APPENDIX 10

Geotechnical Investigation

GROUND TECHNOLOGIES

Geotechnical Testing Services

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GTE-547
4 May 2015

Duggan & Hede Pty Ltd
PO Box 496
Clayfield, QLD, 4011

Attention: Ray Duggan
E-mail: r.duggan@dhenv.com.au

Dear Sir,

RE: GEOTECHNICAL INVESTIGATION at No.14 Rayben Street, Glendenning.

This letter presents a geotechnical report on the inspection and testing services associated with the geotechnical investigation undertaken at the above project.

Should you have any questions related to this report please do not hesitate to contact the undersigned.

For and on behalf of
Ground Technologies Pty Ltd

A. Bennett
Senior Geotechnical Engineer

Reviewed By

M. Khan *AMIEAust*
Principal Engineering Officer (Geotechnical)

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1. INTRODUCTION

Ground Technologies Pty Ltd (Ground Tech) has prepared this report to discuss the results of the geotechnical investigation undertaken for the proposed extension to an existing warehouse at No.14 Rayben Street, Glendenning (herein referred to as the "site"). Ground Tech was engaged to provide professional assistance for this component of the project.

The geotechnical investigation included drilling two boreholes using a 4WD Toyota Landcruiser Ute mounted drill rig with 100mm diameter solid flight spiral augers at the locations shown on drawing Figure 1. Sampling and testing for Acid Sulphate Soils was undertaken during the course of the investigation. This report provides a geotechnical assessment on the existing soil conditions.

This report is based only on the information provided at the time of this report preparation and may not be valid if changes are made to the site or to the construction method.

1.1 Proposed Development

It is understood that the proposed works will comprise the construction of a new waste management facility on an existing site. In addition, a 2.5m deep 5000L inground concrete sump will be installed as a part of the development.

2. SITE DETAILS

2.1 Geology

The 1:100,000 scale Geological Series Map of the Penrith region indicates that the subject site is underlain by an Alluvial (Qal) profile comprising *fine grained sand, silt and clay*.

2.2 Site Description

The subject site site is near-square in shape, measuring approximately 95m wide along the Rayben Street frontage and approximately 85m deep. It covers an area of approximately 8,000m² and is relatively flat.

The subject site is currently being used as a waste management depot. A small brick office and a steel framed / metal clad workshop are located within the south-western corner of the site whilst the remainder of the site is covered by a concrete hard stand. A small creek / water channel bounds the site to the north which feed stormwater flow to Eastern Creek.

Figure 1 – Site Location

The proposed development is to be constructed within the north-western portion of the site, directly between the existing metal shed and the northern property boundary. This area is currently covered by a concrete hard stand and the remnant of an old awning structure. The concrete pavement is in a moderate condition for its age with numerous fine cracks observed and some degradation of the pavement at the segment joins (see photographs below). The area is currently used for storage of bins and associated materials.

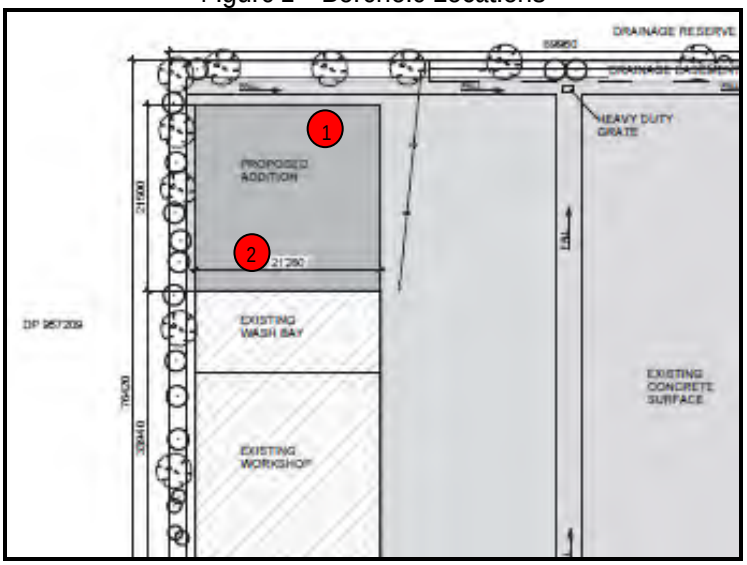
Photograph 1 - Site

Photograph 2 – Typical Damage to Pavement

3. GEOTECHNICAL INVESTIGATION

Fieldwork was undertaken on 1st of April 2015 and included drilling two boreholes (TS1 & TS2) using a 4WD Toyota Landcruiser Ute mounted drill rig with 100 mm solid flight spiral augers at the locations shown on Figure 1. Five samples were recovered during the course of the investigation in order to undertake a preliminary Acid Sulphate Soils assessment. Full borehole log and field observations are presented in Appendix A.

