Appendix H Acid sulfate soil, contamination and salinity assessment

Settlement City Shopping Centre – Port Macquarie Environmental Assessment proposed Stage 1



Manidis Rober

Manidis Roberts

Acid Sulfate Soil, Stage 2 Contamination and Salinity Assessment: Settlement City Port Macquarie NSW



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P0902316JR03_v3 June 2009

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All enquiries regarding this project are to be directed to the Project Manager.



Executive Summary

Overview

The purpose of this report is to provide an acid sulfate soils assessment, Stage 2 contamination assessment and a salinity assessment in accordance with NSW Department of Planning (DoP) Director-General's Requirements (Reference Number MP 05_0134).

Salinity Assessment

During field investigations soil samples were collected for salinity testing purposes to determine the salinity of the site's soil and establish the concentration of chlorides present in the soil. This information was used to determine the aggressiveness of site soils, which may have implications for the final material selection for site foundation solutions.

Examination and laboratory testing of site soils indicate that salinity is not a constraint that needs to be considered in concrete pile design for the proposal. However, given the site contains potential acid sulfate soils within deeper natural stratum (see next) we recommend the aggressiveness of sulfates be determined at CC stage, in accordance with AS 2159 (1995).

Acid Sulfate Soils Assessment

In accordance with recommendations made in the preliminary ASS assessment and requirements specified by the DoP in their DGEAR's, a full ASS assessment was carried out and sub-surface material onsite tested for the presence of potential and actual ASS.

Following site investigations and desktop review of borelogs, site soil stratigraphy was found to be consistent across the site. Sand fill was found to occur down to 2.0 – 2.5m, overlying clays and sandy clay (estuarine deposits) and, deeper down, natural sands. Samples evaluated by laboratory testing were then chosen to accurately assess each layer of observed soil stratigraphy and test material likely to be exposed should excavation for footings and foundations become necessary.

Results indicate:

- 1. No samples are classified as actual ASS.
- 2. Seven of the twenty five (25) samples collected from the site <u>are</u> <u>classified as potential ASS</u> (shown in bold in Table 3)

The samples with ASS potential came from depths below 3.0 m b.g.l. within the natural estuarine deposits. Fill material (generally 2.5m deep) is free of AASS and PASS.

The proposed development does not involve the excavation of the deeper PASS materials (below 3.0m b.g.l). Given this, there is no need for an ASS Management Plan.



Stage 2 Contamination Assessment

In accordance with DoP's requirements in the DGEAR's, a Stage 2 Assessment was undertaken to test subsurface material and confirm the site is not contaminated. The testing regime was configured to provide a broad understanding of the likely nature of contamination within the underlying site fill material.

Results indicate that there is no evidence of contamination (heavy metals, TRH, BTEX, PAH, PCB, OC & OP pesticides) within the development footprint. Therefore, a remedial action plan (RAP) and site remediation is not required. On the basis of completed analysis SCC testing the material tested on site is classified as 'General Solid Waste' in accordance with NSW DECC (2008).

The observed character of fill sands indicates the material may be able to be reclassified as Excavated Natural Material (ENM) subject to testing in accordance with the ENM exemption. Natural sands will not be able to be reclassified to ENM VENM due to their acid sulfate soil nature.



Contents

1.1Background101.2Project Scope101.2.1Acid Sulfate Soils Assessment101.2.2Contamination Assessment101.2.3Salinity Assessment112SITE DESCRIPTION122.1Field Investigations122.2Location & Existing Landuse122.3Topography, Vegetation and Drainage122.4Local Geology and Soil Profile133ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
1.2.1 Acid Sulfate Soils Assessment101.2.2 Contamination Assessment101.2.3 Salinity Assessment112 SITE DESCRIPTION122.1 Field Investigations122.2 Location & Existing Landuse122.3 Topography, Vegetation and Drainage122.4 Local Geology and Soil Profile133 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
1.2.2 Contamination Assessment101.2.3 Salinity Assessment112 SITE DESCRIPTION
1.2.3 Salinity Assessment112 SITE DESCRIPTION
2 SITE DESCRIPTION122.1 Field Investigations122.2 Location & Existing Landuse122.3 Topography, Vegetation and Drainage122.4 Local Geology and Soil Profile133 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
2.1Field Investigations122.2Location & Existing Landuse122.3Topography, Vegetation and Drainage122.4Local Geology and Soil Profile133ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
2.2 Location & Existing Landuse122.3 Topography, Vegetation and Drainage122.4 Local Geology and Soil Profile133 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
2.3 Topography, Vegetation and Drainage122.4 Local Geology and Soil Profile133 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
2.4 Local Geology and Soil Profile133 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT14
3 ENVIRONMENTAL GEOTECHNICAL ASSESSMENT
3.1 Overview 14
2.0 Desults of Laboratory Testing
3.2 Results of Laboratory Testing143.3 Conclusion and Recommendations18
3.3 Conclusion and Recommendations183.4 Limitations18
4 ACID SULFATE SOILS ASSESSMENT
4.1 Findings of Preliminary Acid Sulfate Soils (ASS) Assessment (Martens, 2009)19
4.2 Preliminary Sampling Strategy 19 4.3 DECC Consultation 20
4.3 DECC Consultation204.4 Results20
4.5 Management Recommendations224.6 Conclusion22
5 STAGE 2 ASSESSMENT: SITE SAMPLING
5.1 Summary of Stage 1 Assessment235.2 DECC Consultation23
5.3 Sampling Density235.4 Sampling Locations and Sampling Depths23
5.4 Sampling Locations and sampling Depins 23 5.5 Sample Analysis 24
5.6 Quality Assurance and Quality Control 25
5.6.1 Field QA/QC 25
5.6.2 Laboratory QA/QC 26
5.7 Contamination Guidelines 27
6 STAGE 2 ASSESSMENT RESULTS
6.1 Site Contamination Observations 29
6.2 Laboratory Analysis Results 29
6.2.1 Heavy Metals 29
6.2.2 Polycyclic Aromatic Hydrocarbons (PAH) 30
6.2.3 Total Recoverable Hydrocarbons (TRH)316.2.4 BTEX (Benzene, Toluene, Ethyl Benzene and Xylene)32



6.2.5 Polychlorinated Biphenyls (PCBs)6.2.6 OC/OP pesticides6.3 Summary & Conclusion	32 32 33
6.4 Waste Classification	33
7 STAGE 2 ASSESSMENT - CONCLUSIONS	34
8 STAGE 2 ASSESSMENT - LIMITATIONS STATEMENT	35
9 REFERENCES	36
10 ATTACHMENT A – SITE PLAN	37
11 ATTACHMENT B - FIGURES	39
12 ATTACHMENT C - SOIL BOREHOLE LOGS	41
13 ATTACHMENT D – LABORATORY RESULTS	43
14 ATTACHMENT E – CHAIN OF CUSTODY	45
15 ATTACHMENT F - DECC CORRESPONDENCE, ASS	47
16 ATTACHMENT G - NOTES ABOUT THIS REPORT	49



Figures

Figure 1	40)
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Tables

Table 1: Summary of soil salinity results	14
Table 2: Salinity Assessment: Exposure classification for concrete piles	16
Table 3: Results of SPOCUS testing.	21
Table 4: Soil samples submitted for laboratory analysis.	24
Table 5: QA/QC duplicate testing results	26
Table 6: Contamination guideline limits adopted for assessment of Settle City Shopping Centre site	
Table 7: Results of heavy metal analysis of soil samples (mg/kg)	30
Table 8: Results of PAH analysis of soil samples	31
Table 9: Results of TRH analysis of soil samples	32



1 Overview

1.1 Background

The purpose of this report is to provide an acid sulfate soils assessment, Stage 2 contamination assessment and a salinity assessment to satisfy requirements of the NSW Department of Planning Director-General's Requirements (Reference Number MP 05_0134).

A Stage 1 contamination assessment (P0902316JR02_V2) and preliminary acid sulfate soils assessment ((P0902316JR01_V2) were previously prepared by Martens and Associates.

1.2 Project Scope

1.2.1 Acid Sulfate Soils Assessment

The main objectives of the acid sulfate soil assessment are as follows:

- Provide an assessment of the presence and extent of acid sulfate soils (ASS) at the site in accordance with the ASSMAC guidelines, and
- Determine whether an ASS Management Plan is required.

In addition to this and in accordance with DoP requirements, the Department of Environment and Climate Change (DECC) have been consulted regarding level and distribution of sampling, laboratory results and conclusions drawn from these results.

1.2.2 Contamination Assessment

The main objectives of the Stage 2 contamination assessment are as follows:

- Provide an assessment of site soil contamination in accordance with NSW EPA guidelines, SEPP 55 and the findings of the Stage 1 Contamination assessment (P0902316JR02_v2, dated February 2009).
- Assess the suitability of the site for the continued commercial land use.
- Provide a waste classification (in accordance with DECC, 2008) for the underlying soil should threshold levels of potential



contaminants exceed those provided by relevant NSW EPA guidelines in any areas identified as likely to require remediation.

1.2.3 Salinity Assessment

The main objectives of the salinity assessment are as follows:

- Assess the salinity of soils beneath the site.
- Provide an assessment of salinity levels in terms of the aggressiveness, in accordance with AS 2159 (1995).
- To determine if the above is a constraint to be considered during concrete pile design at Construction Certificate stage.



2 Site Description

2.1 Field Investigations

Site inspections were undertaken on May 3, 4 and 5, 2009. Works conducted during the field investigations included:

- A walk over inspection of the site and surrounding property to review drainage and topography.
- Location of underground services via an accredited underground services locator.
- Excavation of thirty geotechnical bore holes to depths ranging between 1.4 and 9.0 m below ground level (b.g.l.) using a 4WD mounted auger.
- Collection of 73 soil samples for contamination, acid sulfate soil and salinity testing purposes.

Bore hole locations can be found on the site plan in Attachment A. Borehole logs are provided in Attachment C.

2.2 Location & Existing Landuse

The site is located on the corner of Bay and Park Street, Port Macquarie (on Lots 4 and 5 DP 1018087 and Lot 2 DP 702484) and is within the Port Macquarie Hastings Council (PMHC) LGA. The allotment covers an area of approximately 7.4 ha. An existing shopping centre complex is located on the site, with associated on-grade paved carparking in the south east of the site and multi storey carparking in the south western corner of the site.

The site is bounded by Park St and the Hastings River to the east, Bay St to the south and a constructed canal system to the west and north. Attachment A provides the site plan with pertinent site features and Figure 1 (Attachment B) shows the site in its regional context.

2.3 Topography, Vegetation and Drainage

Historic aerial photography interpretation suggests that the site is located on 'reclaimed land', with site topography formerly consisting of flat low lying estuary deposits (and possibly wetland/mangrove) of the Hastings River. It is likely that the dredged material from the adjacent river and/or canal system was used for site filling.



The majority of the site is flat, with grades generally 0-1°. The western and northern boundaries of the site have batter grades of approximately 10-15° down to the canal system.

The majority of the site and surrounding area is covered by buildings or hardstand features. The site is drained by roof drainage and a pit and pipe network, with drainage directed to the Hastings River or the canal system.

There are no significant vegetation communities on the site, however some remnant wetland (mangrove) is located adjacent and east of the site.

2.4 Local Geology and Soil Profile

A review of the 1:250 000 Hastings geology series sheet 56-14 (1970) indicates that the site is underlain by Quaternary Alluvium. Field investigations confirm the site is underlain by sand fill overlying natural estuarine (Quaternary) deposits consisting of clay, sandy clay and sand.



3 Environmental Geotechnical Assessment

3.1 Overview

During field investigations 33 samples were collected for salinity testing purposes. These shall determine the salinity of the site's soil and be used to establish the concentration of chlorides present in the soil and thus the aggressiveness of the site's sub-surface material. This information may have implications for the final material selection for site foundation solutions (to be finalised at CC stage).

3.2 Results of Laboratory Testing

Soil samples were taken from the different soil horizons down to a maximum depth of 9.0m below ground. Soil samples were sent to Envirolab (NATA accredited) for laboratory testing to determine the salinity of the site soils. Salinity results are summarised in Table 1 with the full laboratory report in Attachment D.

Bore Hole & Sample ID	Depth (m)	EC1 (dS/m)	Multiplyer	ECe (dS/m)	Salinity Rating ²
2316/14/0.5	0.5	0.33	23.0	7.6	Moderately Saline
2316/16/0.5	0.5	0.11	23.0	2.5	Slightly saline
2316/25/1.0	1.0	0.05	23.0	1.2	Non-Saline
2316/27/1.0	1.0	0.07	23.0	1.6	Non-Saline
2316/28/1.0	1.0	0.08	23.0	1.8	Non-Saline
2316/24/1.4	1.4	0.06	23.0	1.3	Non-Saline
2316/14/1.5	1.5	0.09	23.0	2.1	Slightly Saline
2316/5/2.0	2.0	0.19	8.6	1.6	Non-Saline
2316/8/2.0	2.0	0.06	8.6	0.5	Non-Saline
2316/18/2.0	2.0	0.10	8.6	0.9	Non-Saline
2316/5/2.5	2.5	0.13	8.6	1.1	Non-Saline
2316/13/2.8	2.8	0.23	8.6	2.0	Slightly Saline
2316/13/2.8	2.8	0.23	8.6	2.0	Slightly Saline
2316/1/3.3	3.3	0.16	8.6	1.4	Non-Saline
2316/8/4.0	4.0	0.11	8.6	0.9	Non-Saline
2316/27/4.0	4.0	0.06	8.6	0.5	Non-Saline
2316/13/4.2	4.2	0.12	8.6	1.0	Non-Saline
2316/13/4.2	4.2	0.12	8.6	1.0	Non-Saline

Table 1: Summary of soil salinity results.



Acid Sulfate Soil, Stage 2 Contamination and Salinity Assessment: Settlement City, Port Macquarie, NSW P0902316JR03_v3 ASS & Stage 2 – June 2009 Page 14

Bore Hole & Sample ID	Depth (m)	EC1 (dS/m)	Multiplyer	ECe (dS/m)	Salinity Rating ²
2316/1/4.5	4.5	0.14	8.6	1.2	Non-Saline
2316/5/4.5	4.5	0.29	8.6	2.5	Slightly Saline
2316/24/4.5	4.5	0.17	8.6	1.5	Non-Saline
2316/16/5.0	5.0	0.19	8.6	1.6	Non-Saline
2316/16/5.0	5.0	0.20	8.6	1.7	Non-Saline
2316/5/5.5	5.5	0.23	8.6	2.0	Slightly Saline
2316/5/6.0	6.0	0.30	8.6	2.6	Slightly Saline
2316/8/6.0	6.0	0.90	8.6	7.7	Moderately Saline
2316/28/6.0	6.0	0.12	8.6	1.0	Non-Saline
2316/5/6.0	6.0	0.33	8.6	2.8	Slightly Saline
2316/1/7.5	7.5	0.11	23.0	2.5	Slightly Saline
2316/8/7.5 ³	7.5	1.10	23.0	25.3	Extremely Saline
2316/28/7.5	7.5	0.11	23.0	2.5	Slightly Saline
2316/1/9.0	9.0	0.10	23.0	2.3	Slightly Saline
2316/14/9.0 ³	9.0	0.45	23.0	10.4	Highly Saline

<u>Notes:</u> ¹ Electrical Conductivity ² Salinity Rating based on the Department of Conservation and Land Management (1992), What Do All The Numbers Mean and Table 6.2 of Department of Land and Water Conservation (2002), Site Investigations for Urban Salinity. ³ Bold samples indicate those likely to be outliers and not a true reflection of site salinity at that depth

The majority of ECe results indicate non-saline to slightly saline soils. According to the Department of Conservation and Land Management (CALM, 1992) and Department of Land and Water Conservation (DLWC,2002) these results indicate that salinity effects are mostly negligible for the site.

