-Sep-2019 12:40
Compound	CAS Number	LOR	Unit		EB1924756-008	EB1924756-009	EB1924756-010	EB1924756-011	EB1924756-012
					Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	----	0.1	-		**----**	**----**	**----**	**2.8**	**----**
Magnesium/Potassium Ratio	----	0.1	-		**----**	**----**	**----**	**4.2**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**410**	**710**	**750**	**10**	**1140**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	W08 / 0.5-0.6	W08 / 0.9-1.0	W11 / 0.0-0.1	W11 / 0.2-0.3	W11 / 0.5-0.6
			Client sampling date / time	17-Sep-2019 12:40	17-Sep-2019 12:40	17-Sep-2019 15:00	17-Sep-2019 15:00	17-Sep-2019 15:00
Compound	CAS Number	LOR	Unit	EB1924756-013	EB1924756-014	EB1924756-015	EB1924756-017	EB1924756-018
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.6	8.6	6.7	6.1	7.6
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	782	765	55	43	576
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	14.5	14.6	5.1	5.0	10.6
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Black (10YR 2/1)	Very Dark Gray (2.5Y 3/1)	Black (10YR 2/1)	Black (10YR 2/1)	Very Dark Grayish Brown (2.5Y 3/2)
Texture	----	-	-	Clay Loam	Clay Loam	Sandy Clay	Sandy Clay	Clay Loam
Emerson Class Number	EC/TC	-	-	2	2	4	2	2
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	64	46	27	23	52
Silt (2-20 µm)	----	1	%	14	16	47	33	23
Fine Sand (0.02-0.2 mm)	----	1	%	9	28	14	24	14
Coarse Sand (0.2-2.0 mm)	----	1	%	8	7	11	19	11
Gravel (>2mm)	----	1	%	5	3	1	1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.34	2.16	2.21	2.47	2.42
ED006: Exchangeable Cations on Alkaline Soils								
ø Exchangeable Calcium	----	0.2	meq/100g	19.4	21.5	----	----	9.6
ø Exchangeable Magnesium	----	0.2	meq/100g	7.4	8.2	----	----	4.5
ø Exchangeable Potassium	----	0.2	meq/100g	0.3	0.5	----	----	0.5
ø Exchangeable Sodium	----	0.2	meq/100g	7.3	8.4	----	----	2.4
ø Cation Exchange Capacity	----	0.2	meq/100g	34.5	38.5	----	----	17.0
ø Exchangeable Sodium Percent	----	0.2	%	21.3	21.7	----	----	14.1
ø Calcium/Magnesium Ratio	----	0.2	-	2.6	2.6	----	----	2.1
ø Magnesium/Potassium Ratio	----	0.2	-	23.4	17.4	----	----	9.4
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	12.5	4.3	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	5.7	2.2	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	1.2	0.4	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	0.5	0.7	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	20.0	7.5	----
Exchangeable Sodium Percent	----	0.1	%	----	----	2.6	9.4	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	W08 / 0.5-0.6	W08 / 0.9-1.0	W11 / 0.0-0.1	W11 / 0.2-0.3	W11 / 0.5-0.6
				Client sampling date / time	17-Sep-2019 12:40	17-Sep-2019 12:40	17-Sep-2019 15:00	17-Sep-2019 15:00	17-Sep-2019 15:00
Compound	CAS Number	LOR	Unit		EB1924756-013	EB1924756-014	EB1924756-015	EB1924756-017	EB1924756-018
					Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	----	0.1	-		**----**	**----**	**2.2**	**2.0**	**----**
Magnesium/Potassium Ratio	----	0.1	-		**----**	**----**	**4.6**	**5.9**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**1120**	**1040**	**30**	**50**	**960**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	W11 / 0.9-1.0	W13 / 0.0-0.1	W13 / 0.1-0.2	W13 / 0.2-0.3	W13 / 0.5-0.6
			Client sampling date / time	17-Sep-2019 15:00	17-Sep-2019 16:20	17-Sep-2019 15:00	17-Sep-2019 15:00	17-Sep-2019 15:00
Compound	CAS Number	LOR	Unit	EB1924756-019	EB1924756-020	EB1924756-021	EB1924756-022	EB1924756-023
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.5	7.3	7.1	8.3	8.0
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	581	541	488	619	572
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	8.1	7.0	8.6	12.8	13.5
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Dark Yellowish Brown (10YR 3/4)	Very Dark Gray (10YR 3/1)	Very Dark Gray (10YR 3/1)	Black (2.5Y 2.5/1)	Black (10YR 2/1)
Texture	----	-	-	Clay Loam	Clay Loam	Sandy Clay	Clay Loam	Clay Loam
Emerson Class Number	EC/TC	-	-	2	2	2	2	2
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	33	53	49	60	54
Silt (2-20 µm)	----	1	%	17	24	25	22	35
Fine Sand (0.02-0.2 mm)	----	1	%	21	11	11	8	3
Coarse Sand (0.2-2.0 mm)	----	1	%	26	8	6	5	6
Gravel (>2mm)	----	1	%	3	4	9	5	2
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.29	2.46	2.54	2.61	2.28
ED006: Exchangeable Cations on Alkaline Soils								
ø Exchangeable Calcium	----	0.2	meq/100g	7.2	----	----	9.6	9.0
ø Exchangeable Magnesium	----	0.2	meq/100g	3.2	----	----	8.1	7.9
ø Exchangeable Potassium	----	0.2	meq/100g	0.4	----	----	0.6	0.6
ø Exchangeable Sodium	----	0.2	meq/100g	1.5	----	----	3.7	5.2
ø Cation Exchange Capacity	----	0.2	meq/100g	12.3	----	----	22.1	22.8