Figure 2 – Borehole Locations



3.1 Soil Profiles

Seven (7) distinct geological units were encountered during the field investigation. These units are detailed in table 1 and the depth of each unit is detailed in table 2:-

Table 1 – Summary of Geological Units

UNIT	SOIL TYPE
UNIT A	Pavement; Concrete underlain by Roadbase.
UNIT B	FILL; Admixed Clayey SAND, brown, white grey, moist.
UNIT C	FILL; Admixed Silty Clay, yellow/brown, red, brown, orange/brown, moist.
UNIT D	NATURAL: Very Silty CLAY, medium plasticity, dark grey, moist to very moist, stiff
UNIT E	NATURAL: Silty CLAY, medium plasticity, yellow/brown, slightly moist, very stiff
UNIT F	NATURAL: Silty CLAY, medium plasticity, orange/brown, moist, very stiff to stiff
UNIT G	NATURAL: Silty CLAY, medium plasticity, pale brown with minor yellow/brown, moist to very moist, stiff to very stiff

Table 2 – Depth of each Geological Unit

Borehole	Geological Unit						
	Unit A	Unit B	Unit C	Unit D	Unit E	Unit F	Unit G
TS1	0-0.3m	0.3-0.5m	0.5-1.4m	1.4-1.7m	1.7-2.1m	2.1-2.8m	2.8-4.5m
TS2	0-0.16m	0.16-0.4m	0.4-1.0m	1.0-1.2m	1.2-2.0m	2.0-2.6m	2.6-4.5m

No groundwater was encountered at the time of our visit.

3.2 Fill Profile

The fill appeared moderately to well compacted from both auger resistance and visual classification. However, at the time of preparing this report, no documentation could be supplied to this office supporting the site fill being placed in a controlled manner and as such is considered UNCONTROLLED.

3.3 Laboratory Testing

Three (3) disturbed soil samples were recovered during the course of the field investigation. These samples were submitted to Ground Technologies NATA accredited laboratory for to determine the Emerson Dispersion Class and the Atterberg Limits of the underlying soil profile. The results are summarized in table 3 below whilst the full report is contained within Appendix B.

Table 3: Summary of Laboratory Test Results

Laboratory	Borehole	Depth	Emerson	PL	LL	PI
L1	TS1	0.6m	4	16	46	30
L2	TS1	1.5m	4	15	37	22
L3	TS1	1.9m	4	16	53	37

Based upon the laboratory test results, the underlying clay profile is defined as medium plasticity.

Based upon the laboratory test results, the underlying clay profile is non dispersive (Class 4)

Extrapolating from the laboratory test results, the soil profile would have an in-situ permeability (K) of approximately $1x10^{-8}$m/s

4. ACID SULFATE SOILS

Acid Sulphate Soils (ASS) are naturally occurring and usually form in low lying coastal areas, creeks, rivers and flood plains. The sulphates present in the soil are stable when in the saturated/waterlogged state, but react to form sulphuric acid when disturbed and exposed to oxygen.

4.1 Sampling and Methodology

Sampling and analysis was undertaken in order to assess the presence or absence, location and likely distribution of any AASS or PASS present at the subject site in the area of the proposed development.
Five soil samples were recovered from the excavated boreholes – one sample from each unit with the samples from within the natural soils sent to an external NATA accredited Laboratory. The samples were subjected to field pH and pH_{FOX} testing and also Suspension Peroxide Combined Acidity and Sulphate (SPOCAS) and also to confirm the presence/absence.

4.2 Field Acid Sulphate Soil Assessment

Three factors are considered in arriving at a positive identification of ASS in the field, in accordance with *Acid Sulfate Soils Planning Guidelines* (AASMAC) these include:

- The strength of reaction with hydrogen peroxide.
- The absolute value of pH_{FOX}.

In addition to the above criteria, the assessment criteria normally applied to assist in the preliminary identification of AASS and PASS is as given below:

- pH_F < 4 indicates an occurrence of oxidation in the past and that AASS are likely to be present.
- pH_{FOX} <3, plus a pH_{FOX} reading at least one pH unit below the corresponding pH_F , plus a strong reaction with peroxide, strongly indicates the presence of PASS.