Two (2) samples, 2316/8/7.5 and 2316/14/9.0, are classed as extremely saline and highly saline, respectively. Given the differences between salinity results of these samples and those from adjacent boreholes at similar depths, it is likely these are outliers and not a true reflection of the material at that depth.

Table 2 established the concentration of chlorides present in the soil and determines the aggressiveness of the site's sub-surface material in accordance with AS 2159 (1995).



Sample	Depth (m)	EC (µ\$/cm)	NaCl (ppm) 1	Chloride in soil (%) ³	Exposure Classification: from Table 6.3 o AS 2159 (1995) ²
2316/14/0.5	0.5	330	211.2	1.29	Mild
2316/16/0.5	0.5	110	70.4	0.43	Non-aggressive
2316/25/1.0	1.0	54	34.6	0.21	Non-aggressive
2316/27/1.0	1.0	70	44.8	0.27	Non-aggressive
2316/28/1.0	1.0	80	51.2	0.31	Non-aggressive
2316/24/1.4	1.4	56	35.8	0.22	Non-aggressive
2316/14/1.5	1.5	92	58.9	0.36	Non-aggressive
2316/5/2.0	2.0	190	121.6	0.74	Mild
2316/8/2.0	2.0	59	37.8	0.23	Non-aggressive
2316/18/2.0	2.0	99	63.4	0.39	Non-aggressive
2316/5/2.5	2.5	130	83.2	0.51	Mild
2316/13/2.8	2.8	230	147.2	0.90	Mild
2316/13/2.8	2.8	230	147.2	0.90	Mild
2316/1/3.3	3.3	160	102.4	0.62	Mild
2316/8/4.0	4.0	110	70.4	0.43	Non-aggressive
2316/27/4.0	4.0	58	37.1	0.23	Non-aggressive
2316/13/4.2	4.2	120	76.8	0.47	Non-aggressive
2316/13/4.2	4.2	120	76.8	0.47	Non-aggressive
2316/1/4.5	4.5	140	89.6	0.55	Mild
2316/5/4.5	4.5	290	185.6	1.13	Mild

Table 2: Salinity Assessment: Exposure classification for concrete piles.



Acid Sulfate Soil, Stage 2 Contamination and Salinity Assessment: Settlement City, Port Macquarie, NSW P0902316JR03_v3 ASS & Stage 2 - June 2009 Page 16

Sample	Depth (m)	EC (µ\$/cm)	NaCl (ppm) 1	Chloride in soil (%) ³	Exposure Classification: from Table 6.3 of AS 2159 (1995) ²
2316/24/4.5	4.5	170	108.8	0.66	Mild
2316/16/5.0	5.0	190	121.6	0.74	Mild
2316/16/5.0	5.0	200	128.0	0.78	Mild
2316/5/5.5	5.5	230	147.2	0.90	Mild
2316/5/6.0	6.0	300	192.0	1.17	Mild
2316/8/6.0	6.0	900	576.0	3.51	Moderate
2316/28/6.0	6.0	120	76.8	0.47	Non-aggressive
2316/5/6.0	6.0	330	211.2	1.29	Mild
2316/1/7.5	7.5	110	70.4	0.43	Non-aggressive
2316/8/7.5	7.5	1100	704.0	4.29	Moderate
2316/28/7.5	7.5	110	70.4	0.43	Non-aggressive
2316/1/9.0	9.0	100	64.0	0.39	Non-aggressive
2316/14/9.0	9.0	450	288.0	1.76	Mild

Note: ¹ EC (μ S/cm) converted to salt concentration (ppm) using estimates provided in DLWC (2002) 'Site Investigations for Urban Salinity: Appendix 1: Units used to Express Salinity' (pg 20) ²Soil conditions A (high permeability soils which are below groundwater) in accordance with Table 6.3 of AS 2159 (1995). ³ Table 1 assesses salinity in terms of aggressiveness of chloride present in each sample. Given the presence of potential acid sulphate soils (Section 4) within deeper stratum, we recommend the aggressiveness of sulfates (SO₃) be considered in accordance with AS 2159 (1995) at Construction Certificate stage.

All chloride results, excluding 2 samples, are below 2%. According to Table 6.3 of AS 2159 (1995) *Piling - Design and Installation* this classes the aggressiveness of the site's sub-surface material as 'non-aggressive' – 'mild' (in terms of chloride only). Two samples, sample 2316/8/6.0 and sample 2316/8/7.5, are classed as 'moderate', however considering both samples came from the one borehole (BH8), it is not considered to be a reflection of wider site soil conditions.



3.3 Conclusion and Recommendations

Examination and laboratory testing of site soils indicate that salinity is not a constraint that needs to be considered in concrete pile design for the proposal. However, given the site contains potential acid sulfate soils within deeper natural stratum (Section 4) we recommend the aggressiveness of Sulfates be determined at CC stage, in accordance with AS 2159 (1995).

3.4 Limitations

The salinity assessment was undertaken in accordance with current industry standards. However, no salinity assessment can be considered to be a complete and exhaustive characterisation of a site and it cannot be guaranteed that any assessment shall identify and characterise all areas of potential salinity. Should material be exposed during the site development process which appears, due to visual indications, to be high in saline, the material should be assessed by Martens & Associates Pty Ltd to determine salinity and land use implications.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of a residential re-development on the site. No reliance on this report should be made for any other investigation or proposal.



4 Acid Sulfate Soils Assessment

4.1 Findings of Preliminary Acid Sulfate Soils (ASS) Assessment (Martens, 2009)

The preliminary ASS Assessment (Martens Report P0902316JR01_v2, February 2009) provided a desktop assessment of the site and the likelihood of ASS being present at the site. The findings and recommendations of this assessment is summarised as follows:

- The Wauchope/Port Macquarie Acid Sulfate Soil Risk Map (1997) identifies the site as disturbed terrain at elevations of 2-4 m ('X2'). This classification reflects past site filling.
- A review of historical aerial photography of the site indicated that the site was most likely a coastal wetland prior to its development in the early 1980s. Development works most likely included the burial of the site's layers of actual and/or potential acid sulfate soils with material of marine / estuarine origin.
- The combination of the geomorphic setting and past management activities result in a significant risk of site acid sulfate soils issues.
- Any aspects of the proposed development which have the potential for lowering the local groundwater table may have significant local impacts through acid sulfate soil processes. It is recommended such works be avoided where possible.
- Further investigation of the characteristics of underlying soil materials and required management measures for any affected spoil is necessary.

In accordance with recommendations made in the preliminary ASS assessment and requirements specified by the Department of Planning (DoP) in their DGEAR's, a full ASS assessment was carried out and site sub-surface material tested for the presence of potential and actual ASS.

4.2 Preliminary Sampling Strategy

Analyses of the presence of ASS material on the site has been evaluated by laboratory testing of 25 soil samples. As material was found to be consistent across the testing area, soil samples were analysed from thirteen (13) of the thirty (30) boreholes.



Following site investigations and desktop review of borelogs, site soil stratigraphy was found to be consistent across the site. Sand fill was found to occur down to 2.0 – 2.5m, overlying clays and sandy clay (estuarine deposits) and natural sands at depth. Given the consistency across the site, sampling was conducted at a reduced rate to that recommended in the ASSMAC guidelines. Samples evaluated by laboratory testing were then chosen to accurately assess each layer of observed soil stratigraphy and test material likely to be exposed through excavation for footings and foundations. Soil samples were analysed with the sPOCUS method by a NATA accredited laboratory.

4.3 DECC Consultation

Glenn Atkinson (Senior Environmental Scientist, DECC) was contacted to provide comment on ASS sampling completed on May 3 - 6, 2009 and subsequent laboratory results.

Correspondence received on May 27, 2009 (Attachment F) recommended that further ASS testing of fill material be undertaken to confirm that there is no AASS or PASS within this layer and confirm, therefore, that an ASS Management Plan is not required.

Subsequently an additional 10 samples were sent to the laboratory for ASS testing.

All laboratory results (original and additional testing) are provided in Section 4.4 and laboratory reports are provided in Attachment D.

4.4 Results

Results for the 25 samples are summarised in Table 3 with the complete laboratory reports provided in Attachment D.



Sample ID	Bore Hole	Sample Depth (m)	рН _{КСL} 1	pH _{ox} ²	TPA (mol H+/t) ³	TSA (mol H+/t)⁴	S _{POS} (%S oxidisable)⁵
2316/24/0.5	24	0.5	9.6	6.1	<5.0	<5.0	0.005
2316/16/1.0	16	1.0	9.7	6.6	<5.0	<5.0	0.008
2316/2/1.0 6	2	1.0	9.3	7.0	<5.0	<5.0	0.014
2316/9/1.0 6	9	1.0	9.5	7.1	<5.0	<5.0	0.014
2316/18/1.0 6	18	1.0	9.6	7.2	<5.0	<5.0	0.012
2316/27/1.0 6	27	1.0	9.5	6.6	<5.0	<5.0	<0.005
2316/29/1.0 6	29	1.0	9.5	7.0	<5.0	<5.0	0.008
2316/24/1.4	24	1.4	9.7	6.3	<5.0	<5.0	<0.005
2316/6/1.4 6	6	1.4	9.6	7.0	<5.0	<5.0	<0.005
2316/29/1.4 6	29	1.4	9.6	7.0	<5.0	<5.0	<0.005
2316/14/1.5 6	14	1.5	9.7	7.0	<5.0	<5.0	<0.005
2316/16/1.5 6	16	1.5	9.6	7.0	<5.0	<5.0	0.008
2316/18/1.5 6	18	1.5	9.4	7.2	<5.0	<5.0	0.005
2316/1/2.5	1	2.5	9.3	5.4	<5.0	<5.0	0.044
2316/28/2.9	28	2.9	4.8	3.1	190	165	0.31
2316/14/3.0	14	3.0	8.6	2.4	130	130	0.43
2316/1/3.3	1	3.3	7.3	3.3	80	80	0.22
2316/5/4.0	5	4.0	6.7	2.0	685	685	1.4
2316/8/4.0	8	4.0	6.9	2.3	143	143	0.39
2316/18/4.5	18	4.5	8.6	2.6	155	155	0.58
2316/28/5.0	28	5.0	5.3	2.8	125	120	0.24
2316/27/5.5	27	5.5	6.2	2.8	<5.0	<5.0	0.23
2316/16/6.0	16	6.0	7.4	3.1	120	120	0.29
2316/8/7.5	8	7.5	6.7	3.6	17	17	0.075

Note: ¹ Actual pH; ² Post peroxide oxidation pH; ³ Total Potential Acidity; ⁴ Total Sulfidic Acidity; ⁵ Percentage peroxide oxidisable sulfur. Bold results indicate those exceeding limits in ASSMAC Table 4.4 ⁶ Further testing of fill material based on DECC recommendations

Using pH_{KCL} and post peroxide oxidation pH_{OX} criteria (ASSMAC, 1998, p12) all soils with a pH_{KCL} of < 4.0 are considered actual ASS. Soils with $pH_{KCL} > 4.0$ and $pH_{OX} < 3.0$ are classified as potential ASS. On the basis of this classification system we note the following:



- 1. No samples are classified as actual ASS.
- 2. Seven of the twenty five samples collected from the site <u>are</u> <u>classified as potential ASS</u> (in bold in Table 3).

The samples with ASS potential came from depths below 3.0 m b.g.l. within the natural estuarine deposits.

4.5 Management Recommendations

In accordance with ASSMAC Action Criteria (p27), a detailed management plan is required for disturbance of potential or actual ASS. Results indicate fill material (generally 2.5m deep) is free of AASS and PASS. The proposed development does not involve the excavation of the deeper PASS materials (below 3.0m b.g.l). Current planning for the development assumes a foundation solution of driven piers into subsurface material; as such no AASS or PASS material will be retrieved. Given this, there is no need for an ASS Management Plan.

Should construction methods be revised, such that material below the surface fill (approximately 2.5m) will be disturbed or retrieved or the groundwater table is lowered beyond this depth, an ASS Management Plan will be required.

4.6 Conclusion

On the basis of site sub-surface investigations and results of the pH_{KCL} and pH_{OX} , materials at the site below a depth of approximately 4.0m has been found to be PASS or AASS. As all excavation works are presently proposed in the non-ASS material and no works likely to lower the groundwater table are proposed further site ASS testing is not required.

A site management plan is not required at this stage as no excavation of subsurface material is proposed. However, should this change a detailed Management Plan will be required prior to the start of site works. Such a plan should provide management recommendations for the underlying potential ASS material and outline required treatment measures prior to removal off-site or on-site re-use.



5 Stage 2 Assessment: Site Sampling

5.1 Summary of Stage 1 Assessment

The Stage 1 assessment completed for the site (Martens report P00902316JR02_v2, February 2009) indicates that there is low potential for past contamination of the site from previous uses which included minor agricultural activity; filling of the site (more than likely with locally sourced sandy soils, possibly from dredging of the Hastings River); and the current commercial land use including petrol retail outlet.

In accordance with DoP's requirements in the DGEAR's, a Stage 2 Assessment was undertaken to test subsurface material and confirm the site is not contaminated.

5.2 DECC Consultation

Consultation with DECC regarding the contamination assessment of the site is ongoing. Preliminary discussions with Mark Bourne (DECC) on May 22, 2009 suggested the site is not mapped as a contamination risk and thus contamination should not be a constraint to the proposal.

5.3 Sampling Density

NSW EPA (1995) sampling guidelines do not provide guidance for testing site's with an area greater than 5 ha. Such site's are usually subdivided into smaller areas depending on the Stage 1 assessment and sampled based on site specific consideration. Accordingly, sampling was undertaken in accessible areas within the development footprint (approximately 1.5 ha). In accordance with Table A of the sampling guidelines, sampling was undertaken from a total of 30 locations within development footprint which included: 27 within the proposed carpark area, 2 within the proposed access road area and 1 where minor landscape works will be undertaken.

5.4 Sampling Locations and Sampling Depths

Due to portions of the site being inaccessible for drilling, soil sampling locations were distributed in as regular and evenly-spaced grid pattern as possible. Sample depths were specified to achieve sampling of both fill and underlying natural soil profiles.

Approximate sample depths are shown on the bore logs (Attachment C) with sampling locations approximately on the site plan (Attachment



A). All collected samples were stored in glass jars with Teflon lined lids, kept on ice in an esky and delivered to the nominated laboratory by courier within 48 hours of sampling.

5.5 Sample Analysis

Soil samples submitted for laboratory analysis are shown in Table 4. The testing regime was configured to provide a broad understanding of the likely nature of contamination within the underlying site fill material.

The soil samples selected included:

- 20 soil samples (not including 4 duplicate samples) were tested for OCP/OPP and heavy metals, and
- 10 samples were tested for OCP/OPP; heavy metals; PCB's; total recoverable hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX).

Laboratory analysis was conducted by the NATA accredited laboratory, 'EnviroLab'.

Sample ID	Composite	Heavy Metals ¹	OCP/OPP	Combination 6 ³
2316/11/0.4				Х
2316/9/0.25				Х
2316/19/0.2				Х
2316/23/0.2				Х
2316/29/0.3				Х
2316/22/3.0				Х
2316/13/2.8				Х
2316/13/4.2				Х
2316/16/3.0				х
2316/24/2.8				Х
2316/4/0.5		Y	Y	
2316/12/0.4	C1	Y	Y	
2316/13/0.5		Y	Y	
2316/9/2.7	<u></u>	Y	Y	
2316/18/3.0	C2	Y	Y	
2316/16/02	<u> </u>	Y	Y	
2316/21/0.2	C3	Y	Y	

Table 4: Soil samples submitted for laboratory analysis.