ø Exchangeable Sodium Percent	----	0.2	%	12.2	----	----	16.8	22.7
ø Calcium/Magnesium Ratio	----	0.2	-	2.2	----	----	1.2	1.1
ø Magnesium/Potassium Ratio	----	0.2	-	8.7	----	----	12.6	12.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	10.5	10.6	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	10.9	10.7	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	1.0	0.8	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	1.4	1.4	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	24.4	23.6	----	----
Exchangeable Sodium Percent	----	0.1	%	----	5.8	6.1	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	W11 / 0.9-1.0	W13 / 0.0-0.1	W13 / 0.1-0.2	W13 / 0.2-0.3	W13 / 0.5-0.6
				Client sampling date / time	17-Sep-2019 15:00	17-Sep-2019 16:20	17-Sep-2019 15:00	17-Sep-2019 15:00	17-Sep-2019 15:00
Compound	CAS Number	LOR	Unit		EB1924756-019	EB1924756-020	EB1924756-021	EB1924756-022	EB1924756-023
					Result	Result	Result	Result	Result
ED008: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	----	0.1	-		**----**	**1.0**	**1.0**	**----**	**----**
Magnesium/Potassium Ratio	----	0.1	-		**----**	**11.4**	**13.1**	**----**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**800**	**800**	**690**	**930**	**850**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	W13 / 0.7-0.8	----	----	----	----
			Client sampling date / time	17-Sep-2019 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1924756-024	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.6	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	451	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	12.9	----	----	----	----
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Dark Gray (10YR 4/1)	----	----	----	----
Texture	----	-	-	Clay Loam	----	----	----	----
Emerson Class Number	EC/TC	-	-	2	----	----	----	----
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	35	----	----	----	----
Silt (2-20 µm)	----	1	%	35	----	----	----	----
Fine Sand (0.02-0.2 mm)	----	1	%	1	----	----	----	----
Coarse Sand (0.2-2.0 mm)	----	1	%	19	----	----	----	----
Gravel (>2mm)	----	1	%	10	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.58	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	7.9	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	8.6	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.5	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	4.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	21.3	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	19.5	----	----	----	----
Calcium/Magnesium Ratio	----	0.1	-	0.9	----	----	----	----
Magnesium/Potassium Ratio	----	0.1	-	17.2	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	670	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1924756**	Page	: 1 of 5
Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: Damien Taylor	Contact	: Tyler Cachia
Address	:	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 623.17170 Wilton Coking Coal	Date Samples Received	: 19-Sep-2019
Order number	: ----	Date Analysis Commenced	: 19-Sep-2019
C-O-C number	: ----	Issue Date	: 26-Sep-2019
Sampler	: CAMERON TRAILL		
Site	: ----		
Quote number	: EN/032/18 Primary work only BQ		
No. of samples received	: 24		
No. of samples analysed	: 21		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 2594215)									
EB1924756-001	W01 / 0.0-0.1	EA002: pH Value	----	0.1	pH Unit	5.9	6.0	1.85	0% - 20%
EB1924756-013	W08 / 0.5-0.6	EA002: pH Value	----	0.1	pH Unit	8.6	8.6	0.00	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 2594217)									
EB1924756-024	W13 / 0.7-0.8	EA002: pH Value	----	0.1	pH Unit	6.6	6.5	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 2594214)									
EB1924756-001	W01 / 0.0-0.1	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	20	22	8.70	0% - 20%
EB1924756-013	W08 / 0.5-0.6	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	782	834	6.44	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 2594218)									
EB1924756-024	W13 / 0.7-0.8	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	451	495	9.30	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2594227)									
EB1924756-001	W01 / 0.0-0.1	EA055: Moisture Content	----	0.1	%	1.0	1.0	0.00	0% - 50%
EB1924756-013	W08 / 0.5-0.6	EA055: Moisture Content	----	0.1	%	14.5	14.1	2.93	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2594228)									
EB1924756-024	W13 / 0.7-0.8	EA055: Moisture Content	----	0.1	%	12.9	12.6	2.26	0% - 20%
ED005: Exchange Acidity (QC Lot: 2598411)									
EB1924756-001	W01 / 0.0-0.1	ED005: Exchange Acidity	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED005: Exchangeable Aluminium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 2598392)									