The field pH_F and pH_{FOX} results are summarized in table 4 with the full laboratory report supplied in Appendix B:

Table 4: Field pH Test Results

Sample	Date Sampled	Borehole	Depth	Description	pH_F	pH_{FOX}	Reaction Vigour
G2	1-04-2015	TS1	1.5m	Unit D – Very Silty Clay	6.9	3.8	H
G3	1-04-2015	TS1	1.8m	Unit E - Silty Clay	7.9	6.5	H
G4	1-04-2015	TS1	2.4m	Unit F - Silty Clay	6.8	4.4	M
G5	1-4-2015	TS1	3.1m	Unit G - Silty Clay	5.9	6.9	E

(S=Slight; M=Moderate; H=High; X=Extreme)

From the above table, the pH_F and pH_{FOX} results of the all soils are above pH 4. The reaction vigour for the peroxide reaction was moderate to extreme 3 and the drop between pH_F and pH_{FOX} was noted to be greater than one pH unit, thus indicating the potential for presence of PASS and AASSwithin the soils.

4.3 SPOCAS Acid Sulphate Soil Assessment

The results of analysis for the soils are compared to the below ASSMAC assessment criteria. It is assumed that <1000 tonnes of material would be disturbed hence the action criteria for less than 1000 tonnes have been applied. The assessment values chosen are based on the natural soils being loams and light clays.

Table 5: NSW ASSMAC Action Criteria

Type of Material Texture	Approx Clay Content (% <0.002mm)	Action Criteria <1000 tonnes Sulfur Trail Spos%	Action Criteria <1000 tonnes Acid Trail TPA mole H+/t
Loams/light clays	5 – 40	0.06	36

The results of the SPOCAS suite tests are summarized in Table 6 with the full laboratory report supplied in Appendix B.

Table 6: SPOCAS TEST Results

Sample	Borehole	Depth	Description	TAA	TPA	TSA	S_{POS}
				mole / tonne			%
G2	TS1	1.5m	Unit D – Very Silty Clay	<2	<2	<2	<0.02
G3	TS1	1.8m	Unit E - Silty Clay	<2	<2	<2	<0.02
G4	TS1	2.4m	Unit F - Silty Clay	7	10	3	<0.02
G5	TS1	3.1m	Unit G - Silty Clay	6	<2	<2	<0.02
Action Criteria (Fine Texture)				-	36	36	0.06

Laboratory results indicate low acid and sulphur trails within the natural soil profile and as such is considered to be absent of Acid Sulphate Soils (AASS or PASS).

5. SITE CLASSIFICATION

This site is classified as Class P in accordance with AS2870 – 2011:

Clause 2.5.3: Fill material other than sand was intersected to depths greater than 400mm.

Should certification of the fill be produced the site may be classified as Class H1.

6. FOOTING DESIGN PARAMETERS

6.1 Fully Suspended Superstructure within Uncontrolled Fill

Due to the depth of uncontrolled fill, all footings and floor slabs should be constructed upon bored concrete piles. Bored concrete piles constructed with a 0.2m socket within Units E, F & G can be designed for an allowable end bearing capacity of 200kPa. Skin friction will carry a nominal 20kPa within these units. No skin friction is available within the fill profile.

Bored pier excavations must be cleaned of any soft, wet or loose infill material which has accumulated at their bases prior to pouring of concrete. Similarly, any accumulated water should be removed. All excavations should be concreted as soon as possible, preferably immediately after excavation, cleaning, inspection and approval. Due to possible water inflow, pier excavations should not be left open overnight.

It is recommended that all footing excavations be inspected by a geotechnical engineer from Ground Tech to confirm that founding conditions are consistent with design recommendations. The footing size and the founding level may need to be adjusted, if required founding material is not encountered at the design founding level.

All excavations should be concreted as soon as possible, preferably immediately after excavation, cleaning, inspection and approval. Due to possible water inflow, pier excavations should not be left open overnight.

6.2 Suspended Footings within Uncontrolled Fill

Due to the depth of uncontrolled fill, all structural footings should be constructed upon bored concrete piles. Bored concrete piles constructed with a 0.2m socket within Units E, F & G can be designed for an allowable end bearing capacity of 200kPa. Skin friction will carry a nominal 20kPa within these units. No skin friction is available within the fill profile.

Bored pier excavations must be cleaned of any soft, wet or loose infall material which has accumulated at their bases prior to pouring of concrete. Similarly, any accumulated water should be removed. All excavations should be concreted as soon as possible, preferably immediately after excavation, cleaning, inspection and approval. Due to possible water inflow, pier excavations should not be left open overnight.

It is recommended that all footing excavations be inspected by a geotechnical engineer from Ground Tech to confirm that founding conditions are consistent with design recommendations. The footing size and the founding level may need to be adjusted, if required founding material is not encountered at the design founding level.

