Supplementary Soil Survey for Proposed Open Cut Area

China First Coal Mine Project

U23415

Prepared for
Waratah Coal

12 December 2012

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Shaping the Future

Document Information

Prepared for	Waratah Coal
Project Name	China First Coal Mine, Alpha
File Reference	U23415_Waratah Coal Report Version 1_ Final.doc
Job Reference	U23415
Date	12 December 2012

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Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
0	29.11.12	Andrew Williams	AW	Karen Gates	KEG
1	12.12.12	Michael Large	ML	Andrew Williams	AW

Executive Summary

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1 Letter of Transmittal

Contact: Andy Williams

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12 December 2012

Waratah Coal
Level 7, 380 Queen Street,
Brisbane QLD4740

Attention: Natasha McIntosh

SUPPLEMENTARY SOIL SURVEY FOR PROPOSED OPEN CUT AREA CHINA FIRST COAL MINE

Dear Natasha,

At the request of the client, Waratah Coal; Cardno Ullman & Nolan Geotechnic (CUNG) have undertaken an additional soil survey to assist in the development approval process for the proposed China First Coal Mine near Alpha in Central Queensland.

This request provides the methodology and findings of the survey. The scope and methodology followed herein has dictated by the client's scope which is understood to adhere to directives from the regulator.

This survey should be construed as preliminary in nature which needs verification by additional work prior to commencement of cut activities.

Thank you for your commission to undertake this investigation. Should you have any queries please do not hesitate to contact the undersigned.

Yours faithfully,

Andrew Williams
Principal Engineering Geologist / Project Director
MS.Env.Mgmt., BSc.(Hons), Pg.Dip., CGeol
for **Cardno Ullman & Nolan Geotechnic**
Email: soils@cardno.com.au

2 Project Description

The Galilee Coal Project (Northern Export Facility – also known as the China First Coal Mine – hereafter referred to as the 'the project' involves the development of the following:

- A new coal mine and associated infrastructure located near Alpha in the Galilee Basin, Central Queensland, and
- A rail network between the mine and the Abbot Point State Development Area (APSDA)

The project is being developed by Waratah Coal, a privately owned Australian Coal Exploration and Coal development company.

The project comprises a new coal mine located in the Galilee Basin, Queensland, approximately 30 km to the North of Alpha and a new rail line connecting the mine to future coal terminal and stockpiling facilities in the Abbot Point State Development Area (ASPDA) and port loading facilities at the Port of Abbot Point. The Rail line and port components are not part of this current commission.

Waratah Coal proposes to mine 1.4 billion tonnes of raw coal from its existing tenements, Exploration Permit for Coal (EPC) 1040 and part of EPC 1079 (mining lease application 70454). The mine development involves the construction of four 9 million tonnes per annum (Mtpa) underground long-wall coal mines, two 10 Mtpa open cut pits and two coal preparation plants both with raw washing capacity of 28 Mtpa.

The annual Run-of-Mine (ROM) coal production will be 56 Mtpa to produce 40 Mtpa of saleable export highly volatile, low sulphur, steaming coal to international markets. At this scale of operation, the capital expense of $8.3 billion (AUD) to construct the mine and rail infrastructure is economically viable over the life of the project.

The particular part of the project involved in this commission is the Open Cut areas of the Coal Mine near Alpha. Figure 1 shows the location of this site area.

3 Methodology of Survey

The scope of the survey was directed by the client following the scope requested by the regulator for additional soil survey. The survey will not meet usual density of sampling but is meant to be preliminary in nature to be followed by a more detailed later stage prior to excavation of the open pit.

3.1 Field Work

The field survey was conducted between 29th and 30th October to collect additional data on the soils of the project site (proposed open cut area on Kia Ora and Glen Innes Property)(Figure 1). This survey was undertaken over a period of two (2) days; consisted of primary sampling and visual assessments. Visual assessments were conducted continuously across the study area while traversing along the limited access tracks. Where visual assessments indicated a change in soils conditions outside of the pre-selected sampling grid, an additional sample was collected.

Sampling strategies and survey plans were developed in accordance *with the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Assessment Techniques (*Department of Minerals and Energy, 1995). However the Kia Ora area was restricted to sampling along the linear Monklands road corridor on the eastern boundary. The land holder denied access to Kia Ora on 29th October. Glen Innes property was accessed but sampling was restricted to existing tracks. Primary sampling was conducted at 20 locations within the boundaries of the proposed open cut areas (figure 2). The location of each site was recorded using a global positioning system (GPS) with an accuracy of +/- 10 metres (m), see figure 2.

Using a mechanical auger for holes 1 to 7 and hang auger for 8 to 20, samples holes were excavated to a depth of 100 centimetres (cm), where possible. Soil samples were collected from a minimum of five depths throughout the profile; typically 0 -10cm, 10 – 20cm, 20 – 30cm, 30 – 60cm and 60 – 100cm. Care was taken to ensure clean samples were taken from each of the five depths in order to avoid cross-contamination.

Sampling at evenly spaced intervals across the Bimblebox area of Glen Innes station (Figure 2) allowed for quantitative comparisons between chemical and physical parameters following analysis and best met the data requirements for determining the pre-mining land use suitable in accordance with the technical guidelines *with the Environmental Management of Exploration and Mining in Queensland (*Department of Minerals and Energy, 1995). The sampling for Kia Ora Station (KO1 & KO7) was restricted as access was denied on the 29th October to the property. The holes were then relocated along Monklands Road in the adjacent road corridor (Figure 3). Although not ideal we feel this still reflects the soil likely to be encountered on Kia Ora.

Each sample was sealed in a clean plastic zip-lock bag. The bags were labelled with the sample site number and depth of sampling. At the completion of the field survey, bagged soil samples were grouped together into similar soil types based on field observations, soil physical characteristics and the topographical and vegetation characteristics of the survey site. This arrangement, coupled with a site map outlining soil sampling location, was used to select several representative samples of each soil type for further analysis of their chemical and physical properties. The selected samples were then packaged for transportation to a National Association of Testing Authorities (NATA) registered laboratory for chemical and physical analysis.
Laboratory Testing

3.1.1 Physical Testing

A total of five sampling locations were selected for physical laboratory analysis. Tests carried out by Mackay CUNG laboratory were gradings, Atterberg limits and Emerson class in accordance with AS1289.

The physical laboratory results are summarised in table 1 below and given in Appendix B.

Table 1 – Physical Laboratory Results

Location	Depth (m)	Material Description	Gravel Content (%)	Sand Content (%)	Clay & Silt Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Emerson Class No.
Bimble Box 07	0.3-0.6	Silty Sand	0	78	22	NO	ND	NP	2
Bimble Box 10	0.1-0.2	Silty Sand	0	77	23	NO	ND	NP	2
Bimble Box 11	0.2-0.3	Silty Sand	0	79	21	NO	ND	NP	2
Monklands Road KO 2	0.3-0.6	Silty Sand	0	79	21	NO	ND	NP	2
Monklands Road KO 5	0.1-0.2	Silty Sand	0	73	27	NO	ND	NP	2

NO = Not Obtainable ND = Non Determinable NP = Non Plastic

3.1.2 Chemical Testing

Twenty two (22) samples were selected from those collected in the field and submitted to a NATA Certified Laboratory, ALS Environmental Laboratories in Brisbane, for chemical Analysis. Surface and subsurface sample from both the KO and BB areas were tested for:

- Conductivity;
- Chloride Concentration;
- Soil pH;
- Cation Exchange Capacity (CEC) with Exchangeable Sodium Percentage (ESP); and
- The Sodium Absorption Ratio (SAR).

Confirmation from ALS indicates that the samples were received in good condition and with recommended holding times.

The results are given in Appendix C.

4 Acid Sulphate Soils Assessment

State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulphate Soils (Department of Infrastructure and Planning (DIP), 2002) sets out the State's interests concerning development involving acid sulphate soils in low-lying coastal areas. The policy applies only to certain types of development assessments in a strict list of local government areas as outlined in Annex 1 of the policy. Given that the Project falls outside of these areas, an assessment of the risk of acid sulphate soils is not relevant. We note also the soils test results indicated uniform alkaline soils and we consider that acid producing soils are unlikely to be encountered at this site.

5 Results and Discussions

The available analytical data from the Waratah Coal's Galilee Coal Project's "the site" soil profile show the soil to be generally non sodic at the surface with a marked increases in sodicity with depth, exhibiting strongly sodic characteristics. The soil profile is moderately alkaline in nature with the pH ranging from 5.9 to 9.4 pH units, with the majority of the tested pH readings ranging from 6-8 pH units. The soil contains no net acidity. The soil alkalinity directly affects the salinity and exchangeable sodium percentage (ESP), hence the soils are moderate to highly saline, however salt crusts were not observed and may go some way in explaining the high concentrations of chloride and sodium in the soil.

Down the soil profile the ESP in the KO area(for example KO1)increases whilst the Sodium absorption ratio (SAR) decreases. Alternatively in the BB area, BB15 shows both variables to increase down the profile and whilst BB6 reveals a third set of trends with an increasing SAR and a decreasing ESP. This may implicitly reveal a trend of increasing sodium concentration, hence sodicity down the soil profile.

The CEC of the soil generally suggests the soil profile to be largely macro and micro nutrient deficient for agronomic purpose.

No conclusions can be drawn into the soil's viability for optimal plants, based on the analytical data. Analysis of nitrogen, phosphorous and organic carbon must be performed to quantify the topsoil for these purposes. "Preliminary Report on the Geochemical Assessment of the Galilee Coal Project – DRAFT" dated 10 November 2012, was reviewed at the request of the client. Although our survey did not go deep enough to validate its findings, the chemistry of the soil supports the findings of the EGI report.

6 Soil Management Units

Based on field and laboratory assessments, ten soil management units (SMUs) were identified within the Project site. These SMUs were classified as the Britt and Nelson unit. The distribution of these units have been mapped and presented in Figure 4. A description of each management unit is provided below.

Britt Soil Management Unit-

- **Australian soil classification:** Brown - Grey Vertosol
- **Topography and Landform Attributed:** Landscapes of the Britt SMU consist primarily of gently undulating plains which have been extensively cleared for agriculture, slopes of 0.5 to 1%.
- **Geology Unit:** The physio-chemical characteristics of this soil are consistent with the soil's development in close proximity to Tertiary basaltic geological formations.
- **Native Vegetation:** Cleared; Non-remnant.
- **Physical Attributes:** The Britt SMU consists primary of a grey to brownish-grey medium clay, with a consistent texture maintained through the profile. Field observations suggest a soil with small and irregular cracking at the surface, indicating a soil that is likely to shrink (dry) swell (wet). The soil is well structured with large (40-80mm), friable peds. A very fine sandy surface layer was present.

7 Recommendations

We have provided the soil mapping areas across the Open Cut area based on limited access, and surrounding surrogate data survey data. We recommend at a later date we verify our mapping at a later date.