EB1924756-004	W01 / 0.5-0.6	ED006: Exchangeable Calcium	----	0.2	meq/100g	2.6	2.7	0.00	0% - 50%
		ED006: Exchangeable Magnesium	----	0.2	meq/100g	3.2	3.3	0.00	0% - 50%
		ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	<0.2	0.00	No Limit
		ED006: Exchangeable Sodium	----	0.2	meq/100g	2.2	2.3	0.00	0% - 50%
		ED006: Cation Exchange Capacity	----	0.2	meq/100g	8.0	8.3	2.70	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 (%)*
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 2598392) - continued									
EB1924756-019	W11 / 0.9-1.0	ED006: Exchangeable Calcium	----	0.2	meq/100g	7.2	7.0	1.48	0% - 20%
		ED006: Exchangeable Magnesium	----	0.2	meq/100g	3.2	3.2	0.00	0% - 50%
		ED006: Exchangeable Potassium	----	0.2	meq/100g	0.4	0.4	0.00	No Limit
		ED006: Exchangeable Sodium	----	0.2	meq/100g	1.5	1.4	0.00	No Limit
		ED006: Cation Exchange Capacity	----	0.2	meq/100g	12.3	12.1	1.74	0% - 20%
ED007: Exchangeable Cations (QC Lot: 2598410)									
EB1924756-001	W01 / 0.0-0.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	2.7	2.8	4.13	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.9	0.9	0.00	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.6	0.6	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED007: Exchangeable Cations (QC Lot: 2598414)									
EB1924756-011	W08 / 0.0-0.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	10.6	10.6	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	3.8	3.8	0.00	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.9	0.9	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
ED008: Exchangeable Cations (QC Lot: 2598431)									
EB1924756-020	W13 / 0.0-0.1	ED008: Exchangeable Calcium	----	0.1	meq/100g	10.5	10.5	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	10.9	10.9	0.00	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	1.0	0.8	14.5	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	1.4	1.4	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2594216)									
EB1924756-001	W01 / 0.0-0.1	ED045G: Chloride	16887-00-6	10	mg/kg	<10	<10	0.00	No Limit
EB1924756-013	W08 / 0.5-0.6	ED045G: Chloride	16887-00-6	10	mg/kg	1120	1200	7.32	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2594219)									
EB1924756-024	W13 / 0.7-0.8	ED045G: Chloride	16887-00-6	10	mg/kg	670	690	3.59	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.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 2594215)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	99.7	98.0	102
EA002: pH 1:5 (Soils) (QCLot: 2594217)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	99.8	98.0	102
EA010: Conductivity (1:5) (QCLot: 2594214)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	101	97.0	103
EA010: Conductivity (1:5) (QCLot: 2594218)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.8	97.0	103
ED005: Exchange Acidity (QCLot: 2598411)								
ED005: Exchange Acidity	----	0.1	meq/100g	<0.1	----	----	----	----
ED005: Exchangeable Aluminium	----	0.1	meq/100g	<0.1	----	----	----	----
ED006: Exchangeable Cations on Alkaline Soils (QCLot: 2598392)								
ED006: Exchangeable Calcium	----	0.2	meq/100g	<0.2	7.0676 meq/100g	124	70.0	130
ED006: Exchangeable Magnesium	----	0.2	meq/100g	<0.2	5.5895 meq/100g	105	70.0	130
ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	1.3505 meq/100g	94.0	70.0	130
ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	2.0578 meq/100g	115	70.0	130
ED006: Cation Exchange Capacity	----	0.2	meq/100g	<0.2	16.0654 meq/100g	114	70.0	130
ED007: Exchangeable Cations (QCLot: 2598410)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	18.1 meq/100g	94.5	79.0	113
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	9.08 meq/100g	91.1	85.0	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.918 meq/100g	90.7	70.0	122
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	3.15 meq/100g	99.4	76.0	112
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	31.3 meq/100g	93.7	82.0	112
ED007: Exchangeable Cations (QCLot: 2598414)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	18.1 meq/100g	95.2	79.0	113
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	9.08 meq/100g	92.8	85.0	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.918 meq/100g	87.3	70.0	122
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	3.15 meq/100g	97.4	76.0	112
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	31.3 meq/100g	94.3	82.0	112
ED008: Exchangeable Cations (QCLot: 2598431)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	16.7 meq/100g	98.0	91.0	109
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	7.74 meq/100g	94.6	89.0	111