The proposed floor slab can be designed on grade based upon a Sub-grade Reaction Modulus (k) of 20kPa/mm or a CBR of 2%. It should be noted that there is an inherent risk of differential settlements and pavement failure when a pavement is constructed upon uncontrolled fill.

6.3 Shallow Footings within Controlled Fill

Should documentation be provided certifying the compaction of the fill material, shallow footings may be utilized for the subject development. Strip and pad footings founded upon controlled fill may be apportioned an allowable end bearing capacity of 100kPa.

The proposed floor slab can be designed on grade based upon a Sub-grade Reaction Modulus (k) of 20kPa/mm or a CBR of 2%.

6.4 Rip and Re-compaction of Fill Material

If it is desired to remove the uncontrolled fill and re-compact it as controlled fill the following process should be followed.

1) Strip the existing site filling and expose the natural soil profile. This profile should be compacted with a minimum of 7 passes of an 8 to 10 tonne static weight smooth drum roller, then proof rolled in order to detect potentially weak spots (ground heave). Areas of localised heaving should be excavated to a depth of 300mm and replace with suitable fill, compacted to a Minimum Dry Density Ratio (MDDR) of 98% Standard, with a moisture content within -2% to +2% of Optimum Moisture Content (OMC).The proof rolling should be supervised by a suitably qualified Geotechnical Engineer / Engineering Geologist. The density testing should be undertaken by a NATA accredited laboratory.
2) On certification of proof rolling, placement of the subgrade materials may proceed. Fill placement shall be in near Horizontal Layers of uniform thickness placed systematically across the fill area. The depth of the compacted layer should not to exceed 300mm in thickness and the maximum particle size not to exceed 2/3rd of layer thickness.
3) Compaction testing should be undertaken as per the minimum Level 2 requirements of AS3798 – 2007 'Guidelines on Earthworks for Commercial and Residential Development', as shown on table 7.

Table 7: Earthworks Testing Requirements

Description	Specification
Dry or Hilf Density Ratio	98% Standard Compaction
Moisture Variation	+/- 2% OMC
Frequency of Density/Moisture Testing	1 test per layer per 2500m^2 or 1 test per 500m^3 or 3 tests per site visit, whichever is greater.

Areas that satisfy the requirements of the Earthworks Specification may be defined as CONTROLLED fill and footings may be designed as per section 6.3 of this report.

7. SITE EXCAVATIONS

Excavations to at least 2.5m should be achieved with bucket attachment to a mid sized excavator. Excavation within the fill profile and underlying natural silty lay should be cut to benches no greater than 1.5mH:1.5mV.

8. CONTAMINATION ASSESSMENT

The contamination assessment criteria used in this investigation have been obtained from the National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; 'Industrial / Commercial' ('D').

Table 8: Chemical Analysis of the Underlying Soils

Contaminant	SCC mg/kg				Health Based Investigation Level (HIL'D')
	C1	**C2**	**C3**	**C4**	
Arsenic	<5	<5	<5	<5	3000
Cadmium	<1	<1	<1	<1	900
Chromium	39	45	26	31	3600
Lead	8	11	10	9	1500
Mercury	<0.1	<0.1	<0.1	<0.1	730
Nickel	20	23	13	16	6000
Benzene	<0.2	<0.2	<0.2	<0.2	95
Toluene	<0.5	<0.5	<0.5	<0.5	135
Ethyl Benzene	<0.5	<0.5	<0.5	<0.5	185
Xylenes (total)	<0.5	<0.5	<0.5	<0.5	95
Benzo(a) Pyrene	<0.5	<0.5	<0.5	<0.5	0.7
Carcinogenic PAH	<0.5	<0.5	<0.5	<0.5	40
Total PAH	2.9	<0.5	<0.5	<0.5	4000
PCB	<0.1	<0.1	<0.1	<0.1	7
Petroleum Hydrocarbon Components - C6-C10	<10	<10	<10	<10	215
Petroleum Hydrocarbon Components – C10-16	<50	<50	<50	<50	170
Petroleum Hydrocarbon Components – C16-C34	<100	<100	<100	<100	2500
Petroleum Hydrocarbon Components – C34-40	<100	<100	<100	<100	6600

The concentrations of all contaminants were well below the relevant assessment criteria (HILs D). Therefore, the contaminant concentrations, present in the fill and natural soil layers are not considered likely to pose a risk to human health or the environment under a 'Commercial / Industrial' setting if they are to remain on site.