The surface soils down to around 300mm depths seem to have the potential for reuse as topsoil for mine site remediation. This needs to be further confirmed with additional investigation into the nutrients levels of the soils.

We have found that on the basis of our survey, no acid providing soils exist at site and therefore no management is required.

We trust that you find this report of interest and look forward answering any queries and to being of service to Waratah Coal again in the near future.

Additional investigation at a later stage is required to sample and test the soils in full area of Open Cut to meet appropriate regulatory requirements.

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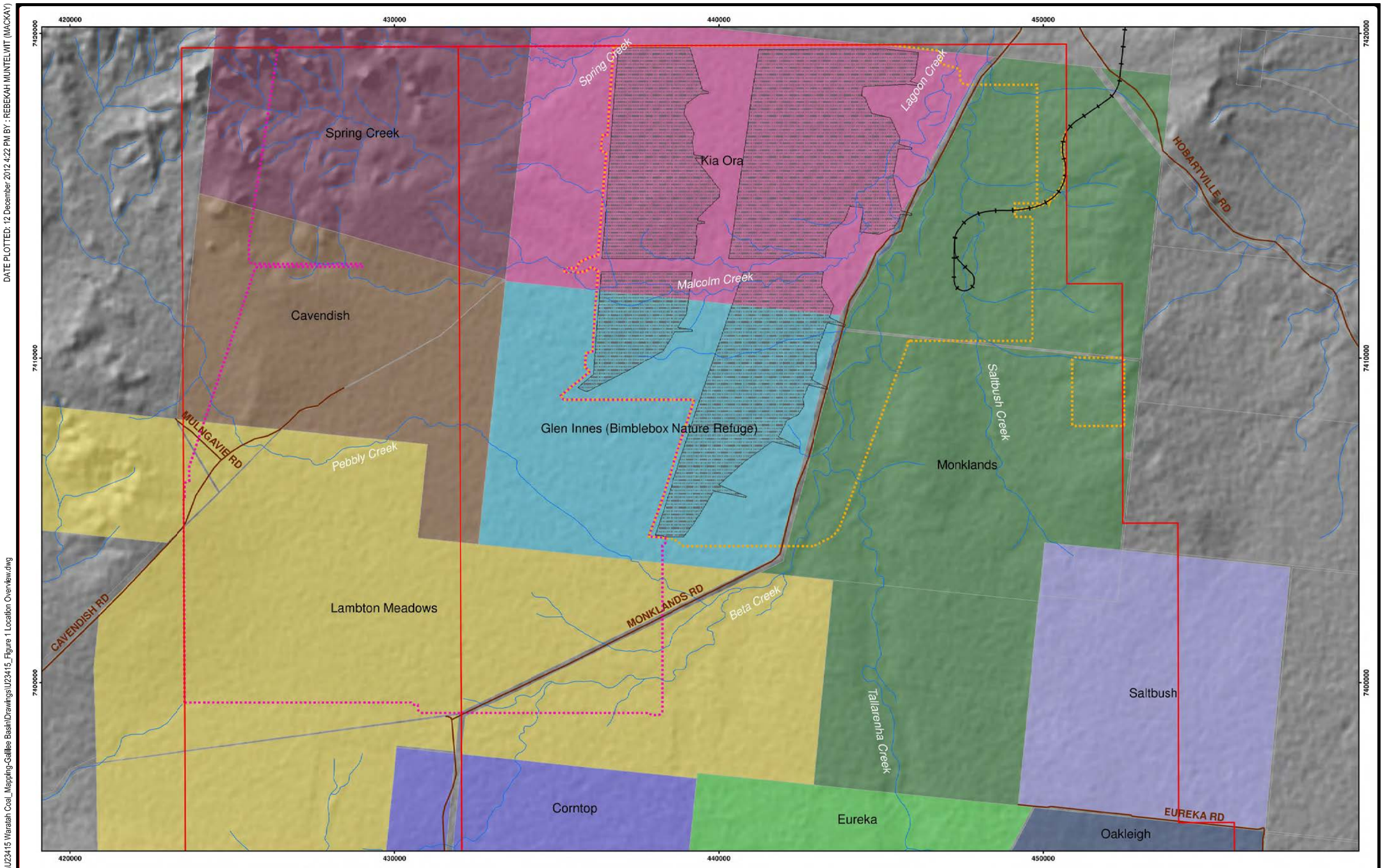

DATE PLOTTED: 12 December 2012 4:22 PM BY: : REBEKAH MUNTELWIT (MACKAY)

XREFs:
CAD FILE: L:\Engineer Reports\U23415 Waratah Coal_Mapping-Galilee Basin\Drawings\U23415_Figure 1 Location Overview.dwg

JOB No.	UN DWG No.	DATE	Checked by	Date
U23415	WCCF001	21.11.2012	AW	12.12.2012

NOTES

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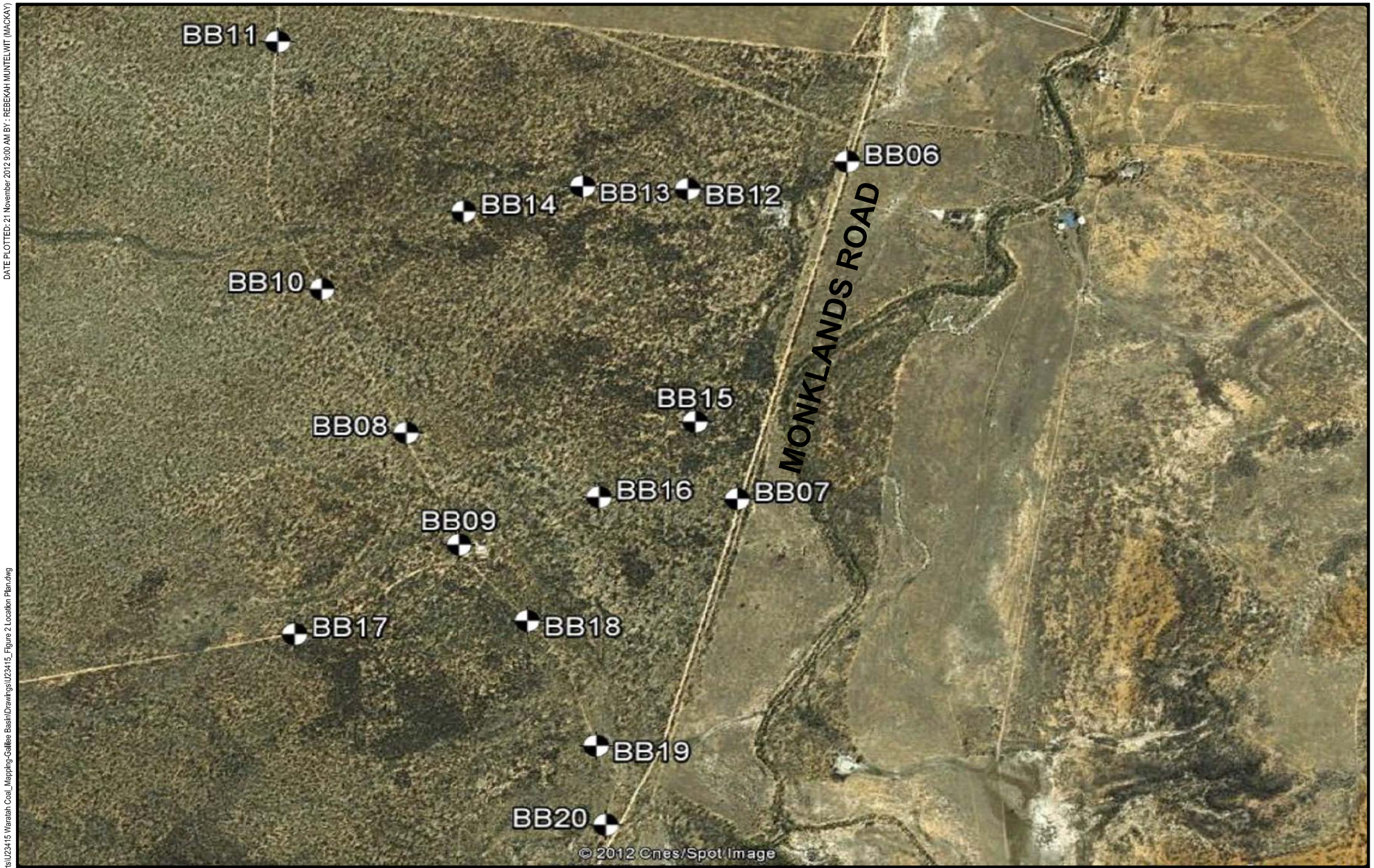
WARATAH COAL

SOIL SURVEY FOR OPEN CUT AREA
CHINA FIRST COAL MINE
GENERAL OVERVIEW

SCALE at A4: NTS

DRAWING No.: FIG 1



DATE PLOTTED: 21 November 2012 9:00 AM BY : REBEKAH MUNTELWIT (MACKAY)

XREFs:
CAD FILE: L:\Engineer Reports\U23415 Waratah Coal_Mapping-Galilee Basin\Drawings\U23415_Figure 2 Location Plan.dwg

JOB No. U23415	UN DWG No. WCCF002	DATE 21.11.2012	Checked by AW	Date 21.11.2012	NOTES	WARATAH COAL	SCALE at A4 NTS
						SOIL SURVEY FOR OPEN CUT AREA CHINA FIRST COAL MINE, GLEN INNIS STATION AUGER HOLE LOCATION PLAN	DRAWING No. FIG 2