Acid Sulfate Soil, Stage 2 Contamination and Salinity Assessment: Settlement City, Port Macquarie, NSW P0902316JR03_v3 ASS & Stage 2 – June 2009 Page 24

Sample ID	Composite	Heavy Metals ¹	OCP/OPP	Combination 6 ³
2316/25/0.2		Y	Y	
2316/17/0.2		Y	Y	
2316/18/0.2	C4	Y	Y	
2316/10/0.2		Y	Y	
2316/19/0.5		Y	Y	
2316/20/0.5	C5	Y	Y	
2316/26/0.5		Y	Y	
2316/15/0.5		Y	Y	
2316/22/0.5	C6	Y	Y	
2316/23/0.5		Y	Y	
2316/11/0.2		Y	Y	
2316/12/0.2	C7	Y	Y	
2316/15/0.25		Y	Y	
2316/z3 ²		Y		
2316/z10 ²		Y		
2316/z11 ²		Y		
2316/z12 ²		Y		

<u>Note:</u> ¹ Eight heavy metals suite: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn. ² Field duplicate samples. ³ Combination 6: TPH, BTEX, PAH, OCP, OPP, PCB and 8 Heavy Metals.

5.6 Quality Assurance and Quality Control

5.6.1 Field QA/QC

All sampling was undertaken by an experienced environmental engineer. Soil samples were collected directly from the pushtube core or end of the soil auger and placed in Teflon lined glass sample jars. Sample jars were uniquely labelled and an appropriate chain of custody form used (Attachment E). Twelve (12) duplicate samples were taken during fieldwork, four (4) of these samples were tested for heavy metals and results compared to the corresponding sample. Results showed, in most cases, comparable levels of contaminants (Table 5).



Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
2316/z3	6	<0.5	11	7	4	<0.1	4	17
2316/11/0.4	6	<0.5	8	6	4	<0.1	4	17
Difference (%)	0	0	27	14	0	0	0	0
2316/z10	8	<0.5	24	10	6	<0.1	14	21
2316/13/2.8	15	<0.5	39	15	12	<0.1	28	45
Difference (%)	87	0	62	50	100	0	100	114
2316/z11	7	<0.5	11	4	3	<0.1	15	13
2316/16/3.0	6	<0.5	11	4	3	<0.1	13	11
Difference (%)	14	0	0	0	0	0	13	15
2316/z12	4	<0.5	28	6	5	<0.1	17	21
2316/24/2.8	8	<0.5	34	10	7	<0.1	25	26
Difference (%)	100	0	21	66	40	0	47	24

Table 5: QA/QC duplicate testing results.

5.6.2 Laboratory QA/QC

As indicated by the Envirolab laboratory report (Attachment D), the laboratory QA/QC included the analysis of reagent blanks, sample portion duplicates, matrix spike duplicates and surrogate spikes. Results indicate that acceptable recovery rates were achieved by the laboratory.



5.7 Contamination Guidelines

Soil sample laboratory analysis results were assessed with reference to the following guidelines (Table 6):

- NSW EPA (2006) Guidelines for the NSW Site Auditor Scheme: Soil Investigation Levels (Column 4 – commercial and industrial) – for assessment of heavy metals, PAH, OCP/OPP and PCB concentrations.
- NSW EPA (1994) Contaminated Sites: Guidelines for Assessing Service Station Sites - for assessment of TRH and BTEX concentrations in the absence of other suitable guidelines for C6 – C40 hydrocarbon chains.



	Guideline Limit (mg/kg)			
Contaminant	NSW EPA (2006) ¹	NSW EPA (1994) ²		
Arsenic	500	-		
Cadmium	100	-		
Chromium	500	-		
Copper	5,000	-		
Lead	1,500	-		
Mercury	75	-		
Nickel	3,000	-		
Zinc	35,000	-		
PAHs (total)	100	-		
Benzo(a)pyrene	5	-		
PCBs (total)	50	-		
Aldrin and Dieldrin	50	-		
DDT + DDD + DDE	1,000	-		
Heptachlor	50	-		
TRH C6 – C9	-	65		
TRH C10 – C40	-	1,000		
Benzene	-	1.0		
Toluene	-	1.4		
Ethyl benzene	-	3.1		
Total Xylenes	-	14.0		

Table 6: Contamination guideline limits adopted for assessment of Settlement City Shopping Centre site.

Notes: ¹ Guidelines for the NSW Site Auditor Scheme: Soil Investigation Levels (Column 4 – Commercial / Industrial). ² Contaminated Sites: Guidelines for Assessing Service Station Sites.



6 Stage 2 Assessment Results

6.1 Site Contamination Observations

Site contamination investigations indicate that the site is free of land contamination.

6.2 Laboratory Analysis Results

Laboratory test results are summarised for heavy metals (Table 7), PAHs (Table 8) and TRH (Table 9) with complete laboratory reports provided as Attachment D.

6.2.1 Heavy Metals

No heavy metal contaminants are above the guideline limits for commercial / industrial land (Table 7).

All of the samples SCC1 tested had heavy metal values less than the 'General Solid Waste' threshold levels.



Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
2316/11/0.4	6	<0.5	8	6	4	<0.1	4	17
2316/9/0.25	5	<0.5	13	8	6	<0.1	6	20
2316/19/0.2	7	<0.5	11	7	8	<0.1	8	32
2316/23/0.2	6	<0.5	24	9	6	<0.1	15	18
2316/29/0.3	4	<0.5	5	3	4	<0.1	3	20
2316/22/3.0	7	<0.5	5	10	1	<0.1	10	8
2316/13/2.8	15	<0.5	39	15	12	<0.1	28	45
2316/13/4.2	<4	<0.5	6	1	1	<0.1	6	6
2316/16/3.0	6	<0.5	11	4	3	<0.1	13	11
2316/24/2.8	8	<0.5	34	10	7	<0.1	25	26
2316/Z3	6	<0.5	11	7	4	<0.1	4	17
2316/Z10	8	<0.5	24	10	6	<0.1	14	21
2316/Z11	7	<0.5	11	4	3	<0.1	15	13
2316/Z12	4	<0.5	28	6	5	<0.1	17	21
C1	7	<0.5	13	14	4	<0.1	3	14
C2	12	<0.5	20	5	4	<0.1	12	24
C3	7	<0.5	15	8	5	<0.1	5	14
C4	7	<0.5	10	9	11	<0.1	7	42
C5	<4	<0.5	12	1	1	<0.1	10	5
C6	5	<0.5	16	7	5	<0.1	11	10
C7	5	<0.5	13	10	4	<0.1	2	11
2316/11/0.4	6	<0.5	14	8	5	<0.1	5	16
Guideline Limit ¹	500	100	500	5000	1500	75	3000	35000
Guideline Limit ²	250	50	250	2500	750	37.5	1500	17500
Guideline Limit ³	167	34	167	1667	500	25	1000	11667
General Solid Waste ⁴	100	20	100	Na⁵	100	4	40	Na⁵
Restricted Solid Waste ⁴	400	80	400	Na⁵	400	16	160	Na⁵
Hazardous Waste⁴	>400	>80	>400	Na⁵	>400	>16	>160	Na⁵

Table 7: Results of heavy metal analysis of soil samples (mg/kg).

Note: ¹ SIL guideline limit for commercial or industrial landuse (NSW EPA, (2006). ² SIL for double composite. ³ SIL for triple composite. ⁴ NSW DECC (2008) Waste Classification Guidelines: Table 1 Contaminant threshold values for classifying waste by chemical assessment without the leaching test. ⁵ No criteria listed.

6.2.2 Polycyclic Aromatic Hydrocarbons (PAH)

Results (Table 8) show that PAH levels in tested samples were all below the laboratory testing detection limits. Level for benzo(a)pyrene and total PAH's were all below the guideline limits.



Sample ID	Benzo(a) pyrene	Fluorene	Napthalene	Phen- anthrene	Total PAHs
2316/11/0.4	<0.05	<0.1	<0.1	<0.1	<0.35
2316/9/0.25	<0.05	<0.1	<0.1	<0.1	<0.35
2316/19/0.2	<0.05	<0.1	<0.1	<0.1	<0.35
2316/23/0.2	<0.05	<0.1	<0.1	<0.1	<0.35
2316/29/0.3	<0.05	<0.1	<0.1	<0.1	<0.35
2316/22/3.0	<0.05	<0.1	<0.1	<0.1	<0.35
2316/13/2.8	<0.05	<0.1	<0.1	<0.1	<0.35
2316/13/4.2	<0.05	<0.1	<0.1	<0.1	<0.35
2316/16/3.0	<0.05	<0.1	<0.1	<0.1	<0.35
2316/24/2.8	<0.05	<0.1	<0.1	<0.1	<0.35
Guideline Limit 1	5.0	Na ³	Na ³	Na ³	100
General Solid Waste ²	0.8	Na³	Na³	Na³	200 ⁴
Restricted Solid Waste ²	3.2	Na³	Na ³	Na³	800 ⁴
Hazardous Waste ²	<3.2	Na³	Na ³	Na ³	<800 ⁴

Table 8: Results of PAH analysis of soil samples.

Note: ¹ NSW EPA (2006) Guidelines for the NSW Site Auditor Scheme, guideline limits for commercial /industrial use (Column 4). ² NSW DECC (2008) Waste Classification Guidelines: Table 1 Contaminant threshold values for classifying waste by chemical assessment without the leaching test. ³ No criteria listed. ⁴ NSW DECC (2008) Waste Classification Guidelines: Table 2 Leachable concentration (TCLP) and specific contaminant concentration (SCC) values for classifying waste by chemical assessment.

6.2.3 Total Recoverable Hydrocarbons (TRH)

Result in Table 9 show that out of the ten (10) samples tested, none recorded that hydrocarbons were present in a detectible concentration.



Sample ID	C6 –C9	C10-C14	C15 – C28	C29 – C36	C10 – C36 TOTAL
2316/11/0.4	<25	<50	<100	<100	<250
2316/9/0.25	<25	<50	<100	<100	<250
2316/19/0.2	<25	<50	<100	<100	<250
2316/23/0.2	<25	<50	<100	<100	<250
2316/29/0.3	<25	<50	<100	<100	<250
2316/22/3.0	<25	<50	<100	<100	<250
2316/13/2.8	<25	<50	<100	<100	<250
2316/13/4.2	<25	<50	<100	<100	<250
2316/16/3.0	<25	<50	<100	<100	<250
2316/24/2.8	<25	<50	<100	<100	<250
Guideline Limit 1	65	n/a³	n/a³	n/a³	1000
General Solid Waste ²	650	n/a³	n/a³	n/a³	10 000 ⁴
Restricted Solid Waste ²	2600	n/a³	n/a³	n/a³	40 000 ⁴
Hazardous Waste ²	>2600	n/a³	n/a³	n/a³	>40 000 ⁴

Table 9: Results of TRH analysis of soil samples.

Note: ¹ NSW EPA (2006) Guidelines for the NSW Site Auditor Scheme, guideline limits for commercial /industrial use (Column 4). ² NSW DECC (2008) Waste Classification Guidelines: Table 1 Contaminant threshold values for classifying waste by chemical assessment without the leaching test. ³ No criteria listed. ⁴ NSW DECC (2008) Waste Classification Guidelines: Table 2 Leachable concentration (TCLP) and specific contaminant concentration (SCC) values for classifying waste by chemical assessment.

6.2.4 BTEX (Benzene, Toluene, Ethyl Benzene and Xylene)

All BTEX results are below guideline limits and less than laboratory detection limits.

6.2.5 Polychlorinated Biphenyls (PCBs)

All PCB results are below guideline limits and less than laboratory detection limits.

6.2.6 OC/OP pesticides

All OC/OP results are below guideline limits and less than laboratory detection limits.



6.3 Summary & Conclusion

Results indicate that there is no evidence of contamination within the development footprint. As a result, a remedial action plan (RAP) and site remediation will not be required.

6.4 Waste Classification

On the basis of completed analysis SCC testing the material tested on site is classified as 'General Solid Waste' (figures in bold) in accordance with NSW DECC (2008).

The observed character of fill sands indicates the material may be able to be reclassified as Excavated Natural Material (ENM) subject to testing in accordance with the ENM exemption. Natural sands will not be able to be reclassified to ENM or VENM due to their acid sulfate soil nature.



7 Stage 2 Assessment - Conclusions

Site investigations (Stage 2 assessment) completed included the collection and analysis of soil samples for a range of parameters determined to assess potential contamination from various past uses.

The field and laboratory investigations revealed that the site is free of contamination with levels below those specified for commercial / industrial land uses, and below laboratory testing detection limits, with the exception of heavy metals (which were at background levels).

In accordance with DECC's Waste Classification Guidelines, all the material tested is classified as ''General solid waste'.



8 Stage 2 Assessment - Limitations Statement

The site contamination assessment undertaken and documented in this report has been undertaken in accordance with the current industry standard for 2 contamination assessments (NSW EPA, 2006). Sampling design has been undertaken in accordance with NSW EPA (1995) sampling design guidelines.

However, it is noted that no site sampling strategy can be considered to be a complete and exhaustive characterisation of a site, nor can it be guaranteed that any assessment shall identify and characterise all areas of contamination. This is particularly the case where filling has occurred on the site. Therefore, this report should not be read as a guarantee that no additional contamination shall be found on the site. Should material be exposed during any future site works which was not encountered during the investigations undertaken, the newly discovered material should be specifically assessed by Martens & Associates to determine contamination implications.

Martens & Associates Pty Ltd has undertaken this assessment for the purpose of evaluating existing site contamination. No reliance on this report should be made for any other investigation or proposal. Martens & Associates accepts no responsibility, and provides no guarantee regarding the characteristics of areas of the site not specifically sampled in this investigation.


9 References

Australian Standard 2159 (1995) Piling – Design and Installation.

Department of Conservation and Land Management (CALM, 1992), What Do All The numbers Mean?

- Department of Land and Water Conservation (2002), Site Investigations for Urban Salinity
- Geological Survey of NSW (1983), Geological Series Sydney Sheet 9130.

NSW EPA (1994) Contaminated Sites: Guidelines for Assessing Service Station Sites.

NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines.

NSW EPA (1998) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.

NSW EPA (2006) 2nd Ed. Contaminated Sites: Guidelines for the NSW Site Auditor Scheme.

NSW DECC (2008) Waste Classification Guidelines; Part 1: Classifying Waste.