9. WASTE CLASSIFICATION

9.1 Fill Material

The Assessment criteria used in this investigation have been obtained from the Specific Contaminant Concentrations from Table 1 of Part 1: Classifying Waste, Waste Classification Guidelines published by the DECCW NSW (2009).

Table 9: Chemical Analysis of the Fill Material – Waste Classification

Contaminant	SCC mg/kg **UL1**	General Solid Waste Criteria CT1
Arsenic	<5	100
Cadmium	<1	20
Chromium	39	100
Lead	8	100
Mercury	<0.1	4
Nickel	20	40
Benzene	<0.2	10
Toluene	<0.5	288
Ethyl Benzene	<0.5	600
Xylenes (total)	<0.5	1000
Benzo(a) Pyrene	<0.5	0.8
Polycyclic Aromatic Hydrocarbons (PAH's)	<0.5	200
Petroleum Hydrocarbon Components - C6-C9	<10	650
Petroleum Hydrocarbon Components – C10-36	<50	10000

No foreign materials or asbestos were observed within the fill material.

After analyzing the soil samples recovered from the subject site, the spoil material is classified as General Solid Waste (non putrescible) for landfill disposal purposes since the results are in accordance with the values in Table 1 of Part 1: Classifying Waste, Waste Classification Guidelines published by the DECC NSW (2009).

9.2 Natural Material - VENM

The Assessment criteria used in this investigation have been obtained from Table 2 of the Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A, "The Excavated Natural Material Exemption 2012" (ENM) by the Department of Environment & Climate Change (DECC) NSW.

Table 10: Chemical Analysis of the Natural Soils - VENM

Contaminant	SCC mg/kg			Absolute Maximum Concentration (mg/kg)
	C2	C3	C4	
Arsenic	<5	<5	<5	40
Cadmium	<1	<1	<1	1
Chromium	45	26	31	150
Lead	11	10	9	100
Mercury	<0.1	<0.1	<0.1	1
Nickel	23	13	16	60
Zinc	26	20	18	300
Total PAH	<0.5	<0.5	<0.5	40
Benzo(a)pyrene	<0.5	<0.5	<0.5	1
Benzene	<0.2	<0.2	<0.2	0.5
Toulene	<0.5	<0.5	<0.5	65
Ethyl-Benzene	<0.5	<0.5	<0.5	25
Xylene	<0.5	<0.5	<0.5	15
Total Petroleum Hydrocarbons (TPHs)	<50	<50	<50	500

The material on the above site is classified as virgin excavated natural material (VENM) for future use; since it is in accordance with the definition of VENM given under the *Protection of the Environments Operations Act 1997* as outlined below:

'Natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining or agricultural activities, and
- That does not contain any sulfidic ores or soils or any other waste.'

10. CONDITIONS OF THE RECOMMENDATIONS

This report is a geotechnical report only and the classification stated shall not be regarded as an engineering design nor shall it replace a design by engineering principles although it may contribute information for such designs. When this report is to be used as a reference by the engineer or builder or other relevant party, this report must be reproduced in total.

The advice given in this report is based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that actual conditions in some parts of the building site may differ from those found in the test holes. If excavations reveal soil conditions different from those shown in our attached Soil Log(s), Ground Tech must be consulted and excavations stopped immediately.

The foundation depths quoted in this report are measured from the surface during our testing and may vary accordingly if any filling or excavation works are carried out. The description of the foundation material has been provided for its easy recognition over the whole building site.

Any sketches in this report should be considered as only an approximate pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions or slope information should not be used for any building cost calculations and/or positioning of the building. Dimensions on logs are correct.

11. LIMITATIONS

This type of investigation (as per our commission) is not designed or capable of locating all ground conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall ground conditions. However, it should be noted that actual conditions in some parts of the site might differ from those found. If excavations reveal ground conditions different from those shown in our findings, Ground Tech must be consulted.

The scope and the period of Ground Tech services are described in the report and are subject to restrictions and limitations. Ground Tech did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Tech in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Tech for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

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12. REFERENCES

- Stone, Y, and Hopkins G (1998). *Acid Sulfate Soils Planning Guidelines.* Published by the Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia.
- Ahern C, R, Stone, Y, and Blunden B (1998). *Acid Sulfate Soils Assessment Guidelines* Published by the Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia
- Geology of Penrith Region 1:100000 Geological Series Sheet 9030, 1st Edition. Geological Survey of NSW Department of Mineral Resources 1991.
- AS2870 (2011), Residential Slab and Footings – Construction