Cardno Ullman & Nolan Geotechnic Pty Ltd ACN: 103 205 205
71 Connors Road, Mackay 4740
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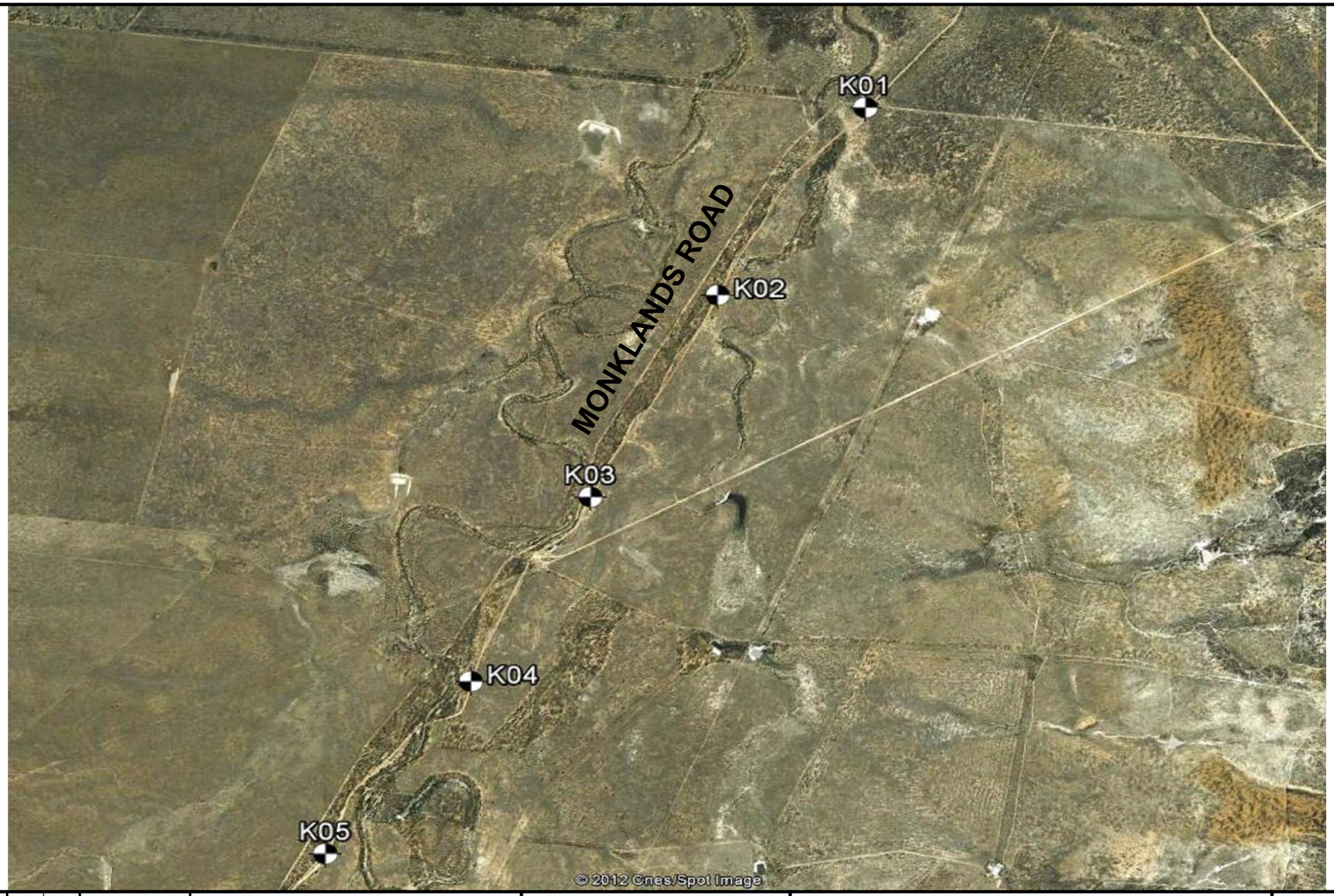
DATE PLOTTED: 21 November 2012 8:33 AM BY : REBEKAH MUNTELWIT (MACKAY)



XREF's:
CAD FILE: L:\Engineer Reports\U23415 Waratah Coal_Mapping-Galilee Basin\Drawings\U23415_Figure 3 Location Plan-Kia Ora Station.dwg

JOB No. U23415	UN DWG No. WCCF003	DATE 21.11.2012	Checked by AW Date 21.11.2012	NOTES		Cardno Ullman & Nolan Cardno Ullman & Nolan Geotechnic Pty Ltd ACN: 103 205 206 71 Connors Road, Mackay 4740 P.O. Box 5630, Mackay 4741 Email: soils@cardno.com.au Phone (07) 4952 5255 Fax (07) 4952 5455	WARATAH COAL SOIL SURVEY FOR OPEN CUT AREA CHINA FIRST COAL MINE, KIA ORA STATION AUGER HOLE LOCATION PLAN	SCALE at A4 NTS DRAWING No. FIG 3

DATE PLOTTED: 21 November 2012 8:57 AM BY : REBEKAH MUNTELWIT (MACKAY)

XREFs:
CAD FILE: L:\Engineer Reports\U23415 Waratah Coal_Mapping-Galilee Basin\Drawings\U23415_Figure 4 Distribution of Soil Managment.dwg

JOB No. U23415	UN DWG No. WCCF004	DATE 21.11.2012	Checked by AW	NOTES	Cardno Ullman & Nolan Geotechnic Pty Ltd ACN: 103 205 205 71 Connors Road, Mackay 4740 P.O. Box 5630, Mackay 4741 Email: solls@cardno.com.au Phone (07) 4952 5255 Fax (07) 4952 5455	WARATAH COAL SOIL SURVEY FOR OPEN CUT AREA CHINA FIRST COAL MINE DISTRIBUTION OF SOIL MANAGMENT UNITS	SCALE at A4 NTS DRAWING No. FIG 4

APPENDIX A

Descriptive Borehole Logs, Site Photographs and Daily Activity Summary

U23415 Waratah Coal Services – Soils Survey Daily Activites

28th October 2012

Time	Activity
	Mobilise from Mackay to Rockampton
5pm	Arrive at Alpha Motel

29th October 2012

Time	Activity
6.15am	Woke up
6.45am	Breakfast
7.00am	Met with Jo Chen
7.45am	Wash down
9.00am	Finish wash down
9.15am	Sign of wash down
9.45am	Toolbox Check
9.45am	Drive to site
10.15am	Arrive at site – discussions with landowner who refused entry to land, discussion with Brisbane and waiting upon instruction
11.45am	Jo Chen has mechanical car breakdown
12.30pm	Arrive a Northern Site , chainage 41.7
12.45pm	Start BH1
1.35pm	Start BH2
2.00pm	Start BH3
2.35pm	Start BH4
3.05pm	Start BH5
3.35pm	Start BH6
4.05pm	Start BH7
4.35pm	Finish BH7 and demobilised for the day
4.55pm	Left Site
5.45pm	Arrive at motel

30th October 2012

Time	Activity
6.15am	Woke up
6.45am	Breakfast
7.35am	Days preparation
7.45am	Leave for site
8.45am	Arrive at site, start BH08
9.25am	Start BH09
10.06am	Start BH10
10.36am	Start BH11
11.25am	Start BH12
11.55am	Start BH13
12.30pm	Start BH14
12.55pm	Start BH15
1.55pm	Start BH16
2.26pm	Start BH17
2.50pm	Start BH18
3.10pm	Start BH19

3.35pm	Start BH20
4.15pm	Left site for motel
5.15pm	Arrived back at motel

31st October 2012

Time	Activity
6.15am	Woke up
7.00am	Demobilisation from Alpha Motel to Rockampton and Mackay
2pm	Arrive in Mackay

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BOREHOLE LOG

Borehole No. : BB 07

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis - Bimble Box

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 339.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 443071.0 m E 7408376.0 m N MGA94

CH29.3km

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
0.05				M	L	**Silty Sand**; black to dark brown, fine grained, with roots and ash, no structure			B-1	
						Sandy Silt (loam); brown, fine grained sand, peds up to 30mm MPS 1 LL NP P75 65			0.10m B-2	
				D					0.20m B-3	
0.28						**Silty Sand**; orange-brown, fine grained MPS 1 LL NP P75 25			0.30m B-4	
0.5	338.5				MD	occassional red iron staining	AT	N	0.60m B-5	
				M		Photographs 12 and 13				
1.0	338.0									
1.40						BB 07 TERMINATED AT 1.40 m Surface Feature: disturbed in cut drain around 200mm below ngl, flat, mature grasses				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

CU_LIB_06.GLB Log CU BOREHOLE LOG U23415_LOGS.GPJ <<DrawingFile>> 29/11/2012 14:52 8.30.003 Developed by Datgel

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BOREHOLE LOG

Borehole No. : BB 08

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 354.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 441268.0 m E 7408766.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sand**; dark brown, fine grained, with rootlets and organics at surface (SANDY LOAM) MPS 1 LL NP P75 30			B-1 0.10m B-2 0.20m B-3	
						becoming brown, no organics, no structure, peds up to 20mm				
0.28										
0.5	353.5			D	MD	**Silty Sand**; orange-brown, fine grained, (SANDY LOAM), no structure MPS 0.5 LL NP P75 35 See phtographs 14 and 15	AT	N		
1.0	353.0					BB 08 TERMINATED AT 1.00 m Surface Feature: flat, mature gums, low strubs and grasses				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

CU_LIB_06.GLB Log CU BOREHOLE LOG U23415_LOGS.GPJ <<DrawingFile>> 29/11/2012 14:52 8.30.003 Developed by Datgel

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BOREHOLE LOG
Borehole No. : BB 09
Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 350.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 441579.0 m E 7408077.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sand**; dark brown, fine grained, with rootlets, (Sandy Loam) MPS 2 LL NP P75 30			B-1 0.10m	
						becoming pale brown, gradational change, no structure and no organics			B-2 0.20m	
				D					B-3 0.30m	
0.5	349.5				MD		AT	N	B-4 0.60m	
									B-5	
0.80				M		**Silty Sandy Gravel**; dark orange-brown mottled brown and grey, angular, sandstone MPS 20 LL NP P75 15 See photographs 16 and 17				
1.0	349.0					BB 09 TERMINATED AT 1.00 m				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
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		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 10

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 348.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 440824.0 m E 7409651.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	L	**Silty Sand**; dark brown, fine grained MPS 1 LL NP P75 40			B-1 0.10m	
				D		becoming pale brown			B-2 0.20m B-3 0.30m	
				M	MD	peds up to 45mm			B-4	
0.45										
0.5	347.5				D	**Silty Clayey Sand**; brown mottled pale brown-biege, fine grained, peds up to 40mm with orange-brown staining along fissures MPS 1 LL NP P75 50	AT	N	0.60m B-5	
						occassional dark red-brown streaks and mottles, iron staining See photographs 18 and 19				
1.0	347.0					BB 10 TERMINATED AT 1.00 m Surface Feature: flat, anthills, mature remnant vegetation - trees, shrubs Drainage: to north				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 11

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 349.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 440568.0 m E 7411182.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sand**; dark brown, fine grained, , no strucutre (Sandy Loam) MPS 1 LL NP P75 30			B-1	
						becoming pale brown			0.10m B-2	
									0.20m B-3	
				D					0.30m B-4	
						becoming orange- brown MPS 1 LL NP P75 35				
0.5	348.5				L	See photographs 20 and 21	AT	N		
				M					0.60m B-5	
1.0	348.0					BB 11 TERMINATED AT 1.00 m Surface Feature: flat, mature remnant 150m south of Kia Ora boundary				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 12

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 338.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442783.0 m E 7410293.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sand**; dark brown, fine grained, with rootlets and organics (Sandy Loam) MPS 1 LL NP P75 40			B-1 0.10m	
					MD	Silty Sand, brown, fine grained, no structure or organics, peds size up to 5mm			B-2 0.20m	
0.20					VD	**Silty Sand**; brown, fine grained, slightly cemented MPS 1 LL NP P75 45			B-3	
0.33						**Clayey Silty Sand**; brown, ped size up to 40mm, uncemented, no structure or organic gradational				
0.5	337.5			D		becoming orange-brown mottled biege, ped size up to 20mm	AT	N		
					MD	See photographs 22 and 23				
1.0	337.0					BB 12 TERMINATED AT 1.00 m Surface Feature: flat, mature, bimble box grass, shrubs and trees Drainage: to north-east				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 13