10 Attachment A – Site Plan





SCALE - 1:500 @ A1 1:1000 @ A3									
MARTENS & CLIENT/ PROJECT	TITLE	E		DESIGNED:	DATUM:	SHEET	REV. DESCRIPTION	DATE	ISSUED
		SITE PLAN AND BO	DREHOLE LOCATIONS;	MLB	mAHD	1	1 DRAFT	26.05.2009	AN
	IS ROBERTS			DRAWN:	HORIZONTAL RATIO:		2 FINAL	17.06.2009	AN
6/37 Leighton Piace Hornsby, NSW 2017 Australia Phone: (02) 9476 8999 Fax: (02) 9476 8787 Email: mai@mailens.com.au Hydraulic -, Wastawater Engineers		SETTLEMENT CITY SHOPPIN	IG CENTRE; PORT MACQUARIE	MLB	1:500 @ A1 1:1000 @ A3	OF I SHEETS			
Phone: (02) 9476 9999 Fax: (02) 9476 8767 Environmental - Geotechnical - Civil				REVIEWED:		PAPER SIZE:			
Email: mai@martens.com.au Internet: http://www.martens.com.au Internet: http://www.martens.com.au	NOT BE USED FOR CONSTRUCTION UNLESS		DRAWING NUMBER:	ANI ANI	1:500 @ A1				
	ments in mm unless otherwise specified.	DREW NORRIS	P0902316JD03_v1	AN	1:1000 @ A3	A1 / A3			

11 Attachment B – Figures





12 Attachment C – Soil Borehole logs



CLIENT	Manidis	Roberts		COMMENCED	5/5/09	COMPLETE	D 5/5/09		REF BH1
PROJECT		ring services		LOGGED	GT/JF Quaternary	CHECKED	JF/AN		Sheet 1 of 2
	Settleme	Hydraulic Auger	g Centre, Port Macquarie	GEOLOGY	Alluvium	VEGETATIO RL SURFAC			PROJECT NO. P0902316
EQUIPMENT EXCAVATION DI		Ø 0.1m X 9.0m depth		NORTHING	NA	ASPECT	North E	ast	SLOPE 0-1%
	ATION DA			TERIAL D		-			SAMPLING & TESTING
	MOISTURE DEPTH (M)	M PENETRATION H RESISTANCE GRAPHIC LOG	DESCRIP Soil type, texture, structure, m particle characteristics, orga	TION OF STR	ATA lasticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	RESULTS AND H ADDITIONAL OBSERVATIONS
A Nil N	M 0.15		GM	EN, ROAD E	ASE		D		-
A Nil N	M 0.3		SILTY SAND FILL -	 Dark brow 	n, gravels, loose.		L		-
A №1 № 2.1	M		xx SP SAND FILL – Light brow fragments, mediu				L		1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
A Nil -	W		SP SAND - Dark grey, shells, mediur				L MD	A	2.5 2316/1/2.5 SPOS = 0.044
A Nil -	- - - - - - - - - - - - -		CL SANDY CLAY - Dark gr strong sulfur od			S		A	3.3 2316/1/3.3 SPOS = 0.22
	W		strong suirur oc	dour, minor	clay content.		MD	A	4.5 2316/1/4.5 4.5
EQUIPMENT / N Natural e: X Existing (BH Backhoe the E Excavato HA Hand aug S Hand apa PT Push tube A Auger CC Concrete (exposure S excavation S bucket R or N ger ade	C Shotcrète X Not RB Rock Bolts	te observed D Dry L Low measured M Moist M Moi ter level W Wet H Hig Wp Plastic limit R Ref ter outflow WI Liquid limit ter inflow	v VS derate S h F St vusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loos Soft L Loose Firm MD Medium D Stiff D Dense Very Stiff VD Very Dens Hard Friable	se A Au B Bul Dense U Un D Dis ie M Mo Ux Tul	LING & TES ger sample lk sample disturbed sa sturbed san isture conte be sample	e nple ent (x mm)	pp Pocket penetrometer SYMBOLS AND S Standard penetration test VS Vane shear DCP Dynamic cone penetrometer N FD Field density WS Water sample
	arte		Pho	MARTENS & 6/37 Hornsby, one: (02) 9476	H ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 5 9999 Fax: (02) 9476 87 WEB: http://www.martens	67			ingineering Log - Borehole

CLIENT	Manidi	s Roberts				COMMENCED	5/5/09	COMPLETER	5/5/0	9		REF	BH1
PROJECT		ering serv				LOGGED	GT/JF	CHECKED	JF/AI	N		Sheet 2 of 2	
SITE	Settlem	ent City S Hydraulic A		g Centr	e, Port Macquarie	GEOLOGY	Quaternary Alluvium NA	VEGETATIO				PROJECT NO.	20902316
EXCAVATION	DIMENSIONS	Ø 0.1m X 9				NORTHING	NA	ASPECT	-	East		SLOPE 0-1	%
EXCA					МА	TERIAL DA	TA	-			SAMPLI	NG & TESTING	6
METHOD SUPPORT WATER	MOISTURE DEPTH (M)	L PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR. nottling, colour, pla anics, secondary a ntamination, odou	asticity, rocks, oxidation, nd minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	RESULTS ADDITIONAL OBSI	ERVATIONS
A Nii -	4.5 - - - 5.0 - W - - - - - - - - - - - - -			SM	SILTY SAND - Dar strong sulfur oc mec				MD				4.5
A Nil -	- - - - - - - - - - - - - - - - - - -			SP	SAND - Brown, w	<i>v</i> et, dense, m	edium grained.		D	Α	7.5 2316/1/	7.5	7 <u>.</u> 8 <u>.</u>
	exposure g excavation e bucket tor uger pade be	SUPPORT SH Shoring SC Shotcrete RB Rock Boll Nil No suppo	e X Notr ts ⊈ Wat ort ◀ Wat ► Wat		I D Dry L Lo M Moist M Mo W Wet H Hig Wp Plastic limit R Re	TRATION CONS w VS oderate S jh F fusal St St VSt H F I	SISTENCY DENSITY Very Soft VL Very Lo Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Der Hard -riable	ose A Aug B Bul Dense U Un D Dis Ise M Moi Ux Tut	ING & Ti jer sample disturbed st sturbed s sture cor e sample S AND /	le sample ample ntent e (x mm	pp Pocket S Standa VS Vane s DCP Dyna penet) FD Field d WS Water	penetrometer S rd penetration test S hear mic cone rometer ensity	9.0 CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural
No.4)						ASSOCIATES PTY LTD			F	naina	orina I	00
m	arte	ens				Hornsby, I	Leighton Place NSW 2077 Australia	767				ering L	
		Associates Pty. L	td . 2009				9999 Fax: (02) 9476 8 WEB: http://www.marter				B	orehole	ļ

_	IEN		-	anidis	Robe	rts				COMMENCED	5/5/09	COMPLET		5/5/09			REF	BH2	
_	ROJE	СТ	_	ngineer				_		LOGGED	GT/JF Quaternary	CHECKED		JF/AN			Sheet 1		
	TE UIPME	NT	Se	ttlemen	Hydra			Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT	-	None NA			PROJECT NO	D. P0902316	
-			DIMEN	SIONS			.4m depth			NORTHING	NA	ASPECT		North Eas	t		SLOPE	0-1%	
	EX	CA\	/AT	ION DA					MA	TERIAL D	ATA	1			S		IG & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	1 V	DEPTH (M)	A		LTS AND OBSERVATIONS	
A	Nil	N	м					XX GM	ASPHALT AND) ROAD BAS	E GRAVELS		D						
А	Nil	N	М	 0.6				XX SM	SILTY/CLAYE gravels, m	EY SAND FIL ledium dense	L – Brown, ., moist.		М	A C	0.5	2316/2/	0.5		
А	Nil	N	м	- - 1.0 - - 1.4				XX SP	SAND FILL – Light bro fragmer	own, medium ts, medium o			МС) A	. 1.0	2316/2/	1.0		1.0
				-					Borehole termin	ated at 1.4m	on sand fill.								
				 															2.0
				- 3.0 - -															3.0
				- - - - - - -															4.0
	K E BH Ba E Ex HA Ha S Ha PT Pu	atural xisting ickhoe cavat and au and sp sh tub iger	exposi e excar e bucki or iger oade ie	ure SI vation S(et RI Ni	UPPOR H Shor C Shot B Rock il No s	ing crete k Bolt uppo	rs ⊻ Wat rt ⊰ Wat → Wat	e obse measu er leve er out er infle	erved D Dry L Lo Ired M Moist M M el W Wet H Hil Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S gh F tfusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B E Dense U I D I se M M Ux T	Auger s Bulk sai Undistu Disturbe Moisture Fube sa	mple rbed sample ed sample e content ample (x m	ple V E E Im) F	S Standard /S Vane sh DCP Dynan penetro D Field dei VS Water sa	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTI Y USCS N Agricultural	
				rte Martens & As		5			Pt	MARTENS & 6/37 Hornsby, none: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 870 WEB: http://www.marten	67				gine	ering oreho	Log - le	

	LIEN			anidis I						COMMENCED	5/5/09		COMPLET		5/5/09			REF	BH3
_	ROJ ITE	ECT	_	ngineer ttlemen				Cei	ntre, Port Macquarie	LOGGED	GT/JF Quaternary				JF/AN			Sheet 1 O	
	UIPM	ENT	00		1	-	Auger			EASTING	Alluvium		RL SURFA	-	NA				
E)					-	Im X	1.4m depth						ASPECT	1	North East			SLOPE	0-1%
	E)			ION DA				Z	IMI	ATERIAL DA				×		5/		G & TEST	ING
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, particle characteristics, or	PTION OF STR mottling, colour, pla anics, secondary a ontamination, odou	asticity, rocks, o and minor com	oxidation, ponents,	CONSISTENCY	DENSITY INDEX	T PF	DEPTH (M)	A		LTS AND OBSERVATIONS
C(_		- M	_ 0.2				- XX		NCRETE SLA	B			- D	A	0.3	2316/3/0	12	
A				0.3				GM XX	SAND FILL -	- Coarse grai		,		м		0.3	2310/3/0		
				0.45				SP		um dense, mo									-
				_						rete/floater in									-
				_															-
				1.0															<u>1.0</u>
				_															-
				-															-
				-															-
				-															-
				_ 2.0															- 2.0
				_															-
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				_															-
				-															-
				3.0															3.0
				-															-
				_															-
				-															-
				-															-
																			-
																			4.0
				-															-
				4.5															-
	N N BH E E E HA F S F PT P A A	Natural Existin Excava Excava Iand a Hand s Tush tu Nuger	uger pade	ure SH vation SG et RI Ni	UPPOI H Sha C Sha B Roa I No	oring otcrete ck Bol suppo	its ⊻ Wat ort √ Wat → Wat	e obse measu er leve er outf er inflo	rved D Dry L Lu red M Moist M M I W Wet H H Wp Plastic limit R R low WI Liquid limit W	ow VS loderate S gh F efusal St VSt H F	Very Soft Soft Firm Stiff Very Stiff Hard Friable	DENSITY VL Very Loo L Loose MD Medium D D Dense VD Very Dens	se A A B E Dense U I D I se M M Ux T	Auger s Bulk sai Jndistu Disturbe Moisture Fube sa	mple rbed sample ed sample e content ample (x m	ple V E m) F V	/S Vane sho OCP Dynam penetro D Field der VS Water sa	penetration test ear ic cone meter isity	4.5 CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural
+		EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
ly Sheet IN	(c) Copyright Martens & Associates Pty. Ltd. 2009 MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 8999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au																		
		(C) Co	opyright	Martens & As	sociate	s Pty. L	.td . 2009			artens.com.au							BC	preno	le

	LIEN		-	anidis I	Robert	s			COMMENCED	5/5/09	COMPLET		/5/09			REF	BH	4
_	ROJE TE	ЕСТ	-	ngineer	-		Co	ntro Bort Mooguorio	LOGGED	GT/JF Quaternary	CHECKED		F/AN one			Sheet 1 PROJECT N		
		NT	56	uemen	Hydraulic		Ce	ntre, Port Macquarie	EASTING	Alluvium NA	RL SURFA					PROJECT	IO. P0902316	
EX				SIONS		K 1.4m depth			NORTHING	NA	ASPECT	N	orth East			SLOPE	0-1%	
	EX	CA		ION DA			7	MA	TERIAL D	ΔΤΑ				SA	MPLIN	IG & TES	TING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		RRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		ULTS AND L OBSERVAT	IONS
сс	Nil	N	м	<u>0</u> .15			xx	CON	NCRETE SLA	Ъ		xx						_
А	Nil	N	м	 0.4			XX GM	BITUMEN	N ROAD BAS	E FILL		D	А	0.3	2316/4/	0.3		-
А	Nil	N	м	0.6			XX SP	SAND FILL – Brown	, gravels (1-1 edium dense.			МС	A	0.5	2316/4/	0.5		_
А	Nil	N	м	- - 1.0 - - - 1.4			XX SP	SAND FILL – Light bro fragmer	own, medium its, medium (grained, minor shell Jense.		MD	A	1.0	2316/4/	1.0		- - 1.0 - -
				-				Borehole termin	ated at 1.4m	on sand fill.								-
				2.0 - - - - -														2.0 - - - - - -
				- 3.0 - - - - - -														- 3.0 - - - - - - - -
				- <u>4.0</u> - - - 4.5														- 4.0 - - - - 4.5
	X E BH Ba E E HA Ha S H PT Pu	atural xisting ackhoe kcavat and au and sp ush tub uger	exposi e excar e bucki or iger oade ie	THOD SU Jre SH vation SC et RE Ni	JPPORT Shoring Shotcre Rock B No sup	ete X Not n olts <u>¥</u> Wat port √ Wat → Wat	e obse measu er leve er outf er inflo	rved D Dry L Lo red M Moist M Mi Wet H Hi Wp Plastic limit R Re Iow WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Lo Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Der Hard Friable	ose A / B I Dense U I D I Ise M I Ux ⁻	Auger sa Bulk san Undistur Disturbe Moisture Fube sai	nple bed sample d sample content mple (x mm	9 5 - V: D - - - - - - - - - - - - - - - - - -	Standard S Vane sh CP Dynam penetro D Field der S Water sa	nic cone ometer nsity	Y USO	S AND CRIPTION
				rte Martens & Ass					MARTENS & 6/37 Hornsby, 10ne: (02) 9476	ASCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marter	67				jine	ering	g Log ble	-

CLIE	ENT	Г	M	anidis	Rober	ts			COMMENCED	5/5/09	COMPLET	TED	5/5/09		REF BH5
PRC		СТ		-	-	ervices			LOGGED	GT/JF Quaternary	CHECKEL		JF/AN		Sheet 1 of 2
SITE			Set	tlemer	-		g Ce	entre, Port Macquarie		Alluvium	VEGETAT		None		PROJECT NO. P0902316
EQUIP				SIONS	Hydraul	-				NA	RL SURF				SLOPE 0-1%
						X 6.0m depth			NORTHING		ASPECT		North East		AMPLING & TESTING
	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION	GRAPHIC LOG	CLASSIFICATION	DESCRIPT Soil type, texture, structure, mo particle characteristics, organ	TION OF STR	ATA asticity, rocks, oxidation, ind minor components,	CONSISTENCY	DENSITY INDEX	TYPE	ĺ,	
	Nil	N		0.15					NCRETE			-			-
	Nil	Ν	М	0.2			GM		D BASE FIL			C			
	Nil	N	M	0.35 0.7			XX XX SM	SILTY/CLAYEY gravels, me		_ – Brown,		м			-
A	A NII - W - SAND - Da me						SAND FILL – Light brow fragments	vn, medium s, medium d			м	D	2.0	Ground water observed at 2.0m below ground level.	
А	Nil	-	w	2.6			SP	SAND - Dark grey, v medium gra	wet, mediun ained, natura	n dense, shells, al soils.		м	A A		2316/5/ 2.5 Z 7
A	Nil	-	w	- - - - - - - - - - - - - - - - - - -			CL	SANDY CLAY - Dark gre strong sulfur odd	ey, medium our, soft, soi	grained sand (50%), ne organics.	S		A		
	Na	tural	W 7 MET expos	ure S	UPPORT H Shorin C Shotcr	WATER mg N Non rete X Not	e obse		OUR, MINOR C	lay content. SISTENCY DENSITY Very Soft VL Very Loo	se A		A & TESTIN sample	NG F	2316/5/ 4.5 4.5 p Pocket penetrometer SYMBOLS AND S Standard penetration test SOIL DESCRIPTION
BH E HA S PT A	Ba Ex Ha Ha Pus Au	ckhoe cavat nd au nd sp sh tub ger	e buck or iger bade be	et R N	B Rock I	Bolts 👽 Wa	ter leve ter out	el W Wet H High Wp Plastic limit R Refu flow WI Liquid limit	n F usal St VSt H	Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	Dense U D se M I	Undisti Disturb Moistur	urbed sample ed sample e content ample (x n	ple \ E nm) F	S Vane shear DCP Dynamic cone penetrometer D Field density WS Water sample
	CC Concrete Corer EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS														
(MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au												E	Enę	gineering Log - Borehole