APPENDIX A

BOREHOLE LOGS

GROUND TECHNOLOGIES
Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210

SITE LOCATION: 14 Rayben Street, Glendenning

TEST SITE NO. 1

WATER	DEPTH (m)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	POCKET PENETROMETER	REMARKS
NIL		PAVEMENT	Concrete (170mm) underlain by Roadbase			
		FILL	Admixed Clayey Sand, brown, white, grey, moist			Fill appears well compacted Sample G1@ 0.4m
	0.5		Admixed Silty Clay, yellow/brown, red, brown, orange/brown, moist			Fill appears well compacted Sample C1, L1 @ 0.6m
	1					
	1.5	CI	Natural Very Silty CLAY, medium palsticity, dark grey, moist to very moist, stiff		300	Alluvial Sample G2, L2, C2 @1.5m
			Silty CLAY, medium plasticity, yellow/brown, slightly moist, very stiff			Sample G3 @1.8m Sample L3, C3 @ 1.9m
	2		Silty CLAY, medium plasticity, orange/brown, moist, stiff to very stiff		180	Alluvial
	2.5				210	Sample G4, C4 @ 2.4m
			Silty Sandy CLAY, medium plasticity, pale brown with minor yellow/brown and grey, very moist, stiff		100	Alluvial
	3					Sample G5 @3.1,
	3.5				110	
	4					
	4.5		*Borehole terminated at 4.5m*			

Method: 4WD Mounted Rig/Solid FlightSpiral Augers
Date of Drilling: 1/4/2015
Logged and Drilled by: AB/ME

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Geotechnical Testing Services

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PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
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SITE LOCATION: 14 Rayben Street, Glendenning

TEST SITE NO. 2

WATER	DEPTH (m)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	POCKET PENETROMETER	REMARKS
NIL		PAVEMENT	Concrete (160mm)			
		FILL	Clayey Gravelly Sand, brown, white, grey			Fill appears well compacted
	0.5		Admixed Silty Clay, yellow/brown, red, brown, orange/brown, moist			Fill appears well compacted
	1	CI	Natural Very Silty CLAY, medium palsticity, dark grey, moist to very moist, stiff		100	Alluvial
			Silty CLAY, medium plasticity, yellow/brown, slightly moist, very stiff		200	Alluvial
	1.5				300	
	2		Silty CLAY, medium plasticity, orange/brown, moist, stiff to very stiff		180	Alluvial
					220	
	2.5		Silty Sandy CLAY, medium plasticity, pale brown with minor yellow/brown and grey, moist, stiff to very stiff		220	Alluvial
	3					
	3.5				250	
	4					
	4.5		*Borehole terminated at 4.5m*			

Method: 4WD Mounted Rig/Solid FlightSpiral Augers
Date of Drilling: 1/4/2015
Logged and Drilled by: AB/ME

APPENDIX B

LABORATORY TEST RESULTS

GROUND TECHNOLOGIES
Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
55 Fifteenth Ave, West Hoxton NSW 2171
Ph: (02) 8783 8200 Fax: (02) 8783 8210
Email: lab@groundtech.com.au

CLIENT:	Duggan & Hede Pty Ltd	**JOB NO:**	GTE547
PROJECT:	Proposed Industrial Subdivision	**REPORT NO:**	GTE547-L2
LOCATION:	Glendenning	**DATE OF TESTING:**	29/4/15

Determination of EMERSON CLASS NUMBER

Sample Number	Sample Location	Material Description (Visual)	Result
L1	TS1 (0.6m)	Pale Grey Brown Silty Clay	4
L2	TS1 (1.5m)	Brown Silty Clay	4
L3	TS1 (1.9m)	Brown Silty Clay	4

Test Method: AS2189.3.8.1

Date Sampled: 23/04/15

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Test Results - Atterberg Limits

Client:	Duggan & Hede Pty Ltd	Job No.	GTE547
Project:	Proposed Industrial Subdivision	Report No.	GTER-L1
Location:	Glendenning	Test date:	30-Apr-15
Contact:	Ray Duggan	Client job No:	-

Sample Location		TS1 (0.6m)	TS1 (1.5m)	TS1 (1.9m)	
Sample Number		**L1**	**L2**	**L3**	
Test procedure		AS1289 3.1.2,3.2.1,3.3.1,3.4.1, 2.1.1			
ATTERBERG LIMITS					
Liquid Limit	%	**46**	**37**	**53**	
Plastic limit	%	**16**	**15**	**16**	
Plasticity Index	%	**30**	**22**	**37**	
Linear Shrinkage	%	**ND**	**ND**	**ND**	
Curling/ Crumbling/ Cracking					
sample history		Low Temperature Oven Dried, Dry Sieved			
Sample description		**L1 Pale Grey Brown Silty Clay L2-L3 Brown Silty Clay**			