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 339.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442218.0 m E 7410304.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	MD	**Silty Sand**; dark brown, with rare gravel, angular (sandy Loam) MPS 10 LL NP P75 30	AT	N	B-1 0.10m	
0.09						**Silty Gravelly Sand**; brown, fine grained MPS 10 LL NP P75 30			B-2 0.20m B-3 0.30m B-4	
				D	D					
0.5	338.5					Silty Gravelley Sand, dark brown mottled grey and pale brown, sub-angular to angular sandstone			0.60m B-5	
						becoming very hard augering (possibly weathered rock) Photographs 24 and 25				
0.75						BB 13 TERMINATED AT 0.75 m Refusal Surface Feature: flat, mature, bimblebox remunant trees, shrubs and grass				
1.0	338.0									

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 14

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 354.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 441580.0 m E 7410140.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	L	**Silty Sand**; dark brown, fine grained, with rootlets and surface organics MPS 1 LL NP P75 25			B-1 0.10m	
0.08						**Silty Sand**; brown, fine grained, with rare roots and rare angular gravels MPS 7 LL 15 P75 30			B-2 0.20m B-3 0.30m B-4	
				D						
0.5	353.5				MD		AT	N	0.60m B-5	
0.70				M		**Silty Sand**; brown-grey mottled orange-brown, fine grained, with gravel MPS 10 LL 20 P75 See photographs 26 and 27				
1.0	353.0					BB 14 TERMINATED AT 1.00 m				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG
Borehole No. : BB 15
Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 350.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442839.0 m E 7408851.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	MD	**Silty Sand**; dark brown, fine grained, with rootlets and organics MPS 1 LL NP P75 40			B-1 0.10m	
0.12									B-2 0.20m	
						Silty Sand; pale brown, fine grained MPS 0.5 LL NP P75 40			B-3 0.30m	
						hard, slow augering due to slight cementation			B-4	
0.45										
0.5	349.5			D	D	**Gravelly Silty Sand**; orange-brown mottled grey, fine grained, fine to coarse grained, angular sandstone gravel MPS 20 LL NP P75 30 See photographs 28 and 29	AT	N	0.60m B-5	
1.0	349.0					BB 15 TERMINATED AT 1.00 m Surface Feature: flat, mature bimle box material trees				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 16

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 345.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442328.0 m E 7408379.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
						Silty Sand; dark brown, fine grained, with organics and rootlets at surface (Sandy Loam) MPS 1 LL NP P75 15			B-1	
0.08						**Silty Sand**; brown, fine grained, no organics, no structure occassional pale brown mottling			0.10m B-2 0.20m B-3 0.30m B-4	
0.38						**Silty Sand**; orange-brown, fine to medium grained, peds up to 20mm, no structure, no organics MPS 2 LL NP P75 25				
0.5	344.5			M	L		AT	N	0.60m B-5	
						occassional pale brown mottling See photographs 30 and 31				
1.0	344.0					BB 16 TERMINATED AT 1.00 m Surface Feature: flat, mature trees, shrubs and grasses				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 17

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 359.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 440703.0 m E 7407514.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
					L	**Silty Sand**; dark brown, fine grained, with organics and rootlets (Sandy Loam)			B-1	
0.07						~~MPS 1 LL 0 P75 30~~			0.10m	
						Silty Sand; pale brown, fine grained, no structure, no organics MPS 2 LL NP P75 35			B-2	
									0.20m	
									B-3	
									0.30m	
									B-4	
				M	MD		AT	N		
0.5	358.5								0.60m	
						Gravelley Silty Sand, pale brown, fine to coarse grained gravels, angular (possible weathered rock) MPS 2 LL NP P75 35			B-5	
						See photographs 32 and 33				
0.79						BB 17 TERMINATED AT 0.79 m Refusal Surface Feature: gentle slope 2 degrees to east, slightly cemented sands exist along road within 10m of auger hole				
1.0	358.0									

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : BB 18

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 345.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 441951.0 m E 7407610.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
						Silty Sand; fine grained, no structure, organics at surface (Sandy Loam)			B-1	
						Silty Sand, pale brown, fine graind, gradational MPS 0.5 LL 20 P75 35			0.10m B-2 0.20m B-3 0.30m B-4	
0.5	344.5			M	L	tree roots at 0.5m	AT	N		
						becoming orange-brown - powdery see photographs 34 and 35			0.60m B-5	
1.0	344.0					BB 18 TERMINATED AT 1.00 m Surface Feature: flat, 3m from track Vegetation: mature trees, shrubs and grasses Drainage: to east See phograph 34 and 35				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG
Borehole No. : BB 19
Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 341.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442329.0 m E 7406839.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
						Silty Sand; dark brown, fine grained, (Sandy Loam) Silty Sand, brown, gradation colour change, ped up to 20mm, no structure, no organics			B-1 0.10m B-2 0.20m B-3 0.30m B-4	
0.5	340.5			M	L		AT	N	0.60m B-5	
						Becoming light brown See photographs 36 and 37				
					MD					
1.0	340.0					BB 19 TERMINATED AT 1.00 m Surface Feature: flat, mature Vegetation: trees and grasses, 4m from track, soft sands on track 50m to west				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

CU_LIB_06.GLB Log CU BOREHOLE LOG U23415_LOGS.GPJ <<DrawingFile>> 29/11/2012 14:52 8.30.003 Developed by Datgel

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BOREHOLE LOG

Borehole No. : BB 20

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Glen Innis Track - Bimble Box

Hole Commenced : 30.10.12
Hole Completed : 30.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 349.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 442386.0 m E 7406351.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	L	**Silty Sand**; dark brown, fine grained, ped size up to 30mm, no organics, no structure (sandy Loam) MPS 1 LL NP P75 35	AT	N	B-1 0.10m B-2 0.20m	
0.22						**Silty Sand**; orange-brown, fine grained, no organics, no structure MPS 1 LL NP P75 30			B-3 0.30m B-4	
0.5	348.5			D		becoming gravelley, angular, dark brown sandstone See photographs 38 and 39			0.60m B-5	
1.0	348.0					BB 20 TERMINATED AT 1.00 m Surface Feature: gentle slope 1 degree to north-east Vegetation: mature trees and shrubs and grasses Drainage: to north-east, fire break scraped surface				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : KO 01

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - CH41.7km

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : WSG 84

Contractor : Cardno UNG
Drill Rig : Cruiser
Mounting : Auger
Diameter: 75 mm
Coords : 448507.0 m E 7419082.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sand**; pale brown, fine grained, slighly clayey, ped size 10-30mm, occassional root with occassional black (root staining) with rare gravels (sandy Loam) MPS 10 LL NP P75 40			B-1 0.10m B-2	
				D	L - MD				0.20m B-3 0.30m B-4	
0.34						**Silty Clay**; green-brown, (VERTOSOL) no structure MPS 1 LL 30 P75 75				
0.5					St	See photographs 1 and 2	AT	N		
				M					0.60m B-5	
					VSt					
1.0						KO 01 TERMINATED AT 1.00 m Surface Feature: Disturbed devegetation, very flat, 10m from road Vegetation: grass, sparce small trees Drainage: to south west				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : KO 02

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - CH39.7km

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : WSG 84

Contractor : Cardno UNG
Drill Rig : Cruiser
Mounting : Auger
Diameter: 75 mm
Coords : 447404.0 m E 7417411.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M	L	**Silty Sandy loam**; brown, fine grained, (Aedian) MPS 2 LL NP P75 30			B-1 0.10m B-2 0.20m B-3 0.30m B-4	
0.5				D		becoming orange-brown MPS 0.5 LL NP P75 21 See photographs 3 to 5	AT	N	0.60m B-5	
1.0				M	MD					
1.20						KO 02 TERMINATED AT 1.20 m Surface Feature: side of road, mature cactus grasses, flat lagoon creek 200m west				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : KO 03

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - CH37.7km

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 334.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Cruiser
Mounting : Auger
Diameter: 75 mm
Coords : 446459.0 m E 7415615.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Silty Sandy loam**; pale brown, fine grained, powdery, with rare rootlets, Aeolian, no structure MPS 2 LL NP P75 25			B-1 0.10m B-2 0.20m B-3 0.30m B-4 0.47m	
				D	L					
0.47										
0.5	333.5			M	St	**Sandy Silty Clay**; brown, with fissures and slicken sides, VERTOSOL MPS 1 LL 20 P75 65 See photographs 6 and 7	AT	N	B-5 0.60m B-6	
1.0	333.0					KO 03 TERMINATED AT 1.00 m				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : KO 04

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - CH35.7km

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 332.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Cruiser
Mounting : Auger
Diameter: 75 mm
Coords : 445571.0 m E 7413978.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
						Sandy Powdery silt; pale brown, with fine grained sand, trace rare gravels and rootlets (LOAM) MPS 10 LL 20 P75 55			B-1 0.10m B-2 0.20m B-3	
				D	F	no gravels			0.30m B-4	
0.5	331.5									
0.55						**Silty Sandy Gravel**; dark brown, angular, shaped ped up to 20mm (ALLUVIAL) MPS 20 LL NP P75 30 No photographs taken	AT	N	0.60m B-5	
				M	D - VD					
1.0	331.0									
1.10						KO 04 TERMINATED AT 1.10 m Surface Feature: flat immature grass and bush, 10m from road Drainage: to east grass sparse and anthills				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG
Borehole No. : KO 05
Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - CH33.7km

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 331.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Hand Auger
Mounting : Auger
Diameter: 75 mm
Coords : 444482.0 m E 7412447.0 m N MGA94

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				D	F	**Sandy Silt loam**; pale brown, fine grained sand, powdery, no organics			B-1 0.10m	
									B-2 0.20m	
					St				B-3 0.30m	
0.38									B-4	
0.5	330.5			M	VSt	**Silty Clay**; green-brown, with rare gravels, angular, with some fissures peds up to 10mm	AT	N	0.60m B-5	
1.0	330.0					KO 05 TERMINATED AT 1.00 m Surface Feature: flat, mature gums and shrubs, grasses, 10m from road, standing water next to road 30m away				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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BOREHOLE LOG

Borehole No. : KO 06

Sheet : 1 of 1

Client : Waratah Coal
Project : Waratah Coal Mapping Galilee Basin
Job No : U23415
Site : China First Coal Mine
Location : Kia Ora - Bimble Box

Hole Commenced : 29.10.12
Hole Completed : 29.10.12
Logged By : AW
Checked By : AW
Surface R.L. (m) : 330.00 WSG 84

Contractor : Cardno UNG
Drill Rig : Cruiser
Mounting : Auger
Diameter: 75 mm
Coords : 443638.0 m E 7410474.0 m N MGA94