С	IEN	т	М	anidis I	Robert	s				COMMENCED	5/5/09		COMPLETE	D 5/5/0	9			REF	BH5	
		ЕСТ	-	ngineer						LOGGED	GT/JF		CHECKED	JF/AI	N			Sheet 2		
_	TE		Se	ttlemen			ping	Cei	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium		VEGETATIO		9			PROJECT NO	D. P0902316	
_				SIONS	Hydraulic Ø 0.1m X		lenth			EASTING NORTHING	NA		RL SURFAC		n East			SLOPE	0-1%	
				ION DA					MA				/.0/ 201	Nora	Last	SA	MPLIN	G & TEST		
METHOD		WATER	MOISTURE	DEPTH (M)		z	GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, n particle characteristics, orgg	PTION OF STF	RATA asticity, rocks, oxidation and minor components	on, S,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		RESU	LTS AND OBSERVATION	s
А	Nil	-	w	4.5 - - 4.8		××××	× × × × × × × ×	SM	SILTY SAND - Da strong sulfur odour, mir			ined.		MD						4.5 _ _
A	Nil	-	w			* * * * * *	× × × × × × × × × × × × × × × × × × ×	SM	SILTY SAND - Dark	k brown, wet,	medium graine	d.		MD						5.0
A	Nil	-	w	- - 5.6				-	COFFEE ROCK	< - Dark brow	n, very dense.			VD	A	5.5	2316/5/	5.5		-
A	NII - W - SM strong sulf								SILTY SAND - Da strong sulfur odour, mir	rk grey, wet, nor clay cont	medium dense, ent, medium gra	ined.		MD	A	6.0	2316/5/	6.0		6.0
			[/ ME		JPPORT 1 1 Shoring	W	/ATER None			TRATION CON	ISISTENCY DENSI	TY		LING & T				enetrometer	CLASSIFICATI	
	BH B E E HA H B H PT P A A	ackhod xcaval and au and sp ush tub uger	iger bade	et RI Ni	C Shotcre 3 Rock Bo I No supp	olts ⊻ port √		er leve er outf	I W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	fusal St VSt H	Firm MD M Stiff D D	oose ledium D ense ery Dens	ense U U D Di e M M	Ik sample ndisturbed sturbed sa bisture cor be sample	sample ample ntent	VS DO FE	S Vane sh CP Dynam penetro O Field der S Water sa	nic cone ometer nsity	t SOIL DESCRIF	
						EXCA	VATIO	ON LO	OG TO BE READ IN CONJU	INCTION WITH	H ACCOMPANYIN	G REP	ORT NOTE	S AND A	BBRE	VIATIO	ONS			
				rte		l td. 200	19			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PT Leighton Place NSW 2077 Austral 9999 Fax: (02) 94 WEB: http://www.r	ia 76 876			E	ng		ering oreho	l Log -	

С	LIEN	Т	М	anidis I	Robert	S			COMMENCED	5/5/09	COMP	LETED	5/5/09			REF	BH6
PF	SOJI	ЕСТ	_	ngineer					LOGGED	GT/JF	CHEC	KED	JF/AN			Sheet 1 o	-
	TE		Se	tlemen			Ce	ntre, Port Macquarie		Quaternary Alluvium		TATION				PROJECT NO.	P0902316
_				SIONS	Hydraulio	c Auger K 1.4m depth			EASTING NORTHING	NA	RL SU ASPE	RFACE	NA North Ea	aet		SLOPE	0-1%
				ON DA		C 1.4III deptil		MA			ASPE	51	Norunea			IG & TESTI	
METHOD		WATER	MOISTURE	DEPTH (M)	M PENETRATION	GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, r particle characteristics, org	PTION OF STF mottling, colour, pl	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY		DENSITY INDEX	TYPE DEPTH (M)		RESUL	TS AND DBSERVATIONS
A	Nil	N	м	- - - - 0.7			XX SM	ORGANIC SILTY minor cla	´ SAND FILL y (topsoil fill)	– Dark brown, loose.			L				- - - - -
А	Nil	N	м	- 1.0 - - 1.4			XX SP	SAND FILL – Light bro fragmer	own, medium nts, medium o		91		MD	A 1.0			- - 1 <u>.0</u> - - -
				-				Borehole termir	nated at 1.4m	on sand fill.							- - - -
				20 - - - - -													2 <u>0</u> - - - - - - - - - - - -
				- 3.0 - - - - - - -													- <u>3.0</u> - - - - - - - - - - - -
				- 4.0 - - - 4.5													- 4.0 - - - - 4.5
	X E BH Ba E E HA H S H PT Pu	atural Existing ackhoo xcaval and au and au and sp ush tub uger	exposi g excav e bucke tor iger pade be	ire SF vation S(et RI Ni	JPPORT I Shoring C Shotcre 3 Rock B I No sup	ete X Noti olts <u>¥</u> Wat port √ Wat → Wat	e obse measu er leve er outt er inflo	erved D Dry L Lo red M Moist M M al W Wet H Hi Wp Plastic limit R Re Now WI Liquid limit	ow VS loderate S gh F efusal St VSt H F	Soft L Loos Firm MD Medi Stiff D Dens Very Stiff VD Very I Hard Friable	Loose / e um Dense e Dense I	A Auge B Bulk s J Undis D Distu M Moist Jx Tube	sample sturbed sa rbed samp ure conter sample (x	mple ble nt mm)	S Standard VS Vane sh DCP Dynan penetro FD Field der WS Water sa	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural
				rte Martens & Ass				PI	MARTENS & 6/37 Hornsby, hone: (02) 9476	ASSOCIATES PTY L ⁻ Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 WEB: http://www.mar	TD 8767				gine	ering oreho	Log - le

C	LIE	NT		Manidi	is R	obert	s			COMMENCED	5/5/09	COMPLETE	ED (5/5/09			REF	BH7	
	RO	JEC	_				rvices			LOGGED	GT/JF Quaternary	CHECKED	-	IF/AN			Sheet 1 o		
			S	ettlem		City S		l Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETATI		None			PROJECT NO	P0902316	
			N DIME	NSIONS			0.8m depth			NORTHING	NA	ASPECT	-	North East			SLOPE	0-1%	
	E	XC/	AVA		DAT				MA	ATERIAL DA	TA				SA	MPLIN	G & TEST	ING	
		VALATED	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org		asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		TS AND DBSERVATIONS	
	A N	il I	NN	0.3				XX SM	ORGANIC SILTY minor clay (top				M)					-
	A N	il !	N	- - - - - 0.8				XX CL	CLAY FILL gravels (1-15	– Orange/gr 5mm, approx		F		A	0.5	2316/7/0	0.5		-
	N X BH E HA S	Natur Exist Backh Excav Hand	al expo ing exo noe buo vator auger spade	1.0 - - - - - - - - - - - - -	SH SC RB	PPORT Shoring Rock Bri No supp	te X Not olts ∏ Wat	e obse measu er leve er out	MOISTURE PENE rved D Dry L Lo red M Moist M M el W Wet H Hi Wp Plastic limit R Re low Wi Liquid limit	e disused risi	SISTENCY DENSITY Very Soft VL Very L Soft L Loose	oose A A B B n Dense U U D D ense M M	uger s ulk sai ndistu isturbi oisturb		pr S V: D) FI		ic cone meter isity	CLASSIFICATIO SYMBOLS AND SOIL DESCRIPT V N Agricultural	ION
┝	A CC	Auger	r ete Co	rer									C / •		\/IA T '				
Quality of Rec 140. 4	(rt(EXCAVATI			MARTENS & . 6/37 Hornsby, none: (02) 9476	ACCOMPANYING RE ASSOCIATES PTY LTI Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	D 8767	S AN			jine	ering oreho	Log - le	

CLIEN	Т		lanid	is Robe	erts			COMMENCE	4/5/09		COMPLETE	D 4/5/	09		REF	BH8	
PROJE	ECI	T	Ingin	eering s	services			LOGGED	GT/JF		CHECKED	JF/A	AN .		Sheet 1 o	-	
SITE		S	ettlen	nent Cit	y Shoppin	g Ce	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium		VEGETATIO	Non	e		PROJECT NO.	P0902316	
EQUIPME					ulic Auger			EASTING	NA		RL SURFA						
					n X 7.5m depth				NA		ASPECT	Nor	th East			0-1%	
EX			TION	DATA		-	MA	TERIAL D	ATA					SA	MPLING & TESTI	NG	
METHOD SUPPORT	WATER	MOISTURE	DEPTH (M)	L PENETRATION	RESISTANCE GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, orga	PTION OF STI nottling, colour, p anics, secondary ntamination, odd	plasticity, rocks, oxio and minor compon	dation, ents,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		TS AND BSERVATIONS	
A Nil	N	-	-0.12	10000		XX		ALT/ROAD E				D					
A Nil	N		0.3			XX XX	RIPPED	SANDSTO				D					
A Nil	N	D	- - - - - - - - - - - - - - - - - - -			XX XX XX XX XX	SILTY SAND FIL dry,	L - Dark bro minor grave		2,		MD	А	1.4	2316/8/1.4		- - - - - - - - - - - - - - - - - - -
A Nil	N 2.0 ⊻		- - 2.0 2.1			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium		or shell		MD	A	2.0	Ground water observed at 2316/8/2.0	2.0m below ground	level.
A Nil	-	v	/			SW	SAND – Grey, mediu fragments (ap	m to coarse prox 20%), r	grained, mino natural soils.	r shell		MD					
A Nil	-	v	- , <u>3.0</u> - 3.3			CL	SANDY CLAY - Dark g strong sulfur or			(50%),	S		A	2.8	2316/8/2.8		3.
A Nil	-	w	-			SP	SAND - Brown g dens	grey, mediur e, minor she	n grained, wet ells.	,		D	А	4.0	2316/8/4.0 SPOS = (0.39	4 <u>.</u>
X E BH Ba E Ex HA Ha S Ha PT Pu	atura xistir ackho xcava and a and s ush tu uger	al exp ng exp oe bu ator auger spade ube	ETHOD osure cavation cket	SUPPOR SH Shot SC Shot RB Rock Nil No s	ing N Nor crete X Not a Bolts ∇ Wa	ie obse measu ter leve ter out	rrved D Dry L Lo Ired M Moist M Mo el W Wet H Hig Wp Plastic limit R Re Ilow WI Liquid limit	w VS oderate S gh F fusal St	Very Soft VL Soft L Firm MD Stiff D	NSITY Very Loo Loose Medium I Dense Very Dens	ose A A B B Dense U U D D se M M	PLING & ⁻ uger samp ulk samp ndisturbe isturbed s bisture co ube samp	ple le ed sample sample ontent	pr S V: D 1) FI	 Pocket penetrometer Standard penetration test S Vane shear CP Dynamic cone penetrometer D Field density VS Water sample 	CLASSIFICATIO SYMBOLS AND SOIL DESCRIPT Y USCS N Agricultura	ION
					EXCAVAT	ON L	OG TO BE READ IN CONJU	JNCTION WIT	TH ACCOMPAN	YING REI	PORT NOTE	S AND	ABBR	EVIAT	IONS		
					S Pty. Ltd . 2009			6/37 Hornsby, ione: (02) 947	ASSOCIATES 7 Leighton Place NSW 2077 Aus 6 9999 Fax: (02 1 WEB: http://ww	stralia 2) 9476 87	767		E	'ng	gineering Borehol	-	

CL	IEN [.]	г	м	anidis I	Roberts	3			COMMENCED	4/5/09	COMPLETE	ED 4/5	/09			RFF	BHS	2	
PR	OJE	СТ	E	ngineer	ring ser	vices			LOGGED	GT/JF	CHECKED	JF	4/5/09 REF BH8 JF/AN Sheet 2 of 2 None PROJECT NO. P0902316						
SIT	Ъ.		Se	ttlemen	it City S	hopping	j Ce	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium	VEGETATIO	No No	ne			PROJECT NO	D. P0902316		
-	IPME				Hydraulic /				EASTING	NA	RL SURFA	_							
EXC						7.5m depth			NORTHING	NA	ASPECT	No	rth East			SLOPE	0-1%		
<u> </u>	EX			ION DA	-	+	7	MA	ATERIAL DA	AIA				SA		G & TEST	ING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H R R R R R R SISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, orga	PTION OF STR mottling, colour, pl anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	A		LTS AND DBSERVATIO		
A	Nil		w	4.5 - - 5.0 - - - - 5.9			SP	SAND - Brown g dense	ırey, medium e, minor shell			D						4.5 - - 5.0 - - - - - - - - - - - - - - - - - - -	
А	Nil	_	w	6.0 - - - - - - - 7.0 - 7.5			CL	SANDY CLAY - Crear	n, stiff to very	v stiff, some gravels.	St- VSt		A	6.0			0.075	6.0 - - - - - - - - - - - - - - - - - - -	
				- - 8.0 - - - - - - - - 9.0				Borehole termina										- - 8.0 - - - - - - - - - - - - - - - - - - -	
N X B E H S P A	Na E: H Ba Ex A Ha Ha T Pu:	atural o xisting ckhoe cavato and au and sp sh tub iger	expos g exca e buck or iger oade oe	sure SH avation SC aet RE Nil	JPPORT H Shoring C Shotcrete B Rock Bol I No suppo	lts 👽 Wat	e obse measu er leve er outf	rrved D Dry L Lo Ired M Moist M Mo el W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	ow VS oderate S gh F efusal St VSt H	SISTENCY DENSITY Very Soft VL Very Lot Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B B Dense U U D D nse M M	uger sar ulk sam ndisturb isturbed oisture o	ole ed sample sample	pp S VS D(Pocket p Standard S Vane sh CP Dynam penetro D Field dei 'S Water sa 	iic cone ometer nsity	CLASSIFIC/ SYMBOLS A SOIL DESC Y USCS N Agricu	AND RIPTION	
	EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																		
(rte	ns sociates Pty. L				6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marter	767		E	ng		ering oreho	Log le	-	

CL	IEN'	Т	м	anidis F	Robe	rts				COMMENCED	5/5/09	COMPLET	FED	5/5/09				REF		BH9	
PR	OJE	СТ	E	ngineer	ing s	erv	/ices			LOGGED	GT/JF	CHECKE	D	JF/AN				Sheet 1			
SI	E		Se	ttlemen		-		Ce	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium	VEGETAT	TION	Grasses	6			PROJECT	NO. POS	902316	
_	JIPME				Hydra					EASTING	NA	RL SURF	ACE	NA							
EXC						n X 3	3.0m depth		N/ A			ASPECT		North E	ast	64			0-1%		
	EX			ION DA				z	IVI <i>F</i>	TERIAL D						5A	MPLIN	G & TES	TING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY			TYPE	DEPTH (M)	А		ULTS AI L OBSEI	ND RVATIONS	
А	Nil	N	м	 0.4				XX MH	ORGANIC SAND' some	Y SILT FILL - e minor grave		S			А	0.25	2316/9/ (0.25			-
A	Nil	N	м	0.6				XX GM	ROAD	BASE GRAV	ÆLS		м	D							_
A	Nil	N	М	- - - - - - - - - - - - - - - - - - -				XX SP	SAND FILL – Light bro fragmer	own, medium ts, medium o		1	N	ID	A	1.0	2316/9/ -	1.0			- - 1.0 - - - - - - - - - - - - - - - - - - -
A	Nil	2.25 <u>V</u> <u>V</u> <u>Y</u>	w	- - 2.4				SP	SAND – Grey, mediu fragments (ap	m to coarse g prox 20%), n	grained, minor shell atural soils.		M	J ID	А	2.4	Ground wa 2316/9/ 2		at 2.25m	below ground k	3vel _
A	Nil	-	w	_ _ 2.8			 	CL	SANDY CLAY - Brow strong sulfur or			s			A	2.7	2316/9/2	2.7			
A	Nil	-	w	_ 3.0			× × × × × × × × ×	SM	SILTY SAND - Dar	k brown, wet	, medium dense.		М	D							- 3.0
N X E E F S F A	H Ba H Ba Ex A Ha T Pu	atural e xisting ckhoe cavate ind au and sp sh tub iger	exposi excar bucko or ger ade e	ure S⊦ vation SC et RE Nil	JPPOR H Shor S Shot No s	ing crete Bolt uppo	ts <u>¥</u> Wate nt	neasu er leve er outf er inflo	rved D Dry L Lo red M Moist M Mi Wet H Hi Wp Plastic limit R Re Iow WI Liquid limit	TRATION CON w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very L Soft L Loose Firm MD Mediuu Stiff D Dense Very Stiff VD Very D Hard Friable	oose A B n Dense U D ense M Ux	Auger Bulk sa Undist Disturt Moistu Tube s	urbed sa bed samp re conter ample (x	mple ple nt (mm)	pp S VS DC FD	Standard Vane she P Dynam penetro Field den S Water sa	ic cone meter sity	SY	ASSIFICATIO MBOLS AND IL DESCRIPT USCS Agricultural	
$\left - \right $		_	~			E	XCAVATIO)N L(OG TO BE READ IN CONJU				ES AI								
							td 2009			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LT Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	767			Eı	ng		erin oreho		og -	