Comments: Sampling Method: AS1289.1.2.1 (6.5.3)

NATA Accredited Laboratory No. 14343
Accredited for compliance with ISO/IEC 17025
The results of the tests, calibrations and/or measurements in this document are traceable to Australian/National Standards

Approved Signatory

Date of issue 4/05/2015

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
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GLADSTONE 45 Cahoonfield Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
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MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Wallsend NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
ORANGE 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
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SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ALS Environmental

CLIENT: Ground Technologies	TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: 55 Fifteenth Avenue, West Hoxton	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT: gte523 Glendenning	ALS QUOTE NO.: SY/554/14	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER:		COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 28.0 °C
PROJECT MANAGER: Anthony Bennett	CONTACT PH: 0433284610	OF: 1 2 3 4 5 6 7	Other comments:
SAMPLER: Anthony Bennett	SAMPLER MOBILE:	RELINQUISHED BY: Anthony Bennett	RECEIVED BY: Stacy Stephens
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME: 2/4	DATE/TIME: 02/4/15 1540
Email Reports to: anthony@groundtech.com.au, moustafa@groundtech.com.au		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed):		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH	pHfox	sPOCAS						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	~~GR~~ G2	1/04/2015	s			x	x	x						
2	G3	1/04/2015	s			x	x	x						
3	G4	1/04/2015	s			x	x	x						
4	G5	1/04/2015	s			x	x	x						
				TOTAL	1	1								

Environmental Division Sydney
Work Order
ES1507775
Telephone : +61-2-8784 8555

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

CERTIFICATE OF ANALYSIS

Work Order	: **ES1507775**	Page	: 1 of 4
Client	: **GROUND TECHNOLOGIES**	Laboratory	: Environmental Division Sydney
Contact	: MR ANTHONY BENNETT	Contact	: Client Services
Address	: PO BOX 1121 GREEN VALLEY NSW,AUSTRALIA 2168	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: anthony@groundtech.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 8783 8200	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: GTE523	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-APR-2015
Sampler	: AB	Issue Date	: 15-APR-2015
Site	: ----		
		No. of samples received	: 4
Quote number	: SY/554/14	No. of samples analysed	: 4

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*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Satishkumar Trivedi	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **ASS: EA003 (NATA Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme**
- **ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.**
- **ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme**
- **EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	G2	G3	G4	G5	----
				Client sampling date / time	01-APR-2015 15:00	01-APR-2015 15:00	01-APR-2015 15:00	01-APR-2015 15:00	----
Compound	CAS Number	LOR	Unit		ES1507775-001	ES1507775-002	ES1507775-003	ES1507775-004	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**7.0**	**7.5**	**6.5**	**6.2**	----
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		**6.4**	**6.2**	**5.1**	**5.2**	----
pH OX (23B)	----	0.1	pH Unit		**7.1**	**7.2**	**6.4**	**6.9**	----
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	**7**	**6**	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		<2	<2	**10**	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		<2	<2	**3**	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	----
Peroxide Sulfur (23De)	----	0.02	% S		**0.02**	<0.02	<0.02	<0.02	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		**0.02**	<0.02	<0.02	<0.02	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		**14**	<10	<10	<10	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		**0.06**	**0.05**	**0.03**	<0.02	----
Peroxide Calcium (23Wh)	----	0.02	% Ca		**0.09**	**0.05**	**0.03**	<0.02	----
Acid Reacted Calcium (23X)	----	0.02	% Ca		**0.03**	<0.02	<0.02	<0.02	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		**13**	<10	<10	<10	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		**0.02**	<0.02	<0.02	<0.02	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		**0.09**	**0.13**	**0.14**	**0.12**	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg		**0.10**	**0.14**	**0.15**	**0.13**	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg		<0.02	<0.02	<0.02	<0.02	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		<10	<10	<10	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		**0.27**	**0.05**	----	**0.25**	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	G2	G3	G4	G5	----
				Client sampling date / time	01-APR-2015 15:00	01-APR-2015 15:00	01-APR-2015 15:00	01-APR-2015 15:00	----
Compound	CAS Number	LOR	Unit		ES1507775-001	ES1507775-002	ES1507775-003	ES1507775-004	----
EA029-F: Excess Acid Neutralising Capacity - Continued									
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		**54**	**10**	----	**50**	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		**0.09**	<0.02	----	**0.08**	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S		**0.02**	<0.02	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t		**14**	<10	<10	<10	----
Liming Rate	----	1	kg CaCO3/t		**1**	<1	<1	<1	----
EA037: Ass Field Screening Analysis									
pH (F)	----	0.1	pH Unit		**6.9**	**7.9**	**6.8**	**5.9**	----
pH (Fox)	----	0.1	pH Unit		**3.8**	**6.5**	**4.4**	**6.9**	----
Reaction Rate	----	1	-		**3**	**3**	**2**	**4**	----