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED008: Exchangeable Cations (QCLot: 2598431) - continued								
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.711 meq/100g	91.5	79.0	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.91 meq/100g	99.7	75.0	118
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	26.1 meq/100g	96.7	88.0	110
ED045G: Chloride by Discrete Analyser (QCLot: 2594216)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	102	83.0	119
				<10	5000 mg/kg	102	83.0	119
ED045G: Chloride by Discrete Analyser (QCLot: 2594219)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	97.5	83.0	119
				<10	5000 mg/kg	102	83.0	119

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) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1924756**	Page	: 1 of 8
Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: Damien Taylor	Telephone	: +61 2 8784 8555
Project	: 623.17170 Wilton Coking Coal	Date Samples Received	: 19-Sep-2019
Site	: ----	Issue Date	: 26-Sep-2019
Sampler	: CAMERON TRAILL	No. of samples received	: 24
Order number	: ----	No. of samples analysed	: 21

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

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
EA002: pH 1:5 (Soils)							
Snap Lock Bag (EA002)							
W01 / 0.0-0.1, W01 / 0.1-0.2, W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**19-Sep-2019**	24-Sep-2019	✓	**19-Sep-2019**	20-Sep-2019	✓
EA010: Conductivity (1:5)							
Snap Lock Bag (EA010)							
W01 / 0.0-0.1, W01 / 0.1-0.2, W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**19-Sep-2019**	24-Sep-2019	✓	**19-Sep-2019**	17-Oct-2019	✓

Matrix: **SOIL**

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
EA055: Moisture Content (Dried @ 105-110°C)								
Snap Lock Bag (EA055)								
W01 / 0.0-0.1,	W01 / 0.1-0.2,	**17-Sep-2019**	**----**	----	----	**19-Sep-2019**	01-Oct-2019	✓
W01 / 0.5-0.6,	W01 / 0.9-1.0,							
W03 / 0.0-0.1,	W03 / 0.2-0.3,							
W03 / 0.5-0.6,	W03 / 0.9-1.0,							
W08 / 0.0-0.1,	W08 / 0.3-0.4,							
W08 / 0.5-0.6,	W08 / 0.9-1.0,							
W11 / 0.0-0.1,	W11 / 0.2-0.3,							
W11 / 0.5-0.6,	W11 / 0.9-1.0,							
W13 / 0.0-0.1,	W13 / 0.1-0.2,							
W13 / 0.2-0.3,	W13 / 0.5-0.6,							
W13 / 0.7-0.8								
EA058: Emerson Aggregate Test								
Snap Lock Bag (EA058)								
W01 / 0.0-0.1,	W01 / 0.1-0.2,	**17-Sep-2019**	**----**	----	----	**24-Sep-2019**	15-Mar-2020	✓
W01 / 0.5-0.6,	W01 / 0.9-1.0,							
W03 / 0.0-0.1,	W03 / 0.2-0.3,							
W03 / 0.5-0.6,	W03 / 0.9-1.0,							
W08 / 0.0-0.1,	W08 / 0.3-0.4,							
W08 / 0.5-0.6,	W08 / 0.9-1.0,							
W11 / 0.0-0.1,	W11 / 0.2-0.3,							
W11 / 0.5-0.6,	W11 / 0.9-1.0,							
W13 / 0.0-0.1,	W13 / 0.1-0.2,							
W13 / 0.2-0.3,	W13 / 0.5-0.6,							
W13 / 0.7-0.8								
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Snap Lock Bag (EA150H)								
W01 / 0.0-0.1,	W01 / 0.1-0.2,	**17-Sep-2019**	**----**	----	----	**26-Sep-2019**	15-Mar-2020	✓
W01 / 0.5-0.6,	W01 / 0.9-1.0,							
W03 / 0.0-0.1,	W03 / 0.2-0.3,							
W03 / 0.5-0.6,	W03 / 0.9-1.0,							
W08 / 0.0-0.1,	W08 / 0.3-0.4,							
W08 / 0.5-0.6,	W08 / 0.9-1.0,							
W11 / 0.0-0.1,	W11 / 0.2-0.3,							
W11 / 0.5-0.6,	W11 / 0.9-1.0,							
W13 / 0.0-0.1,	W13 / 0.1-0.2,							
W13 / 0.2-0.3,	W13 / 0.5-0.6,							
W13 / 0.7-0.8								