	IEN		-	anidis I	Roberts	S			COMMENCED	4/5/09	COMPLET		/09			REF	BH1	0
		СТ		ngineer			0.0	the Deut Meesurerie	LOGGED	GT/JF Quaternary	CHECKED	017				Sheet 1		
SI		NT	Se	tiemen	Hydraulic		Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT					PROJECT NO	D. P0902316	
_			DIMEN	SIONS		1.5m depth			NORTHING	NA	ASPECT		th East			SLOPE	0-1%	
	EX	CA	/AT	ON DA			I	MA	TERIAL D	ATA	1			SA	MPLIN	IG & TEST	ſING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STF nottling, colour, pl anics, secondary ntamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		LTS AND OBSERVATIO	NS
А	Nil	N	М	0.1			XX SM		AND FILL – E -10mm, appr			MD						
А	Nil	N	М	0.4			xx	BLUE METAL GRAVE				MD	A	0.2	2316/10/	0.2		-
A	Nil	N	м	 0.6 			XX SP	SAND FILL	– Brown, re	d gravels.		MD	A	0.5	2316/10/	0.5		
A	Nil	N	м	- 1.0 1.1			XX SP	SAND/CRUSH Brown/re	ED SANDST ed/orange, g			MD	A	1.0	2316/10/	1.0		- 1.0
A	Nil	N	м	- - 1.5			SP	SAND FILL – Light bro fragmen	own, medium its, medium o			MD						-
								Borehole termin	ated at 1.5m	on sand fill.								- - 2.0 - - - - - - - - - - - - - - - - - - -
N X B E F S F A	E: H Ba Ex A Ha Ha T Pu	atural kisting ckhoe cavat nd au nd sp sh tub ger	exposi g excar e bucki or iger oade ie	ure SF vation SC et RE Nil	JPPORT Shoring Shotcred Rock Bo No supp	te X Notr bits ⊻ Wat oort - Wat → Wat	e obse measu er leve er outf er inflo	rved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re Iow WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	ose A A B E Dense U I D I se M M Ux T	Auger sam Bulk samp Jndisturbed Disturbed Moisture c Tube samp	le ed sample sample ontent ble (x mm)	pp S D D F E W	Standard S Vane sh CP Dynam penetro D Field der S Water sa	nic cone ometer nsity	CLASSIFICA SYMBOLS A SOIL DESCI Y N Agricu	ND RIPTION
				rte Martens & Ass	ns			Pr	MARTENS & 6/37 Hornsby, none: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten:	67				jine	ering oreho	y Log · ole	•

СІ	IEN	т	М	anidis I	Roberts	s			COMMENCED	4/5/09	COMPLET	TED	4/5/09			REF	BH11
PF	ROJE	ст		ngineer					LOGGED	GT/JF	CHECKEI	C	JF/AN			Sheet 1 of	
	TE		Se	ttlemen			Ce	ntre, Port Macquarie		Quaternary Alluvium	VEGETAT		None			PROJECT NO.	P0902316
_				SIONS	Hydraulic	Auger 1.4m depth			EASTING NORTHING	NA NA	ASPECT	ACE	NA North Ea	act.		SLOPE	0-1%
				ON DA		1.4m depth		MA			AGFECT		NOTULE		SAMPLIN	IG & TESTI	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, n particle characteristics, orga	PTION OF STF	RATA asticity, rocks, oxidation, and minor components,	CONSISTENCY				H (M)	RESUL	
A	Nil	N	М	0.1			XX GM	ASPHALT AND	ROAD BAS	E GRAVELS							
А	Nil	N	м	- - 0.4			xx	CRUSHED SAND m	OSTONE FILI oist, dense.	L - Orange/red,			D		0.2 2316/11/ 0.4 2316/11/		-
A	Nil	N	м	- - 0.7			XX SP	SAND FILL gravels (1-	 Brown/lig 20mm, appro 			м	ID				-
А	Nil	N	м	- - - - - 1.4			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium c			м	D	A 1	.0 2316/11/	1.0	- - 1.0 - - -
				-				Borehole termin	nated at 1.4m	on sand fill							
				 													- 2 <u>0</u> - - -
				- - - 3.0													- - - - 3.0
				- - -													- - -
				-													- - -
																	- 4.0 - - -
	K E BH Ba E Ex HA Ha B Ha PT Pu	atural xisting ackhoe cavat and au and sp ish tub uger	exposi e excav e bucke or ger ade e	ure SF vation SC et RE Nil	JPPORT Shoring Shotcrel Rock Bo No supp	te X Not bits ⊻ Wat → Wat → Wat	e obse measu er leve er out er infle	erved D Dry L Lo red M Moist M Mo al W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F fusal St VSt H F	ISISTENCY DENSITY Very Soft VL Very Lo Soft L Lose Firm MD Medium Stiff D Dense Very Stiff VD Very Der Hard Friable	ose A B B Dense U D nse M U Ux	Auger Bulk sa Undist Disturt Moistu Tube s	urbed samp bed samp re conten ample (x	mple ble nt mm)	VS Vane sh DCP Dynan penetre FD Field de WS Water sa	d penetration test ear nic cone ometer nsity	4.5 CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural
				rte Martens & Ass	ns			Pr	MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REI ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 5 9999 Fax: (02) 9476 87 WEB: http://www.marter	67				gine	ering orehol	-

с	LIEN	т	м	anidis I	Roberts	6			COMMENCED	4/5/09	COMPLET	ED 4	4/5/09			REF	BH12	٦
	ROJE	СТ		ngineer					LOGGED	GT/JF Quaternary	CHECKED		JF/AN			Sheet 1		
		NT	Se	ttlemen	Hydraulic		Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT	_	None NA			PROJECT NO	P0902316	
_				SIONS		1.4m depth			NORTHING	NA	ASPECT	-	North Eas	:		SLOPE	0-1%	
	EX	CA	/AT	ION DA				MA	TERIAL D	ATA				S	AMPLIN	G & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pl anics, secondary ntamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TVDE	DEPTH (M)	A		LTS AND OBSERVATIONS	
А	Nil	N	-	0.1			GM	ASPHALT AND	ROAD BAS	E GRAVELS		V)					
Α	Nil	N	м	_ _ 0.5			xx	CRUSHED SANE m	OSTONE FIL loist, dense.	L - Orange/red,		D	A		2316/12/ 2316/12/			
А	Nil	х	м	- - 1.0 - - 1.4			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium d			ME) A A		2316/12/ 2316/12/			
				_				Borehole termin	ated at 1.4m	on sand fill.								-
				 2.0 														2.0
				-														
				- 3.0 - - -														3.0
				- - 4.0 - -														4.0
	X E BH Ba E E HA Ha S H S H PT Pu A A	atural existing ackhoe cavat and au and sp ush tub uger	expos g exca e buck or ger ger oade	ure SH vation SG et RI Ni	JPPORT H Shoring C Shotcret B Rock Bc I No supp	olts ⊻ Wat oort → Wat → Wat	e obse measu er leve er out er infle	erved D Dry L Lo rred M Moist M Mo el W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loos Soft L Loose Firm MD Medium [Stiff D Dense Very Stiff VD Very Dens Hard Friable	Ise A A B E Dense U U D E Se M N Ux T	Auger s Bulk sar Undistu Disturbe Aoisture Tube sa	mple rbed sample ed sample e content ample (x m	ple \ E m) F	Standard S Vane sh OCP Dynan penetro D Field de VS Water so	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND	4. <u>5</u> N
				rte Martens & Ass	ns			Pr	MARTENS & 6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.martens	57				gine	ering oreho	Log - le	

CLIEN	Т		Ma	anidis	Roberts				COMMENCED	5/5/09		COMPLET	ED 5	/5/09		REF	BH13	
PROJ	EC.	т	En	ngineer	ring serv	vices			LOGGED	GT/JF		CHECKED) J	F/AN		Sheet 1		
SITE			Set	tlemen			Cei	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium		VEGETAT		one		PROJECT	NO. P0902316	
EQUIPME					Hydraulic A				EASTING	NA		RL SURFA						
						4.3m depth		R# A	NORTHING	NA ATA		ASPECT	N	orth East	<u> </u>	SLOPE		
<u> </u>		474	11	ON DA			7	MA	I ERIAL D	AIA					54	AMPLING & TES	IING	
METHOD SUPPORT	WATER	WAIEN	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, m particle characteristics, orga	PTION OF STF nottling, colour, p anics, secondary ntamination, odo	lasticity, rocks, ox and minor compo	idation, nents,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		ULTS AND L OBSERVATIONS	
A Nil	N	N	М -	_ _ 0.4			XX GM	BLUE METAL	GRAVELS F	ROAD BASE			D					-
A Nil			M .	- - - - - - - - - - - - - - - - - - -			XX SP	SAND FILL – Light bro fragmen	wn, medium ts, medium (nor shell		МС	A A		2316/13/ 0.5		- - - - - - - - - - - - - - - - - - -
A Ni	2.: ↓ I Y		M	- - 2.5			SP	SAND – Grey, r minor shell fragmen					L/ ME	,		Ground water observed	l at 2.2m below ground lev	/el. -
A Nil	-	-	w	- - - 3.0			CL	SANDY CLAY - Dark g strong sulfur or				s		A	2.8	2316/13/ 2.8		3.0
A Nil	-	-	w	- - - - - - - - - - - - - - - - - - -			SM	SILTY SAND - Da strong sulfur o			se,		МЕ) A	4.2	2316/13/ 4.2		4.(
				-				Borehole termina	ated at 4.3m	on silty sand	J.							
X E BH B E E HA H S H PT P	latura Existi ackho xcav land a land s ush to uger	al exp ing en ioe b vator auge space	MET posu xcava ucke r le	re Si ation Si t R	UPPORT H Shoring C Shotcrete B Rock Bol il No suppo	ts 👽 Wat	e obse measu er leve er outf	rved D Dry L Lov red M Moist M Mo I W Wet H Hig Wp Plastic limit R Ref Iow WI Liquid limit	w VS oderate S gh F fusal St VSt H	Very Soft VL Soft L Firm MI Stiff D	Loose D Medium D	ise A B Dense U D Se M	Auger sa Bulk san Undistur Disturbe Moisture	& TESTIN Imple tiple bed sample content mple (x mr	p S N D	p Pocket penetrometer Standard penetration to S Vane shear CP Dynamic cone penetrometer D Field density /S Water sample	CLASSIFICATION SYMBOLS AND est SOIL DESCRIPTI Y USCS N Agricultural	
					E	EXCAVATIO	ON LO	OG TO BE READ IN CONJU	NCTION WITH	H ACCOMPAN	YING REP	ORT NOT	ES AN	D ABBR	EVIATI	ONS		
(NS sociates Pty. L	td . 2009			6/37 Hornsby, one: (02) 9476	ASSOCIATES 'Leighton Place NSW 2077 Au 9999 Fax: (02 WEB: http://ww	e stralia 2) 9476 876			E	Ξng	gineering Boreho		

CL	IEN	т	М	anidis	Roberts	S			COMMENCED	5/5/09	COMPLET	ED 5/	5/09			REF	BH	14
PR	OJE	ЕСТ	E	nginee	ring ser	vices			LOGGED	GT/JF	CHECKED	JF	/AN			Sheet 1	of 2	
SI			Se	ttlemer	_		g Ce	ntre, Port Macquarie		Quaternary Alluvium	VEGETAT		one			PROJECT NO	D . P090231	6
				ISIONS	Hydraulic				EASTING NORTHING	NA	RL SURFA	-	A orth East			SLOPE	0.49/	
EXC						9.0m depth		МА	TERIAL DA		ASPECT	N	orth East	5/		G & TES		
МЕТНОD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	DESCRIF Soil type, texture, structure, r particle characteristics, orga	TION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)			LTS AND	IONS
А	Nil	Ν	-	0.05			GM	BITUM	EN/ROAD B	ASE								
A	Nil	N	м	 			XX SW	SAND FILL gravels (1-	– Yellow/orar -10mm, appro	nge/brown, ox 15%).		L						-
А	Nil	N	М	- - - - - - - - -			XX SP	SAND FILL – Light bro fragmen	wn, medium ts, medium d			MD	A		2316/14/ 2316/14/			<u>1.</u>
				1.6									A	1.5	2316/14/	1.5		
A	Nil	N 1.9 ⊻	м	_ _ 2.0			sw	SAND – Grey, minor shell fragmen				L/ MD	A	2.0		vater observed 2.0	at 1.9m below	- ground level. 2.0
A	Nil	-	w	_ _ 2.4			CL	SANDY CLAY - Dark g strong sulfur or			S		A	2.3	2316/14/	2.3		
A	Nil	-	w	_			sw	SAND - Grey, ı shell	medium to co s (approx 20 ⁰			L/ MD						
A	Nil	_	w	2.6		<u></u> -	CL	SANDY CLAY					A	2.7	2316/14/	2.7		
A	Nil		w	2.8 - 3.0 - - - - - - - - - - - - - - - - - - -			SM	SILTY SAND - Da Strong sulfur o		medium dense,	S	MD	A	4.0	2316/14/ 2316/14/ 2316/14/	4.0	: 0.43	3.(3.(- - - - - - - - - - - - - - - - - - -
N X B B H S F A	I Ni H Ba ED IA Ha Ha T Pu A	MENT atural xisting ackhoe ccavat and au and sp sh tub uger ncrete	expos g exca e buck or iger oade oe	ure SI vation S(et RI Ni	JPPORT H Shoring C Shotcret B Rock Bo I No supp	lits ⊻ Wat lort √ Wat → Wat	measu er leve er out er inflo	erved D Dry L Lo Irred M Moist M Mo el W Wet H Hig Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loos Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	ISE A A B E Dense U U D E SE M N Ux T	uger sa Julk sam Indistur Disturbe loisture Tube sam	nple bed sample d sample content nple (x mm	PI S D D I) FI W	Standard S Vane sh CP Dynam penetro D Field de /S Water si	nic cone ometer nsity	SYMBOL SOIL DE	FICATION S AND SCRIPTION SCS ricultural
		/					5.4 L			ASSOCIATES PTY LTD	2.11101				_	-		
				rte Martens & As	ns sociates Pty. I	Ltd . 2009			6/37 Hornsby, ione: (02) 9476	Leighton Place NSW 2077 Australia 9 9999 Fax: (02) 9476 87 WEB: http://www.marten			E	ng		ering oreho		-