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
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MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
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SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Ground Technologies	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle):**
OFFICE: 55 Fifteenth Avenue, West Hoxton		☒ Non Standard or urgent TAT **(List due date):** 3 day TAT	Custody Seal intact? Yes / No / N/A
PROJECT: gte547 Glendenning	**ALS QUOTE NO.:** SY/554/14	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER:		COC: (1) 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Anthony Bennett	**CONTACT PH:** 0433284610	OF: (1) 2 3 4 5 6 7	Other comment:
SAMPLER: Anthony Bennett	**SAMPLER MOBILE:**	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	*Anthony Bennett*	Frank ALS
Email Reports to: anthony@groundtech.com.au, moustafa@groundtech.com.au		DATE/TIME: 26/4	DATE/TIME: 27/4/15 1130
Email Invoice to (will default to PM if no other addresses are listed):		**RELINQUISHED BY:** DATE/TIME:	**RECEIVED BY:** DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	S-16	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	C1	23/04/2015	s			x	
2	C2	23/04/2015	s			x	
3	C3	23/04/2015	s			x	
4	C4	23/4/15	S			x	
				TOTAL	4	4	

TAT

Environmental Division
Sydney
Work Order Reference
ES1520505
Telephone : +61-2-8784 8555

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

CERTIFICATE OF ANALYSIS

Work Order	: **ES1520505**	Page	: 1 of 6
Client	: **GROUND TECHNOLOGIES**	Laboratory	: Environmental Division Sydney
Contact	: MR ANTHONY BENNETT	Contact	:
Address	: PO BOX 1121 GREEN VALLEY NSW,AUSTRALIA 2168	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: anthony@groundtech.com.au	E-mail	:
Telephone	: +61 02 8783 8200	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: GTE547 Glendenning	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 27-Apr-2015 11:30
C-O-C number	: ----	Date Analysis Commenced	: 27-Apr-2015
Sampler	: ANTHONY BENNETT	Issue Date	: 30-Apr-2015 14:06
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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*
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics
Shobhna Chandra	Metals Coordinator	Sydney Organics

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
ø = ALS is not NATA accredited for these tests.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	C1	C2	C3	C4	----
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	----
Compound	CAS Number	LOR	Unit		ES1520505-001	ES1520505-002	ES1520505-003	ES1520505-004	--------
					Result	Result	Result	Result	Result
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%		10.6	18.2	14.6	16.0	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		39	45	26	31	----
Copper	7440-50-8	5	mg/kg		22	26	14	15	----
Lead	7439-92-1	5	mg/kg		8	11	10	9	----
Nickel	7440-02-0	2	mg/kg		20	23	13	16	----
Zinc	7440-66-6	5	mg/kg		22	26	20	18	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	C1	C2	C3	C4	----
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	----
Compound	CAS Number	LOR	Unit		ES1520505-001	ES1520505-002	ES1520505-003	ES1520505-004	--------
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		**0.6**	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		**0.6**	<0.5	<0.5	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		**0.6**	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg		**0.5**	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	C1	C2	C3	C4	----
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	----
Compound	CAS Number	LOR	Unit		ES1520505-001	ES1520505-002	ES1520505-003	ES1520505-004	--------
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		**0.6**	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**2.9**	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.7**	**0.6**	**0.6**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	C1	C2	C3	C4	----
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	----
Compound	CAS Number	LOR	Unit		ES1520505-001	ES1520505-002	ES1520505-003	ES1520505-004	--------
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		120	124	108	107	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		123	128	110	113	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		102	105	88.0	91.1	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		91.5	82.1	88.2	81.3	----
2-Chlorophenol-D4	93951-73-6	0.5	%		91.0	87.4	88.8	88.0	----
2.4.6-Tribromophenol	118-79-6	0.5	%		92.0	85.3	89.5	83.4	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		98.1	106	102	97.5	----
Anthracene-d10	1719-06-8	0.5	%		93.2	98.5	106	98.6	----
4-Terphenyl-d14	1718-51-0	0.5	%		97.7	104	105	100	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		102	94.0	102	103	----
Toluene-D8	2037-26-5	0.2	%		121	114	121	122	----
4-Bromofluorobenzene	460-00-4	0.2	%		116	110	115	118	----