CH31.4km

STRATA				VISUAL SOIL DESCRIPTION			DRILLING			TESTING
Depth (m)	RL (m WSG 84)	Graphic Log	Classification	Moisture	Consistency	Description (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	Method & Bit	Support	Sampling	Testing
				M		**Sandy Silt**; pale grey-biege, fine grained sand, sandy loam, ped size 20mm , no organics (LOAM) becoming less gravel MPS 4 LL NP P75 60			B-1 0.10m B-2 0.20m B-3 0.30m B-4	
0.28						**Silty Clay**; dark brown, with pale brown, angular gravels of Sandstone, with fine grained sand, ped size 8mm, no fissures (VERTOSOL)				
0.5	329.5			D	F		AT	N	0.60m B-5	
						becoming less gravelly MPS 4 LL 35 P75 65 MPS 20 LL 25 P75 60				
1.0	329.0					KO 06 TERMINATED AT 1.00 m Surface Feature: flat, mature gums 15m from road Vegetation: grasses and low bushes Drainage: drains to east				

Moisture		Consistency		Visual Description		Method		Bit		Support		Sampling	
D	Dry	VS	very soft	MPS	Maximum particle size	A	Auger	R	Roller	C	Casing	U	Undisturbed Sample & Size in mm
M	Moist	S	soft	LL	Liquid Limit	W	Washbore	B	Blank	M	Mud	D	Disturbed Sample
W	Wet	F	firm	P75	% passing 75um sieve	P	Percussion	V	V bit	N	Nil	N	Standard Penetration Test & Result
		St	stiff			H	Hammer	T	TC bit			PP	Pocket Penetrometer Value
		VSt	very stiff			C	Core	D	Diamond			B	Bulk Sample
		H	hard			R	Rotary air flush					ES	Environmental Sample
		VL	very loose			V	Vibrocore					LAB	Sample sent to Lab
		L	loose									DUP	Duplicate Sample
		MD	medium dense									SPLIT	Split Sample
		D	dense										
		VD	very dense										

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Photo 1 KO 1 – Typical surface features

Photo 2 KO 1 – Soil profile 0.0 – 1.0m

Photo 3 KO 2 – Typical Surface Features

Photo 4 KO 2 - Soil Profile0.0 – 1.0m

Photo 5 KO 2 - Soil profile on Auger

Photo 6 KO 3 – Typical surface features

Photo 7 KO 3 – Soil Profile 0.0 – 1.0m

Photo 8 KO 5 – Typical surface features

Photo 9 KO 5 – Soil Profile 0.0 – 1.0m

Photo 10 KO 6 – Typical surface features

Photo 11 KO 6 – Soil Profile 0.0 – 1.0m

Photo 12 KO 7 – Typical surface features

Photo 13 KO 7 – Soil Profile 0.0 – 1.0m

Photo 14 BB 8 – Typical surface features

Photo 15 BB 8 – Soil Profile 0.0 – 1.0m

Photo 16 BB 9 – Typical surface features

Photo 17 BB 9 – Soil Profile 0.0 – 1.0m

Photo 18 BB 10 – Typical surface features

Photo 19 BB 10 – Soil Profile 0.0 – 1.0m

Photo 20 BB 11 – Typical surface features (Notice ant hills)

Photo 21 BB 11 – Soil Profile 0.0 – 1.0m

Photo 22 BB 12 – Typical surface features

Photo 23 BB 12 – Soil Profile 0.0 – 1.0m

Photo 24 BB 13 – Typical surface features

Photo 25 BB KO 13 – Soil Profile 0.0 – 1.0m

Photo 26 BB 14 – Typical surface features

Photo 27 BB 14 – Soil Profile 0.0 – 1.0m

Photo 28 BB 15 – Typical surface features (Notice ant hill in the distance)

Photo 29 BB 15 – Soil Profile 0.0 – 1.0m

Photo 30 BB 16 – Typical surface features

Photo 31 BB 16 – Soil Profile 0.0 – 1.0m

Photo 32 BB 17 – Typical surface features

Photo 33 BB 17 – Soil Profile 0.0 – 1.0m

Photo 34 BB 18 – Typical surface features

Photo 35 BB 18 – Soil Profile 0.0 – 1.0m

Photo 36 BB 19 – Typical surface features

Photo 37 BB 19 – Soil Profile 0.0 – 1.0m

Photo 38 BB 20 – Typical surface features

Photo 39 BB 20 – Soil Profile 0.0 – 1.0m

APPENDIX B

Physical Test Results

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A.C.N. 103 205 205

UNGR 1 G
(-/12/05)

REPORT ON SOIL CLASSIFICATION

Sheet 1 of 1 — Mackay Laboratory

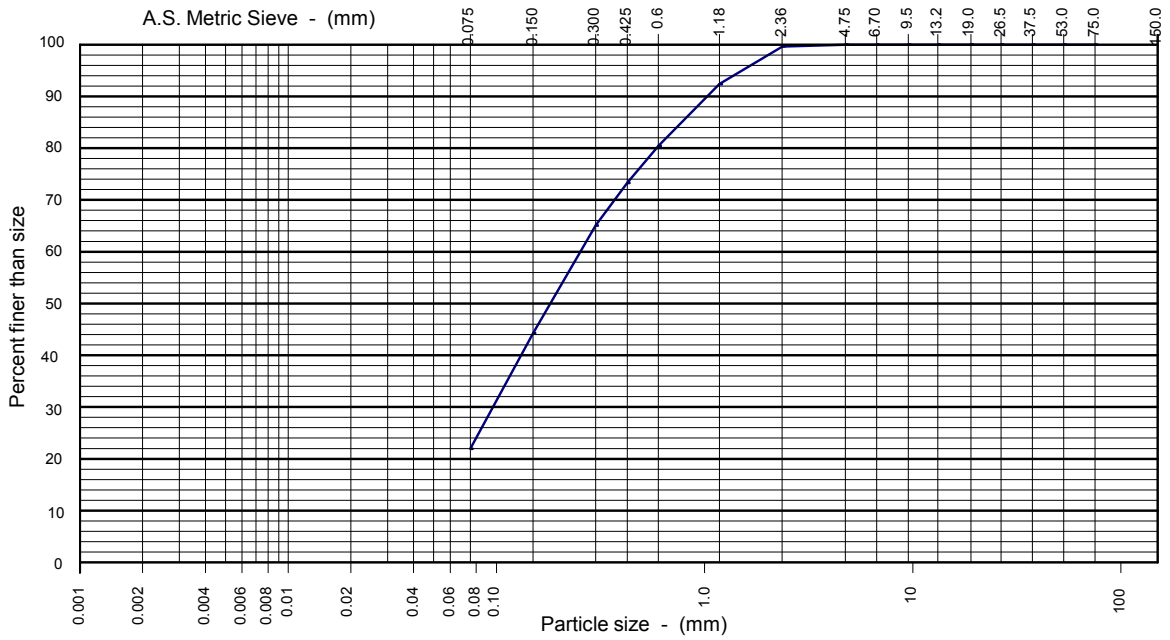
CLIENT: Waratah Coal **JOB NO:** U23415 **LAB REF NO:** 12-6901ABC

PROJECT: China First Coal Mine **SAMPLED BY:** CUNG **DATE:** 1.11.12

LOCATION: Glenn Innis **TESTED BY:** KC,LH **DATE:** 2.11.12

MATERIAL: Bimble Box 7, Depth 0.30-0.60m **CHECKED BY:** NJR **DATE:** 7.11.12

TEST PROCEDURES: AS 1289.3.1.1,3.2.1,3.3.1,3.4.1,3.6.1,3.8.1 **CLIENT REF:** -



clay	silt			sand			gravel			cobbles
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
22				31	27	20	0	0	0	0

Particle Size (mm)	Percent Passing (%)	Particle Size (mm)	Percent Passing (%)
150.0			
75.0			
37.5	100		
19.0	100		
9.5	100		
4.75	100		
2.36	100		
1.18	92		
0.600	80		
0.425	73		
0.300	65		
0.150	44		
0.075	22		

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Soil Particle Density (g/cm^3)
Not Obtainable	Non Determinable	Non Plastic	-	-

Classification: **Silty Sand** (SP)

Emerson Class No. 2 Type of Water: Distilled Temperature of Water: 23°C

Preparation History of Atterberg Limits

Sample : ~~Natural~~/Air Dried~~/Oven~~

Sieved: ~~Wet~~/dry

Linear Shrinkage Data

Length of Mould (mm) : 252

Sample: -

NATA

Accredited No. 910

Certificate No. 12-6901A

Date of Issue 7.11.12

This document is issued in accordance with NATA's accreditation requirements.

Authorised Signatory ..... N. J. Richardson

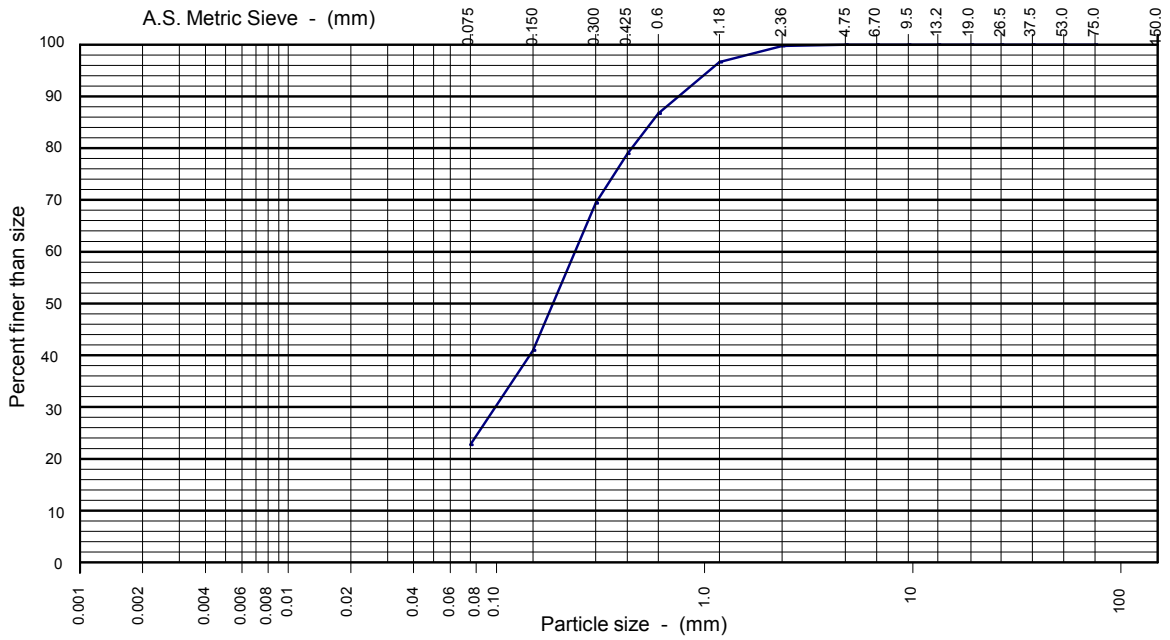
ULLMAN & NOLAN
Technical Services Pty Ltd
A.C.N. 103 205 205

UNGR 1 G
(-/12/05)