CL	IEN	Т	M	anidis	Roberts				COMMENCED	5/5/09	COMPLETE	D 5/5/0	9			REF	•	BH14	
	OJE	СТ			ring serv				LOGGED	GT/JF Quaternary	CHECKED	JF/A				Sheet	2 of 2	2	
SIT		ΝТ	Set	tleme	Hydraulic A		Cen	tre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETATION RL SURFAC	_	e			PROJECT	NO. 1	P0902316	
				SIONS	Ø 0.1m X 9	-			NORTHING	NA	ASPECT	_	h East			SLOPE	0-1	1%	
	EX	CA\	/ATI	on da				MA	TERIAL DA	TA	-			SA	MPLIN	G & TE	STING	3	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pla anics, secondary a ontamination, odou	sticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		SULTS AL OBS	AND ERVATIONS	
А	Nil	-	W	4.5 4.6		× × × × × ×	SM	SILTY SAND - Da strong sulfur o				MD							4.5
А	Nil	-	vv	- - 5.0 - - 5.4			SM		ND - Dark bro			MD							5_1
A	Nil	-	w	- - - - - - - - - - - - - - - - - - -				COFFEE ROCH	< - Dark brow	n, very dense.		VD	A A	6.0					6 <u>.0</u>
A E N X B F	Na E: H Ba	atural e xisting ckhoe	W / MET exposu escava	re S ation S t F	UPPORT IS Shoring C Shotches B Rock Bol	ts 👽 Wat	e observ	ved D Dry L Lo	ated at 9.0m FRATION CON: W VS oderate S ph F	on silty sand. SISTENCY DENSITY Very Soft VL Very Loos Soft L Loose Firm MD Medium I	ise A Ai B Bi Dense U U	MD	le : I sample	pr S V	Standard S Vane she	enetrometer penetration ear	test	CLASSIFICATIO SYMBOLS AND SOLD ESCRIPT	
H S P A	A Ha Ha T Pu Au	cavate ind aug and sp sh tub iger ncrete	ger ade		lil No suppo	H H Wat	er inflow	w Wi Liquid limit	VSt H F I	Very Stiff VD Very Dens Hard Friable	se M M Ux Tu	sturbed s bisture co be sampl S AND A	ntent e (x mm)	FI W	CP Dynam penetro D Field der S Water sa	meter sity	H	Y USCS N Agricultural	
4. 4		/)							ASSOCIATES PTY LTD			F	nr	nino	orin	I nd	00 -	
ity Sheet		n	á	rte	ns				Hornsby, I none: (02) 9476	Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876				''y		breh	-	.og -	
Cual	- ((C) Cop	yright N	Aartens & A	ssociates Pty. L	td . 2009				NEB: http://www.martens					DC	nen	Ule	;	

_	IEN		-	anidis I						COMMENCED		COMPLE		5/5/09				REF	BH15	
-	OJE	СТ	-	ngineer				0	the Deut Meesurerie	LOGGED	GT/JF Quaternary	CHECKE		JF/AN				Sheet 1		
SI		NT	Se	ttiemen	Hydrau			Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGET A		None NA				PROJECT N	O . P0902316	
_			DIMEN	SIONS			.4m depth			NORTHING	NA	ASPECT		North E	ast		:	SLOPE	0-1%	
	EX	CA	VAT	ION DA					MA	TERIAL D	ATA					SAN	/IPLIN	G & TES	ΓING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STF nottling, colour, p anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY		DENSITY INDEX	TYPE	DEPTH (M)	AI		ILTS AND OBSERVATIONS	
А	Nil	Ν	-	0.1			\times	GM	BITUMEN A	ND ROAD B	ASE.									
А	Nil	N	м	0.2				хх	CRUSHED SANDS	TONE - Ye	low, gravels.			D						
А	Nil	N	м	_				XX SM		ID FILL – Bro 10mm, appro				L	A	0.25 2	2316/15/0	25		_
A	Nil	N	м	0.4 				XX SP	SAND FILL – Light bro		grained, minor she		M	ИD			2316/15/ 0			
									Borehole termin	ated at 1.4m	on sand fill.									
N X E E F S F A	H Ba Ex A Ha Ha T Pu	atural xisting ckhoe cavat nd au and sp sh tub ger	expos g exca e buck tor uger bade be	ure SH vation SC et RE Nil	JPPORT Shorii Shotc Rock No su	ng crete Bolts uppor	s ⊻ Wate → Wate → Wate	e obse neasu er leve er outf er inflo	rved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re Iow WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Soft L Loose Firm MD Mediu Stiff D Dense Very Stiff VD Very E Hard Friable	Loose A m Dense U Dense M Munter M Ux	Auger Bulk s Undis Distur Moist Tube	IG & TES sample ample turbed sa bed sam ure conte sample (x	ample ple nt < mm)	pp I S VS DCF FD WS	Standard Vane she Dynami penetror Field dens Water sar	c cone neter ity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural	N
				rte Martens & Ass		\$			Pr	MARTENS & 6/37 Hornsby, none: (02) 9476	ASSOCIATES PTY LT Leighton Place NSW 2077 Australia § 9999 Fax: (02) 9476 WEB: http://www.mart	D 8767					ine	ering reho	g Log - ole	

_	IEN		-	anidis I	Roberts	;			COMMENCED	4/5/09	COMPLET	ED	4/5/09			REF		BH16	
	OJE	СТ	-	ngineer					LOGGED	GT/JF Quaternary	CHECKED		JF/AN			Sheet		2	
SIT EQU		т	Se	ttlemen	Hydraulic		g Ce	entre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETATI	_	None NA			PROJEC	T NO.	P0902316	
EXC				ISIONS	Ø 0.1m X	6.0m depth			NORTHING	NA	ASPECT		North East			SLOPE		1%	
	EX	CA	/AT	ION DA			z	MA	TERIAL D				,	SA		IG & TE	STIN	G	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, orga	PTION OF STR mottling, colour, pl anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		SULTS	AND SERVATIONS	
A	Nil	Ν	М	0.08				BITUM	IEN/ROAD B	ASE		D)						
A	Nil	Ν	м	 0.45			XX CL	SANDY CLAY FILL medium to	– Dark brow coarse grain		F- St		A	0.2					-
А	Nil	Ν	М	- - - 1.0 - -			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium c			м	A A		2316/16/	0.5 1.0 + Z1	SPOS :	= 0.008	- - - 1.0 - -
		1.8 <u>V</u>		 1.9									A	1.5	2316/16/ Ground v		ved at 1.8	3m below ground	level.
A	Nil	-	w	2.0 - - - - - - - - - - - - -			CL	SANDY CLAY - Dark g strong sulfur o r			S		A A A		2316/16/	2.5			2.0 - - - - - - - - - - - - - - - - - - -
A	Nil	-	w	4.0 - - 4.5			SM	SILTY SAND - Da strong sulfur o	odour, minor o	lay content.		М			2316/16/-	4.0			- 4.0 - - 4.5
N X B E H S P A	Na E: H Ba Ex A Ha Ha T Pu:	itural kisting ckhoe cavat nd au ind sp sh tub ger	expos g exca e buck or iger bade be	sure SH ivation SC iet RE Nil	JPPORT Shoring Shotcrete Rock Bol No supp	lts 👽 Wat	neasi er lev er out	erved D Dry L Lo Ired M Moist M Mo el W Wet H Hig Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S gh F efusal St VSt H	SISTENCY DENSITY Very Soft L Loose Firm MD Medium F Stiff D Dense Very Stiff VD Very Den: Hard Friable	ise A A B E Dense U U D D Se M M	uger : Julk sa Indisti Disturb	& TESTIN sample ample urbed samp ed sample re content ample (x mr	n) Fl	 Pocket p Standard S Vane sh CP Dynam penetro D Field der 'S Water sa 	nic cone ometer nsity	er in test	CLASSIFICATIC SYMBOLS AND SOIL DESCRIPT Y USCS N Agricultura	TION
					E	EXCAVATIO	ON L	OG TO BE READ IN CONJU			PORT NOT	ES A	ND ABBR	EVIAT	IONS				
(rte Martens & Ass		_td . 2009			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten			E	ng		erin oreh	_	Log -	

С	LIEN	Т	м	anidis I	Roberts	i			COMMENCED	4/5/09	co	OMPLETED	4/5/09			REF	BH16	
Ы	ROJI	ЕСТ	E	ngineer	ring ser	vices			LOGGED	GT/JF	Cł	HECKED	JF/AN			Sheet 2 o	-	
SI	TE		Se	ttlemen	nt City S	hoppin	g Ce	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium	VE	EGETATION	None			PROJECT NO.	P0902316	
	UIPME				Hydraulic A				EASTING	NA		L SURFACE	NA					
EX				SIONS	Ø 0.1m X 6	6.0m depth		MA	NORTHING		AS	SPECT	North Ea			SLOPE	0-1%	
\vdash						(7)	z	IVIA				<u> </u>	×	- 5/		Galesh	NG	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pi anics, secondary ontamination, odo	asticity, rocks, oxidatic and minor components	on, s,	CONSISTENCY		TYPE DEPTH (M)	A		TS AND BSERVATIONS	
A	Nil	-	w	4.5 <u>5.0</u> 5.1			SM	SILTY SAND - Da strong sulfur o					MD ,	A 5.0	2316/16/5	5.0		4.5 - - 5.0
A	. Nil	-	w					COFFEE	ROCK - Darl	s brown.			VD					
				- 6.0 - - - - - -				Borehole termina	ated at 6.0m	on coffee rock.				A 6.0	2316/16/	3.0 SPOS = 0	.29	- 6.0 - - - - -
				 														- 7 <u>.0</u> - - - - - -
				- - 8.0 - - - -														- 8 <u>.C</u> - - - -
	X E BH Ba E E: HA Ha S H PT Pu	atural Existing ackhoe xcavat and au and sp ush tub uger	expos g exca buck or ger ger ade e	ure SH vation SC et RE Ni	B Rock Bolt I No support No support Bolt Bolt Bolt Bolt Bolt Bolt Bolt Bol	ts ⊻ ^{Wa} d Wa d Wa	e obse measu ter leve ter outf ter inflo	rrved D Dry L Lo rred M Moist M Mo el W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	w VS oderate S gh F fusal St VSt H F	Soft L Lo Firm MD Mi Stiff D Do Very Stiff VD Ve Hard Friable	ery Loose oose edium Dens ense ery Dense	se U Undis D Distu M Moistu Ux Tube	sample sample turbed san bed samp ure conten sample (x	p S Ile L t mm) F V	S Standard /S Vane shi OCP Dynam penetro 7D Field der VS Water sa	ic cone meter isity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTIN Y USCS N Agricultural	
4.0		/					2.1 L(ASSOCIATES PT						*		
sheet N		m	4	rte	ns				6/37	Leighton Place NSW 2077 Austral				Eng	gine	erıng	Log -	
Quality Sheet No.	(sociates Pty. L	td . 2009			none: (02) 9476	8 9999 Fax: (02) 9 WEB: http://www.n	476 8767	om.au			Bo	orehol	le	
~			-					-										

_	LIEN			anidis I						COMMENCED	4/5/09	COMPLET		4/5/09				REF	BH	17
	ROJI TE	ECT	-	ngineer ttlemen				Се	ntre, Port Macquarie	LOGGED	GT/JF Quaternary Alluvium	CHECKED		JF/AN None				Sheet 1 PROJECT N		3
EC	UIPME				Hydrau					EASTING	NA	RL SURF		NA						-
EX				SIONS		X 1	.4m depth		MA			ASPECT		North E	ast	541		SLOPE	0-1%	
METHOD		WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, n particle characteristics, orgg	PTION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX		TYPE	DEPTH (M)		RESU	JLTS AND . OBSERVAT	IONS
А	Nil	N	-	_ 0.18					ASPHALT AND	ROAD BAS	E GRAVELS		[D	A	0.2	2316/17/ ().2		-
А	Nil	N	м	0.45				XX SM	SILTY SANI gravels and s	D FILL - Yello shells (20%),			М	ID						
A	Nil	N	м	- - - - - - - - - - - - 1.4				XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium d			м	D	A		2316/17/			- - - 1.0 - - - -
				- - - 20 - - - -					Borehole termin	ated at 1.4m	on sand fill.									 2.0
				- 3.0 - - - - - -																- 3.0 - - - - - - - - - - - -
				4.0 4.5																4.0 - - - 4.5
	X E BH B E E HA H S H PT P	atural Existing ackhoo xcaval and au and au and sp ush tub uger	expos g exca e buck tor uger bade be	ure SH vation S(et RI Ni	JPPORT H Shorir C Shotc B Rock I No su	ng rete Bolts ippoi	s ⊻ Wate d ⊲ Wate → Wate	neasu er leve er outf er inflo	rved D Dry L Lo red M Moist M Mo I W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Lor Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A / B I Dense U D D I Ise M I Ux T	Auger : Bulk sa Jndistu Disturb Moistu Fube s	urbed sam bed sam re conte ample (x	imple ple nt (mm)	S VS DC FD WS	Standard Vane she P Dynam penetro Field der S Water sa	ic cone meter sity	Y US	S AND SCRIPTION
	(rte Martens & Ass		\$		DN LO		MARTENS & 6/37 Hornsby, 10ne: (02) 9476	1 ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten	67	ES AN	ND ABI			ine	ering oreho	g Log ble	-

CLIE	NT		Ma	anidis	Rober	rts				COMMEN			COMPLE		4/5/09			REF BH18
PRO		-		-	-	ervices				LOGGED	0		CHECKE		JF/AN			Sheet 1 of 2
		_	Set	tlemer	-	Shoppi	ng (Centr	e, Port Macquarie	GEOLOG	Alluvii Alluvii		VEGETA RL SURF		None NA			PROJECT NO. P0902316
EXCAV			MEN	SIONS	-	X 9.0m dept	h			NORTHIN			ASPECT		North	East		SLOPE 0-1%
				ON DA					МА		L DATA		-				SA	MPLING & TESTING
METHOD		WATER	MOISTURE	DEPTH (M)		RAPHIC LOG	CI ASSIEICATION		DESCRIP Soil type, texture, structure, nr particle characteristics, orga fill, cor	nottling, cold	our, plasticity, ndary and min	rocks, oxidation, or components,	CONSISTENCY		DENSITY INDEX	түре	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
A N	lil	N	-	<u>0</u> .1			G	м	BITUM	EN/ROA	AD BASE							
A N	111	N	м	- - 0.4				X XL	SANDY CLAY (FILL) medium to o				F- St			A	0.2	2316/18/0.2
A Ni	a r	Ν	D	- - - 1.0 - - -				X S	AND FILL – Light brov fragment		lium grain um dense.		1	٩	ИD	A	1.0	2316/18/0.5 2316/18/1.0 <u>1.</u> 2316/18/1.5 + Z2
	22	2.4 ⊻		- - 2.0 - - - 2.5												A		2316/18/2.0 2.1 Ground water observed at 2.4m below ground level. 2316/18/2.5
A N	441	-	w	- - - - - - - - - - - - - - - - - - -				S	ANDY CLAY - Dark g strong sulfur oc n		ft, some o), s			A	3.0	2316/18/3.0 3_ 4_
X BH E HA S	IPME Natu Exis Back Exca Hand Hand	ENT / ural ex sting e thoe t avator d aug d spa	W MET xposi excav bucke r er de	– 4.5 HOD Si ure Si vation Si et R	JPPORT H Shorin C Shoter B Rock I I No su	rete X N Bolts <u>▼</u> V pport - √ V	ER lone o lot me Vater l	outflow		dour, min RATION w derate h fusal	CONSISTEN VS Very S S Soft F Firm St Stiff VSt Very S H Hard	DICY DENSITY oft VL Very L L Loose MD Mediur D Dense	.oose A B m Dense U D ense M	MPLIN Auger Bulk s Undis Distu	MD IG & TE r sample sample sturbed sa rbed sample ure cont sample	e sample mple tent	pr S V: D	2316/18/4.5 SPOS = 0.58 4. CLASSIFICATION Pocket penetrometer Standard penetration test S Vane shear CP Dynamic cone penetrometer Field density N Agricultural
Α	Push Auge	er				Þ١	Vater i	Intiow			F Friable						W	'S Water sample
CC (Conci	rete (Corer			FXCAVA			TO BE READ IN CONJU	NCTION						BRPF	1/14	IONS
(rte Martens & As				LUG	Ph	MARTEN Horn one: (02)	NS & ASSO 6/37 Leigh Isby, NSW 1 9476 9999	CIATES PTY LT	D 8767		AND A			nineering Log - Borehole