Matrix: **SOIL**

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
EA152: Soil Particle Density							
Snap Lock Bag (EA152)							
W01 / 0.0-0.1, W01 / 0.1-0.2, W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**----**	----	----	**26-Sep-2019**	15-Mar-2020	✓
ED005: Exchange Acidity							
Snap Lock Bag (ED005)							
W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**23-Sep-2019**	15-Oct-2019	✓
Snap Lock Bag (ED005)							
W01 / 0.0-0.1, W01 / 0.1-0.2	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**24-Sep-2019**	15-Oct-2019	✓
ED006: Exchangeable Cations on Alkaline Soils							
Snap Lock Bag (ED006)							
W01 / 0.0-0.1, W01 / 0.1-0.2, W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**23-Sep-2019**	15-Oct-2019	✓

Matrix: **SOIL**

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
ED007: Exchangeable Cations							
Snap Lock Bag (ED007)							
W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**23-Sep-2019**	15-Oct-2019	✓
Snap Lock Bag (ED007)							
W01 / 0.0-0.1, W01 / 0.1-0.2	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**24-Sep-2019**	15-Oct-2019	✓
ED008: Exchangeable Cations							
Snap Lock Bag (ED008)							
W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**23-Sep-2019**	15-Oct-2019	✓
Snap Lock Bag (ED008)							
W01 / 0.0-0.1, W01 / 0.1-0.2	**17-Sep-2019**	**23-Sep-2019**	15-Oct-2019	✓	**24-Sep-2019**	15-Oct-2019	✓
ED045G: Chloride by Discrete Analyser							
Snap Lock Bag (ED045G)							
W01 / 0.0-0.1, W01 / 0.1-0.2, W01 / 0.5-0.6, W01 / 0.9-1.0, W03 / 0.0-0.1, W03 / 0.2-0.3, W03 / 0.5-0.6, W03 / 0.9-1.0, W08 / 0.0-0.1, W08 / 0.3-0.4, W08 / 0.5-0.6, W08 / 0.9-1.0, W11 / 0.0-0.1, W11 / 0.2-0.3, W11 / 0.5-0.6, W11 / 0.9-1.0, W13 / 0.0-0.1, W13 / 0.1-0.2, W13 / 0.2-0.3, W13 / 0.5-0.6, W13 / 0.7-0.8	**17-Sep-2019**	**19-Sep-2019**	15-Oct-2019	✓	**20-Sep-2019**	17-Oct-2019	✓

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: **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)							
Chloride Soluble By Discrete Analyser	ED045G	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chloride Soluble By Discrete Analyser	ED045G	4	21	**19.05**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	21	**19.05**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride Soluble By Discrete Analyser	ED045G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**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 (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Emerson Aggregate Test	EA058	SOIL	In house: Referenced to AS1289.3.8.1. Testing is performed only on soils with suitable aggregates; sands and gravels are usually unsuitable for this test. The test classifies the behaviour of soil aggregates, when immersed, on their coherence in water.
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Soil Particle Density	EA152	SOIL	Soil Particle Density by AS 1289.3.5.1-2006 : Methods of testing soils for engineering purposes - Soil classification tests - Determination of the soil particle density of a soil - Standard method
Exchange Acidity by 1M Potassium Chloride	* ED005	SOIL	In house: referenced to Rayment and Lyons, (2011), method 15G1. This method is unsuitable for near neutral and alkaline soils. NATA accreditation does not cover performance of this service.
Exchangeable Cations on Alkaline Soils	* ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Higginson (2011) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons 2011 method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.