REPORT ON SOIL CLASSIFICATION

Sheet 1 of 1 — Mackay Laboratory

CLIENT:	Waratah Coal	**JOB NO:**	U23415	**LAB REF NO:**	12-6902ABC
PROJECT:	China's First Coal Mine	**SAMPLED BY:**	CUNG	**DATE:**	1.11.12
LOCATION:	Glenn Innis	**TESTED BY:**	KC,LH	**DATE:**	2-6.11.12
MATERIAL:	Bimble Box 10, depth 0.10-0.20m	**CHECKED BY:**	NJR	**DATE:**	7.11.12
TEST PROCEDURES:	AS 1289.3.1.1,3.2.1,3.3.1,3.4.1,3.6.1,2.1.1,3.8.1	**CLIENT REF:**	-		



clay	silt			sand			gravel			cobbles
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
23				30	34	13	0	0	0	0

Particle Size (mm)	Percent Passing (%)	Particle Size (mm)	Percent Passing (%)
150.0			
75.0			
37.5	100		
19.0	100		
9.5	100		
4.75	100		
2.36	100		
1.18	97		
0.600	87		
0.425	79		
0.300	69		
0.150	41		
0.075	23		

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Soil Particle Density (g/cm^3)
Not Obtainable	Non Determinable	Non Plastic	-	-

Classification: **Silty Sand** (SP)

Emerson Class No. 2 — Type of Water: Distilled — Temperature of Water: 23°C

Preparation History of Atterberg Limits
Sample : ~~Natural~~/Air Dried~~/Oven~~
Sieved: ~~Wet~~/dry

Linear Shrinkage Data
Length of Mould (mm) : 252
Sample: -

NATA
Accredited No. 910
Certificate No. 12-6902A
Date of Issue 7.11.12

This document is issued in accordance with NATA's accreditation requirements.

Authorised Signatory ..... N. J. Richardson

ULLMAN & NOLAN
Technical Services Pty Ltd
A.C.N. 103 205 205

UNGR 1 G
(-/12/05)

REPORT ON SOIL CLASSIFICATION

Sheet 1 of 1 — Mackay Laboratory

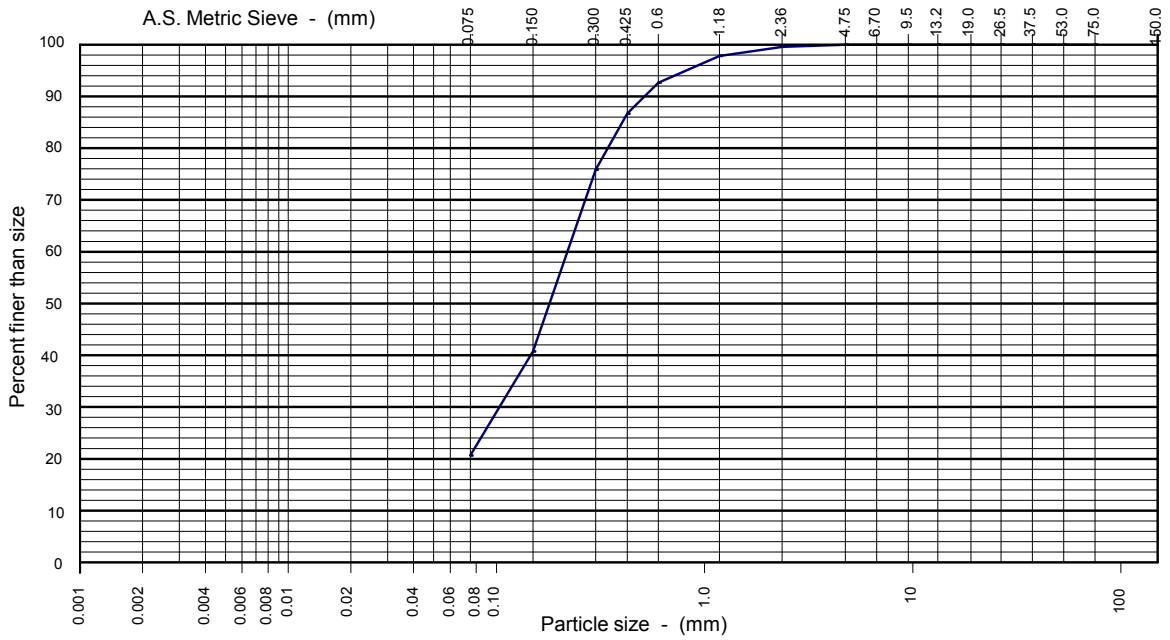
CLIENT: Waratah Coal **JOB NO:** U23415 **LAB REF NO:** 12-6903ABC

PROJECT: China First Coal Mine **SAMPLED BY:** CUNG **DATE:** 1.11.12

LOCATION: Glenn Innis **TESTED BY:** KC,LH **DATE:** 2-6.11.12

MATERIAL: Bimble Box 11, Depth 0.20-0.30m **CHECKED BY:** NJR **DATE:** 7.11.12

TEST PROCEDURES: AS 1289.3.1.1,3.2.1,3.3.1,3.4.1,3.6.1,2.1.1,3.8.1 **CLIENT REF:** -



clay	silt			sand			gravel			cobbles
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
21				34	38	7	0	0	0	0

Particle Size (mm)	Percent Passing (%)	Particle Size (mm)	Percent Passing (%)
150.0			
75.0			
37.5	100		
19.0	100		
9.5	100		
4.75	100		
2.36	100		
1.18	98		
0.600	93		
0.425	87		
0.300	76		
0.150	41		
0.075	21		

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Soil Particle Density (g/cm^3)
Not Obtainable	Non Determinable	Non Plastic	-	-

Classification: **Silty Sand**

(SP)

Emerson Class No. 2 Type of Water: Distilled Temperature of Water: 23°C

Preparation History of Atterberg Limits

Sample : ~~Natural~~/Air Dried~~/Oven~~

Sieved: ~~Wet~~/dry

Linear Shrinkage Data

Length of Mould (mm) : 252

Sample: -

NATA

Accredited No. 910

Certificate No. 12-6903A

Date of Issue 7.11.12

This document is issued in accordance with NATA's accreditation requirements.

Authorised Signatory ..... N. J. Richardson

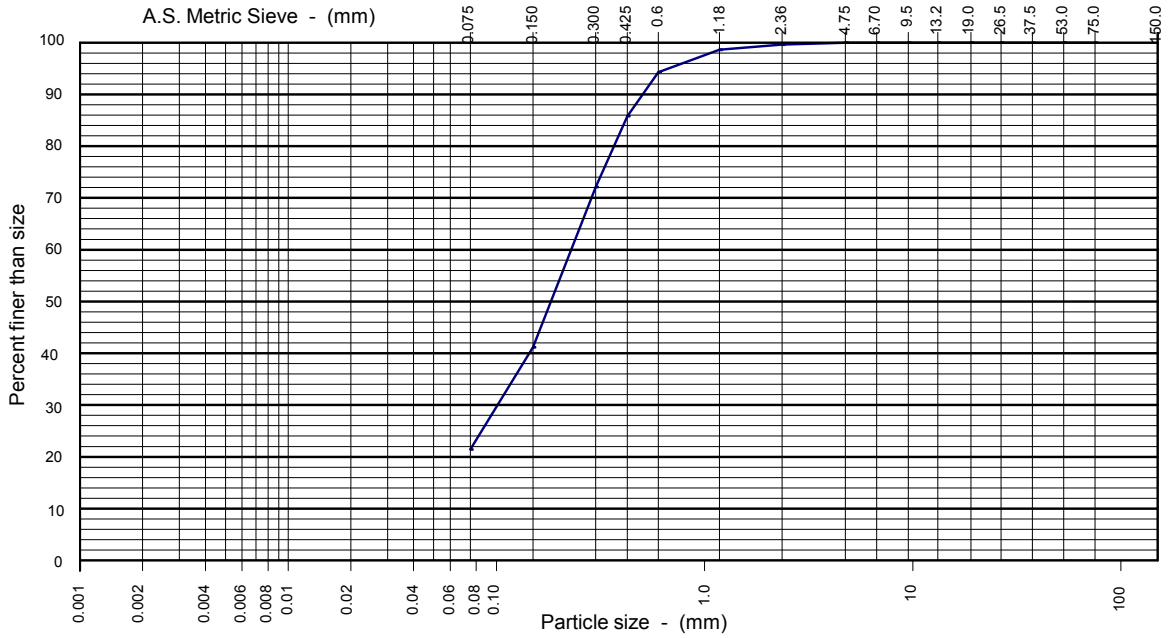
ULLMAN & NOLAN
Technical Services Pty Ltd
A.C.N. 103 205 205

UNGR 1 G
(-/12/05)

REPORT ON SOIL CLASSIFICATION

Sheet 1 of 1 — Mackay Laboratory

CLIENT:	Waratah Coal	**JOB NO:**	U23415	**LAB REF NO:**	12-6904ABC
PROJECT:	China First Coal Mine	**SAMPLED BY:**	CUNG	**DATE:**	29.10.12
LOCATION:	Monklands Road	**TESTED BY:**	KC,LH	**DATE:**	2-6.11.12
MATERIAL:	KO 2, Depth 0.30-0.60m	**CHECKED BY:**	NJR	**DATE:**	7.11.12
TEST PROCEDURES:	AS 1289.3.1.1,3.2.1,3.3.1,3.4.1,3.6.1,2.1.1,3.8.1	**CLIENT REF:**	-		



clay	silt			sand			gravel			cobbles
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
21				33	40	6	0	0	0	0

Particle Size (mm)	Percent Passing (%)	Particle Size (mm)	Percent Passing (%)
150.0			
75.0			
37.5	100		
19.0	100		
9.5	100		
4.75	100		
2.36	100		
1.18	99		
0.600	94		
0.425	86		
0.300	72		
0.150	41		
0.075	21		

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Soil Particle Density (g/cm^3)
Not Obtainable	Non Determinable	Non Plastic	-	-

Classification: **Silty Sand** (SP)

Emerson Class No. 2 — Type of Water: Distilled — Temperature of Water: 23°C

Preparation History of Atterberg Limits
Sample : ~~Natural~~/Air Dried~~/Oven~~
Sieved: ~~Wet~~/dry

Linear Shrinkage Data
Length of Mould (mm) : 252
Sample: -

NATA
Accredited No. 910
Certificate No. 12-6904A
Date of Issue 7.11.12

This document is issued in accordance with NATA's accreditation requirements.

Authorised Signatory ..... N. J. Richardson

ULLMAN & NOLAN
Technical Services Pty Ltd
A.C.N. 103 205 205

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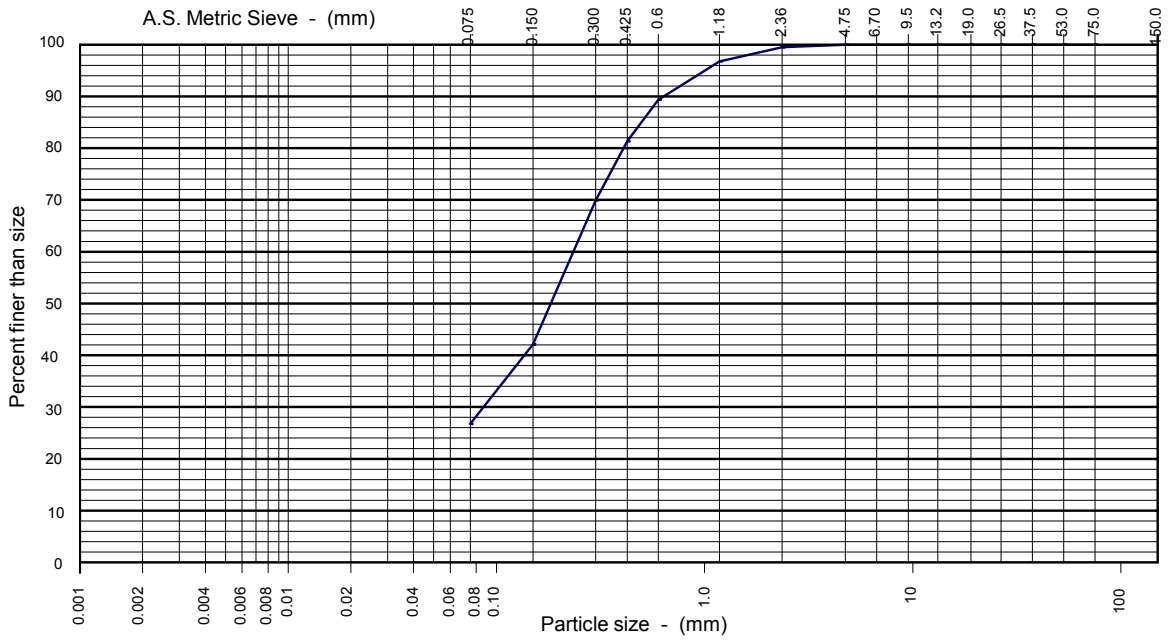
(-/12/05)

REPORT ON SOIL CLASSIFICATION

Sheet 1 of 1 — Mackay Laboratory

CLIENT:	Waratah Coal	**JOB NO:**	U23415	**LAB REF NO:**	12-6905ABC
PROJECT:	China First Coal Mine	**SAMPLED BY:**	CUNG	**DATE:**	29.10.12
LOCATION:	Monklands Road	**TESTED BY:**	KC,LH	**DATE:**	2-6.11.12
MATERIAL:	KO 5, Depth 0.10-0.20m	**CHECKED BY:**	NJR	**DATE:**	7.11.12
TEST PROCEDURES:	AS 1289.3.1.1,3.2.1,3.3.1,3.4.1,3.6.1,2.1.1,3.8.1	**CLIENT REF:**	-		



clay	silt			sand			gravel			cobbles
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
27				27	35	11	0	0	0	0

Particle Size (mm)	Percent Passing (%)	Particle Size (mm)	Percent Passing (%)
150.0			
75.0			
37.5	100		
19.0	100		
9.5	100		
4.75	100		
2.36	100		
1.18	97		
0.600	89		
0.425	81		
0.300	70		
0.150	42		
0.075	27		

Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Soil Particle Density (g/cm^3)
Not Obtainable	Non Determinable	Non Plastic	-	-

Classification: **Silty Sand** (SP)

Emerson Class No. 2 — Type of Water: Distilled — Temperature of Water: 23°C

Preparation History of Atterberg Limits
Sample : ~~Natural~~/Air Dried~~/Oven~~
Sieved: ~~Wet~~/dry

Linear Shrinkage Data
Length of Mould (mm) : 252
Sample: -

NATA
Accredited No. 910
Certificate No. 12-6905A
Date of Issue 7.11.12

This document is issued in accordance with NATA's accreditation requirements.

Authorised Signatory ..... N. J. Richardson

APPENDIX C

Chemical Test Results

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1229103**	Page	: 1 of 7
Client	: **CARDNO ULLMAN & NOLAN GEOTECHNIC PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ANDREW WILLIAMS	Contact	: Customer Services
Address	: 71 CONNORS ROAD MACKAY QLD, AUSTRALIA 4740	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: soils@cardno.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 49525255	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 49525455	Facsimile	: +61 7 3243 7218
Project	: U23415	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: UN6267		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2012
Sampler	: ----	Issue Date	: 14-NOV-2012
Site	: ----		
		No. of samples received	: 22
Quote number	: EN/024/11	No. of samples analysed	: 22

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Greg Vogel	Laboratory Manager	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

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.

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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

				Client sample ID	KO 1 0.1-0.2M	KO1 0.2-0.3m	KO2 0.6-1.0m	KO3 0.6-1.0m	KO4 0.2-0.3m
				Client sampling date / time	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB1229103-001	EB1229103-002	EB1229103-003	EB1229103-004	EB1229103-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**6.9**	**7.1**	**6.5**	**8.2**	**7.1**
EA006: Sodium Adsorption Ratio (SAR)									
Sodium Adsorption Ratio	----	0.01	-		**1.16**	**0.86**	**0.39**	**31.7**	**1.43**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**16**	**17**	**5**	**369**	**19**
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**11.9**	**7.7**	**15.1**	**25.9**	**2.2**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**1.7**	**2.0**	**0.7**	**0.7**	**2.8**
Exchangeable Magnesium	----	0.1	meq/100g		**1.2**	**3.8**	**0.2**	**1.0**	**0.6**
Exchangeable Potassium	----	0.1	meq/100g		**0.1**	**0.1**	<0.1	<0.1	**0.2**
Exchangeable Sodium	----	0.1	meq/100g		<0.1	**0.5**	<0.1	**0.9**	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		**3.1**	**6.5**	**1.0**	**2.6**	**3.7**
Exchangeable Sodium Percent	----	0.1	%		**1.6**	**8.0**	<0.1	**32.9**	**0.3**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**10**	<10	<10	**450**	**20**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	KO5 0.3-0.6m	BB15-0.6-1.0m	BB15 0.2-0.3m	BB12 0.3-0.6m	BB12 0.6-1.0m
				Client sampling date / time	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00
Compound	CAS Number	LOR	Unit		EB1229103-006	EB1229103-007	EB1229103-008	EB1229103-009	EB1229103-010
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.8	7.5	5.9	8.4	9.0
EA006: Sodium Adsorption Ratio (SAR)									
Sodium Adsorption Ratio	----	0.01	-		65.6	1.48	0.26	2.85	18.7
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		481	29	5	42	119
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		19.8	8.0	14.8	10.5	18.6
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		3.1	5.1	0.4	1.5	1.7
Exchangeable Magnesium	----	0.1	meq/100g		1.4	4.1	0.3	1.0	1.6
Exchangeable Potassium	----	0.1	meq/100g		<0.1	0.2	<0.1	0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		1.1	0.2	<0.1	0.5	1.2
Cation Exchange Capacity	----	0.1	meq/100g		5.6	9.6	0.8	3.2	4.6
Exchangeable Sodium Percent	----	0.1	%		18.8	2.1	<0.1	16.1	27.5
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		480	20	<10	30	80

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID	BB07 0.1-0.2m	BB11 0.0-0.1m	BB10 0.3-0.6m	BB09 0.1-0.2m	BB13 0.6-0.75m
				Client sampling date / time	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00
					EB1229103-011	EB1229103-012	EB1229103-013	EB1229103-014	EB1229103-015
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**6.4**	**6.1**	**8.4**	**6.2**	**7.0**
EA006: Sodium Adsorption Ratio (SAR)									
Sodium Adsorption Ratio	----	0.01	-		**0.27**	**0.17**	**16.8**	**0.89**	**0.47**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4**	**7**	**168**	**13**	**10**
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**10.7**	**14.8**	**11.2**	**16.0**	**13.0**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**0.6**	**1.1**	**1.0**	**1.4**	**2.1**
Exchangeable Magnesium	----	0.1	meq/100g		**0.2**	**0.4**	**1.6**	**0.5**	**1.2**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	**0.1**	**0.2**	**0.2**
Exchangeable Sodium	----	0.1	meq/100g		<0.1	<0.1	**0.8**	<0.1	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		**0.8**	**1.6**	**3.6**	**2.1**	**3.6**
Exchangeable Sodium Percent	----	0.1	%		<0.1	<0.1	**23.7**	<0.1	**2.2**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		<10	<10	**130**	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BB19 0.2-0.3m	BB17 0.6-1.0m	BB16 0.6-1.0m	BB20 0.0-0.1m	BB6 0.2-0.3m
			Client sampling date / time	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00	29-OCT-2012 15:00
Compound	CAS Number	LOR	Unit	EB1229103-016	EB1229103-017	EB1229103-018	EB1229103-019	EB1229103-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.2	7.5	6.1	6.2	6.3
EA006: Sodium Adsorption Ratio (SAR)								
Sodium Adsorption Ratio	----	0.01	-	4.28	1.74	2.44	1.49	2.02
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	8	31	4	4	17
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.5	23.6	17.3	14.0	2.5
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.2	2.1	0.6	0.9	1.0
Exchangeable Magnesium	----	0.1	meq/100g	0.4	2.8	0.3	0.2	0.7
Exchangeable Potassium	----	0.1	meq/100g	0.1	0.3	<0.1	0.1	0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.3	<0.1	<0.1	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	1.6	5.5	1.0	1.2	1.8
Exchangeable Sodium Percent	----	0.1	%	1.1	6.1	<0.1	<0.1	4.8
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	<10	20	<10	<10	20

Page	:	7 of 7
Work Order	:	EB1229103
Client	:	CARDNO ULLMAN & NOLAN GEOTECHNIC PTY LTD
Project	:	U23415

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BB6 0.3-0.6m**	**BB18 0.0-0.1m**	----	----	----
			Client sampling date / time	29-OCT-2012 15:00	29-OCT-2012 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1229103-021**	**EB1229103-022**	**----**	**----**	**----**
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.4**	**6.5**	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
Sodium Adsorption Ratio	----	0.01	-	**35.0**	**0.30**	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**257**	**6**	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**17.0**	**17.7**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**21.7**	**1.2**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**6.1**	**0.2**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	**0.3**	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**1.1**	<0.1	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**29.2**	**1.5**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**3.7**	<0.1	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**70**	<10	----	----	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB1229103**	Page	: 1 of 5
Client	: **CARDNO ULLMAN & NOLAN GEOTECHNIC PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ANDREW WILLIAMS	Contact	: Customer Services
Address	: 71 CONNORS ROAD MACKAY QLD, AUSTRALIA 4740	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: soils@cardno.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 49525255	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 49525455	Facsimile	: +61 7 3243 7218
Project	: U23415	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2012
Sampler	: ----	Issue Date	: 14-NOV-2012
Order number	: UN6267		
		No. of samples received	: 22
Quote number	: EN/024/11	No. of samples analysed	: 22

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Greg Vogel	Laboratory Manager	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002 : pH (Soils) (QC Lot: 2587414)									
EB1229103-001	KO 1 0.1-0.2M	EA002: pH Value	----	0.1	pH Unit	6.9	6.7	2.5	0% - 20%
EB1229103-011	BB07 0.1-0.2m	EA002: pH Value	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
EA002 : pH (Soils) (QC Lot: 2587421)									
EB1229103-021	BB6 0.3-0.6m	EA002: pH Value	----	0.1	pH Unit	9.4	9.5	0.0	0% - 20%
EA010: Conductivity (QC Lot: 2587415)									
EB1229103-001	KO 1 0.1-0.2M	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	16	17	6.1	0% - 50%
EB1229103-011	BB07 0.1-0.2m	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	4	3	28.6	No Limit
EA010: Conductivity (QC Lot: 2587422)									
EB1229103-021	BB6 0.3-0.6m	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	257	251	2.4	0% - 20%
EA055: Moisture Content (QC Lot: 2587386)									
EB1229036-016	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	2.0	2.2	8.0	No Limit
EB1229103-003	KO2 0.6-1.0m	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	15.1	15.2	1.2	0% - 50%
EA055: Moisture Content (QC Lot: 2587387)									
EB1229103-016	BB19 0.2-0.3m	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	1.5	1.5	0.0	No Limit
ED008: Exchangeable Cations (QC Lot: 2591351)									
EB1229103-001	KO 1 0.1-0.2M	ED008: Exchangeable Calcium	----	0.1	meq/100g	1.7	1.8	7.3	0% - 50%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.2	1.3	0.0	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.1	0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
EB1229103-009	BB12 0.3-0.6m	ED008: Exchangeable Calcium	----	0.1	meq/100g	1.5	1.4	8.7	0% - 50%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.0	1.0	10.0	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.5	0.5	0.0	No Limit
ED008: Exchangeable Cations (QC Lot: 2591353)									
EB1229103-021	BB6 0.3-0.6m	ED008: Exchangeable Calcium	----	0.1	meq/100g	21.7	22.0	1.4	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	6.1	6.1	0.0	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.3	0.3	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	1.1	1.0	0.0	0% - 50%
ED045G: Chloride Discrete analyser (QC Lot: 2587416)									
EB1229103-001	KO 1 0.1-0.2M	ED045G: Chloride	16887-00-6	10	mg/kg	10	20	0.0	No Limit
EB1229103-011	BB07 0.1-0.2m	ED045G: Chloride	16887-00-6	10	mg/kg	<10	<10	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2587423)									
EB1229103-021	BB6 0.3-0.6m	ED045G: Chloride	16887-00-6	10	mg/kg	70	60	0.0	No Limit

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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (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 (Soils) (QCLot: 2587414)								
EA002: pH Value	----	0.1	pH Unit	----	4.00 pH Unit	100	98	102
EA002 : pH (Soils) (QCLot: 2587421)								
EA002: pH Value	----	0.1	pH Unit	----	4.00 pH Unit	100	98	102
EA006: Sodium Adsorption Ratio (SAR) (QCLot: 2591345)								
EA006: Sodium Adsorption Ratio	----	0.01		<0.05	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR) (QCLot: 2591346)								
EA006: Sodium Adsorption Ratio	----	0.01		<0.05	----	----	----	----
EA010: Conductivity (QCLot: 2587415)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	86	110
EA010: Conductivity (QCLot: 2587422)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	86	110
ED008: Exchangeable Cations (QCLot: 2591351)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	100	91	109
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.666 meq/100g	103	87	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.519 meq/100g	96.1	79	117
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.870 meq/100g	106	75	125
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	4.055 meq/100g	102	84	116
ED008: Exchangeable Cations (QCLot: 2591353)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	99.3	91	109
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.666 meq/100g	102	87	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.519 meq/100g	96.3	79	117
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.870 meq/100g	105	75	125
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	4.055 meq/100g	101	84	116
ED045G: Chloride Discrete analyser (QCLot: 2587416)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	5000 mg/kg	92.7	77	115
ED045G: Chloride Discrete analyser (QCLot: 2587423)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	5000 mg/kg	97.0	77	115

Matrix Spike (MS) Report

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

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

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

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

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

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1229103**	Page	: 1 of 8
Client	: CARDNO ULLMAN & NOLAN GEOTECHNIC PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ANDREW WILLIAMS	Contact	: Customer Services
Address	: 71 CONNORS ROAD MACKAY QLD, AUSTRALIA 4740	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: soils@cardno.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 49525255	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 49525455	Facsimile	: +61 7 3243 7218
Project	: U23415	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2012
Sampler	: ----	Issue Date	: 14-NOV-2012
Order number	: UN6267		
		No. of samples received	: 22
Quote number	: EN/024/11	No. of samples analysed	: 22

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

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 (Soils)								
Snap Lock Bag (EA002)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**09-NOV-2012**	05-NOV-2012	✗	**12-NOV-2012**	09-NOV-2012	✗
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							
EA006: Sodium Adsorption Ratio (SAR)								
Snap Lock Bag (EA006)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**14-NOV-2012**	27-APR-2013	✓	**14-NOV-2012**	27-APR-2013	✓
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							

Page	: 3 of 8
Work Order	: EB1229103
Client	: CARDNO ULLMAN & NOLAN GEOTECHNIC PTY LTD
Project	: U23415

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
EA010: Conductivity								
Snap Lock Bag (EA010)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**09-NOV-2012**	05-NOV-2012	×	**12-NOV-2012**	07-DEC-2012	✓
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							
EA055: Moisture Content								
Snap Lock Bag (EA055-103)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**----**	----	----	**08-NOV-2012**	12-NOV-2012	✓
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							
ED008: Exchangeable Cations								
Snap Lock Bag (ED008)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**13-NOV-2012**	26-NOV-2012	✓	**13-NOV-2012**	26-NOV-2012	✓
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							

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
ED045G: Chloride Discrete analyser								
Snap Lock Bag (ED045G)								
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	**29-OCT-2012**	**09-NOV-2012**	05-NOV-2012	×	**12-NOV-2012**	07-DEC-2012	✓
KO2 0.6-1.0m,	KO3 0.6-1.0m,							
KO4 0.2-0.3m,	KO5 0.3-0.6m,							
BB15-0.6-1.0m,	BB15 0.2-0.3m,							
BB12 0.3-0.6m,	BB12 0.6-1.0m,							
BB07 0.1-0.2m,	BB11 0.0-0.1m,							
BB10 0.3-0.6m,	BB09 0.1-0.2m,							
BB13 0.6-0.75m,	BB19 0.2-0.3m,							
BB17 0.6-1.0m,	BB16 0.6-1.0m,							
BB20 0.0-0.1m,	BB6 0.2-0.3m,							
BB6 0.3-0.6m,	BB18 0.0-0.1m							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chloride Soluble By Discrete Analyser	ED045G	3	22	**13.6**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	3	22	**13.6**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	3	22	**13.6**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	3	30	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	3	22	**13.6**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Chloride Soluble By Discrete Analyser	ED045G	4	22	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride Soluble By Discrete Analyser	ED045G	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sodium Adsorption Ratio (SAR)	EA006	2	22	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	(APHA 21st ed., 4500H+) pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 103)
Sodium Adsorption Ratio (SAR)	EA006	SOIL	USEPA 600/2 - 78 - 54. The concentration as meq of Ca, Mg and Na are determined on saturated soil by water leach. Results are used to calculate SAR.
Electrical Conductivity (1:5)	EA010	SOIL	(APHA 21st ed., 2510) Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations with pre-treatment	ED008	SOIL	Rayment & Higginson (1992) 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 (1999) Schedule B(3) (Method 301)
Chloride Soluble By Discrete Analyser	ED045G	SOIL	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition 4500-Cl- E.

Preparation Methods	Method	Matrix	Method Descriptions
SAR Prep	EA006PR	SOIL	USEPA 600/2. Soil is bought to saturation with distilled water by capiliary action.
Exchangeable Cations Preparation Method	ED007PR	SOIL	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 distilled 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.

Summary of Outliers

Outliers : Quality Control Samples

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

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **SOIL**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	**Days overdue**	Date analysed	Due for analysis	**Days overdue**
EA002 : pH (Soils)							
Snap Lock Bag							
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	09-NOV-2012	05-NOV-2012	**4**	12-NOV-2012	09-NOV-2012	**3**
KO2 0.6-1.0m,	KO3 0.6-1.0m,						
KO4 0.2-0.3m,	KO5 0.3-0.6m,						
BB15-0.6-1.0m,	BB15 0.2-0.3m,						
BB12 0.3-0.6m,	BB12 0.6-1.0m,						
BB07 0.1-0.2m,	BB11 0.0-0.1m,						
BB10 0.3-0.6m,	BB09 0.1-0.2m,						
BB13 0.6-0.75m,	BB19 0.2-0.3m,						
BB17 0.6-1.0m,	BB16 0.6-1.0m,						
BB20 0.0-0.1m,	BB6 0.2-0.3m,						
BB6 0.3-0.6m,	BB18 0.0-0.1m						
EA010: Conductivity							

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA010: Conductivity - Analysis Holding Time Compliance							
Snap Lock Bag							
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	09-NOV-2012	05-NOV-2012	**4**	----	----	----
KO2 0.6-1.0m,	KO3 0.6-1.0m,						
KO4 0.2-0.3m,	KO5 0.3-0.6m,						
BB15-0.6-1.0m,	BB15 0.2-0.3m,						
BB12 0.3-0.6m,	BB12 0.6-1.0m,						
BB07 0.1-0.2m,	BB11 0.0-0.1m,						
BB10 0.3-0.6m,	BB09 0.1-0.2m,						
BB13 0.6-0.75m,	BB19 0.2-0.3m,						
BB17 0.6-1.0m,	BB16 0.6-1.0m,						
BB20 0.0-0.1m,	BB6 0.2-0.3m,						
BB6 0.3-0.6m,	BB18 0.0-0.1m						
ED045G: Chloride Discrete analyser							
Snap Lock Bag							
KO 1 0.1-0.2M,	KO1 0.2-0.3m,	09-NOV-2012	05-NOV-2012	**4**	----	----	----
KO2 0.6-1.0m,	KO3 0.6-1.0m,						
KO4 0.2-0.3m,	KO5 0.3-0.6m,						
BB15-0.6-1.0m,	BB15 0.2-0.3m,						
BB12 0.3-0.6m,	BB12 0.6-1.0m,						
BB07 0.1-0.2m,	BB11 0.0-0.1m,						
BB10 0.3-0.6m,	BB09 0.1-0.2m,						
BB13 0.6-0.75m,	BB19 0.2-0.3m,						
BB17 0.6-1.0m,	BB16 0.6-1.0m,						
BB20 0.0-0.1m,	BB6 0.2-0.3m,						
BB6 0.3-0.6m,	BB18 0.0-0.1m						

Outliers : Frequency of Quality Control Samples

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

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

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