CLIEI			Ma	anidis	Robert	ts			COMMENCED	4/5/09	COMPLETE	D 4/5/	09		REF	BH18	
PROJ	JEC	СТ	-	-	ring se				LOGGED	GT/JF Quaternary	CHECKED	JF//			Sheet 2 of		
			Set	tleme	-		Cei	ntre, Port Macquarie	GEOLOGY	Alluvium	VEGETATIO	_	ie		PROJECT NO.	P0902316	
			IMEN	SIONS	Mydraulio	c Auger X 9.0m depth			EASTING NORTHING	NA	RL SURFAC		th East		SLOPE	0-1%	
								МА	TERIAL DA		_	1.121		SA	MPLING & TESTIN		
METHOD	2011001	WATER	MOISTURE	DEPTH (M)	M PENETRATION	RAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, m particle characteristics, orga	PTION OF STR/ nottling, colour, pla anics, secondary a ntamination, odou	sticity, rocks, oxidation, nd minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	RESULT ADDITIONAL OI		
A Ni	il	-	w	4.5 5.0 5.5			SM	SILTY SAND - Da strong sulfur odour, mir				MD					4.
A Ni	il	-					SM	SILTY SAND - B strong sulfur odour, mir				MD	A	6.0	2316/18/ 6.0		
EQUI	IPME	ENT		- - - - - - - - - - - - - - - - - - -	SUPPORT	WATER		Borehole termin		on silty sand.	SAMP	1 ING &	A		2316/18/9.0	CLASSIFICATIO	8 <u>.</u> 9.1
N I BH E E I HA F S I PT F A	Natu Exis Back Exca Hano Hano Push Auge	ural e sting khoe avato d aug d spa n tube er	xposu excav bucke r ler ade	re S ation S t F	SUPPORT SH Shoring SC Shotcre RB Rock B Nil No sup	g N Non ete X Not 8olts ∏ Wat	e obse measu er leve er outf	rved D Dry L Lov red M Moist M Mc I W Wet H Hig Wp Plastic limit R Ref low WI Liquid limit	w VS v oderate S h F fusal St S VSt v H H	ISTERCY DENSITY Very Soft VL Very Loo Soft L Loose Firm MD Medium D Very Stiff VD Very Dens tard riable	se A Au B Bu Dense U Ur D Di se M Mo	uger sam ulk sampl ndisturbe sturbed s pisture co	ple e d sample sample	pp S VS DC	Pocket penetrometer Standard penetration test 3 Vane shear 2P Dynamic cone penetrometer 0 Field density S Water sample	CLASSIFICATION SYMBOLS AND SOIL DESCRIPT Y USCS N Agricultural	
	n	n) a	rte	ns	1	ON LO		MARTENS & A 6/37 I Hornsby, N one: (02) 9476	ACCOMPANYING REP SSOCIATES PTY LTD eighton Place ISW 2077 Australia 3999 Fax: (02) 9476 876 VEB: http://www.martens	67	S AND			vineering Borehol		

CLIENT Manidis Roberts PROJECT Engineering services SITE Settlement City Shopping Centre, Port Ma										COMMENCED 4/5/09 COMPLETED LOGGED GT/JF CHECKED							REF	BH19
		СТ	-	-				Co	ntro Dort Magguaria	LOGGED	Quaternary	CHECKED		JF/AN None			Sheet 1 PROJECT N	
		NT	36	luemen	Hydra			Ce	nite, Port Macquarie	EASTING	Alluvium NA	RL SURFA		NA			PROJECT N	0. P0902316
EX				SIONS		n X 1	1.4m depth			NORTHING	NA	ASPECT	1	North East			SLOPE	0-1%
_	EX			ION DA				z	MA	TERIAL D	ATA				SA	MPLIN	IG & TEST	ſING
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	A		ILTS AND OBSERVATIONS
А	Nil	N	-	0.15				GM	ASPHALT AND	ROAD BAS	E GRAVELS							
A	Nil	N	D	- - 0.6				XX SM	SILTY SAN gravels (1-15	ID FILL - Dar 5mm, approx			ME	A D A		2316/19/0 2316/19/		
A NII N M 10 - - - - - - - - - - - - -									SAND FILL – Light bro fragmer	own, medium ts, medium o	grained, minor shell lense.		ME	A	1.4	2316/19/	1.4	<u>11</u>
				-					Borehole termin	ated at 1.4m	on sand fill.							
																		2.
				-														
				- 3.0 - -														3.
				- - - 4.0														4.1
				_ _ _ <u>4</u> .5														4.
	X E BH Ba E Ex HA Ha S Ha PT Pu	atural xisting ckhoe cavat nd au and sp sh tub ger	exposi g excav e bucke tor iger pade be	ure SF vation SC et RI Ni	JPPOR H Shor C Shot B Rock I No s	ing crete Bolt uppo	ts ⊻ Wate ort ∢ Wate → Wate	e obse measu er leve er outt er inflo	erved D Dry L Lo rred M Moist M Mr al W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F fusal St VSt H F	SISTENCY DENSITY VerySoft VL VeryLoc Soft L Loose Firm MD Medium [Stiff D Dense VeryStiff VD VeryDens Hard Friable	ose A A B E Dense U U D D Se M N Ux T	uger s sulk sar Indistu isturbe loisture ube sa	mple rbed sample ed sample e content ample (x mm	pr S D D) FI W	Standard S Vane sh CP Dynan penetro D Field der S Water sa	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural
+ +						E	EXCAVATIO	ON L	OG TO BE READ IN CONJL	MARTENS &	ASSOCIATES PTY LTD	ORT NOTE	S AN				.	
				rte Wartens & Ass			td . 2009			Hornsby, 10ne: (02) 9476	Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten:			E	ng		oreho	y Log - ole

	IEN		-	anidis I	Roberts	5										REF	BH20	
		СТ		ngineer			0.	ntus Daut Maanusuis		GT/JF Quaternary	CHECKED		JF/AN			Sheet 1		
	TE JIPME	NT	Se	ttlemen	Hydraulic		Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT RL SURFA		None NA			PROJECT NO	P0902316	
			DIMEN	SIONS		1.4m depth			NORTHING	NA	ASPECT		North Ea	st		SLOPE	0-1%	
	EX	CA\	/AT	ION DA			1	MA	TERIAL DA	ATA				S		IG & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, planics, secondary a ntamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY			DEPTH (M)			.TS AND DBSERVATIONS	
A	Nil	N	м	0.1			GM	BITUMEN A	ND ROAD B	ASE.		C)					
A	Nil	N	М	0.2			хх	CRUSHED SANDS	TONE – Yel	low, gravels.		C						
А	Nil	N	м	0.45			XX SM		ID FILL – Bro 10mm, appro			L		4 0.2	5 2316/20/	0.25		-
A	Nil	N	м	- - - - - - - - 1.0			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium o			м	D		 2316/20/ 2316/20/ 2316/20/ 			- - 1.0 -
				- - 2.0 - - -				Borehole termin	ated at 1.4m	on sand fill.								
				- - - - - - - -														3.0
				- 4.0 - - - 4.5														- 4.0 - - - 4.5
	(E BH Ba E E> HA Ha B Ha PT Pu	atural xisting ckhoe cavat ind au and sp sh tub iger	exposi e excar e bucki or ger ade ie	THOD SU ure SH /ation SC at RE	JPPORT Shoring Shotcret 3 Rock Bo No supp	lts 👽 Wat	e obse measu er leve er out	erved D Dry L Lo Ired M Moist M Mo el W Wet H Hig Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S gh F fusal St VSt H	SISTENCY DENSITY Very Soft VL Very Lor Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Der Hard Friable	ose A B Dense U D Ise M	Auger s Bulk sa Undistu Disturb Moistur	G & TEST sample urbed sam ved sampl re content ample (x r	iple e		nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTIC Y USCS N Agricultural	
				rte Martens & Ass	ns		ON L	OG TO BE READ IN CONJU Pr mail@m	MARTENS & 6/37 Hornsby, ione: (02) 9476	ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marter	67	ES AN			gine	ering oreho	Log - le	

CL	IEN	Г	Μ	anidis I	Roberts	6			COMMENCED	4/5/09	COMPLET	ED	4/5/09			REF	BH21
	OJE	СТ		ngineer					LOGGED	GT/JF Quaternary	CHECKED		JF/AN			Sheet 1 o	of 1
SIT		UT.	Se	ttlemen	t City S		Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT	_	None NA			PROJECT NO	- P0902316
			DIMEN	SIONS		1.5m depth			NORTHING	NA	ASPECT		North Eas	:		SLOPE	0-1%
	EX	CA	/AT	ION DA	TA			MA	TERIAL D	ATA		1		S	AMPLIN	G & TEST	ING
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga fill, cc	anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components, .r.	CONSISTENCY	DENSITY INDEX		DEPTH (M)	A		TS AND DBSERVATIONS
A	Nil Nil	N N	- M	0.05			GM XX		AND ROAD I SANDSTON			C					
_	1.411			0.15			~~	OROGHED	0, 11001011				, А	0.2	2316/21/	0.2	
А	Nil	N	м	0.45			XX SM	SILTY S/ gravels (1-15n	AND FILL – E nm, approx 2			L					
А	Nil	N 1.2 Ţ	М	- - - 1.0 - - - 1.5			XX SP	SAND FILL – Light bro minor shell fragments				М	D		2316/21/ Ground v 2316/21/	rater observed at	1.2m below ground level.
								Borehole termina	ated at 1.5m	on sands fill.							2
N X BIE H S P A	Na Ex H Ba Ex A Ha Ha T Pus	atural e kisting ckhoe cavate nd au nd sp sh tub iger	expos exca buck or ger ade e	ure SH vation SG et RI Ni	JPPORT H Shoring C Shotcrett 3 Rock Bo I No supp	olts 👽 Wat	e obse neasu er leve er outf	erved D Dry L Lo rred M Moist M Mo el W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F ifusal St VSt H	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose AA BE Dense UU DE se MM	Auger s Bulk sa Jndistu Disturb Aoistur	G & TESTI sample imple urbed sample re content ample (x m	p Sole V E m) F		nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y N Agricultural
				rte Martens & Ass			ON LO	DG TO BE READ IN CONJU Pr mail@m	MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 870 WEB: http://www.marten	67	ES AN			gine	ering oreho	Log - le

CL	IEN	Г	М	anidis F	Roberts	6			COMMENCED	4/5/09	COMPLET	ED	4/5/09			REF	BH22	٦
PR SI	OJE	СТ		ngineer	-		<u>Ca</u>	atro Bort Mooguaria	LOGGED	GT/JF Quaternary			JF/AN Grasses			Sheet 1 c PROJECT NO		
		NT	Se	lliemen	Hydraulic		Cer	ntre, Port Macquarie	EASTING	Alluvium NA	RL SURFA	-	NA			PROJECT NO	- 20902316	_
EXC				SIONS		3.0m depth			NORTHING	NA	ASPECT		North East			SLOPE	0-1%	
	EX	CA	/AT	ION DA			7	MA	ATERIAL D	ATA				S	AMPLIN	IG & TEST	ING	_
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION R R R ESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ontamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY		TYPE	DEPTH (M)	A		TS AND DBSERVATIONS	
А	Nil	Ν	-	0.15			GM	ASPHALT AND	ROAD BAS	E GRAVELS		D						-
А	Nil	N	D	0.15			XX SM	SILTY SAND F gravels (1-	ILL – Red/ora 10mm, appro			M)					
А	Nil	N 1.95 T7	D	- - - 1.0 - - - - - - - - - - - -			XX SP	SAND FILL – Light bro fragments, m				M	A) A		2316/22/ 2316/22/	1.5		
		1.95 <u>¥</u>		2.0									A	2.0	Ground w 2316/22/		1.95m below ground leve	el. 2.0
A	Nil	Y	w	 2.4			sw	SAND – Grey, minor shell fragmen	medium to co its (approx 20	arse grained, %), natural soils.		M	/ D					
A	Nil	-	w	2.6			CL	SANDY CLAY - Brow strong	vn, medium g sulfur odour		s		A	2.5	2316/22/	2.5 + 26		
A	Nil	-	w	- - 3.0			sw	SAND - Grey, i shells (appro				м	A	3.0	2316/22/	3.0		- - 3.0
N		itural e	expos	ure S⊦	JPPORT 1 Shoring	WATER N None		rved D Dry L Lo	TRATION CON w VS	SISTENCY DENSITY Very Soft VL Very Loc	ose A A	Auger :	a TESTI ample	p	p Pocket p	enetrometer	CLASSIFICATION SYMBOLS AND	
X E F S F A	E: H Ba Ex A Ha Ha T Pu	kisting ckhoe cavate nd au nd sp sh tub ger	excar buck or ger ade e	vation SC et RE Nil	Shoring Shotcret Rock Bo No supp	e X Notm blts ∏ Water	r leve r leve r outfl	red M Moist M M I W Wet H Hi Wp Plastic limit R Re Iow WI Liquid limit	oderate S gh F efusal St VSt H	Very Soft VL Very Loose Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	B E Dense U I D I se M M	Bulk sa Jndistu Disturb Aoistu	sample mple irbed samp ed sample e content ample (x m	ole \ E m) F	p Pocket p S Standard /S Vane sh DCP Dynan penetro D Field dei VS Water si	d penetration test ear nic cone ometer nsity	SYMBOLS AND SOIL DESCRIPTIO Y USCS N Agricultural	N
						EXCAVATIO	N LC	OG TO BE READ IN CONJU	JNCTION WITH	ACCOMPANYING REP	ORT NOT	ES AN		EVIAT	IONS			
				rte Martens & Ass		Ltd . 2009			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten:			Ľ	Enę	-	ering oreho	Log - le	

С	LIEN	IT	Ν	lanidis	Roberts	6			COMMENCED	4/5/09	COMPLET	ED 4	4/5/09			REF	BH23	
_	ROJ	EC		nginee					LOGGED	GT/JF Quaternary	CHECKED		JF/AN			Sheet 1 o		
_			Se	ettlemer	Hydraulic		Ce	ntre, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT	-	Grasses NA			PROJECT NO	D. P0902316	
_			I DIME	NSIONS	-	1.5m depth			NORTHING	NA	ASPECT	-	North East			SLOPE	0-1%	
	E)	(C/	VAT	ION DA	TA			MA	ATERIAL DA	ATA				SA	MPLIN	G & TEST	ING	
METUOD	SUPPORT	WATED	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, orga	PTION OF STR mottling, colour, pl anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	م		LTS AND OBSERVATIONS	
A	Nil	N	I -	<u>_0.13</u>			GM	ASPHALT AND	ASPHALT AND ROAD BASE GRAVELS						2316/23/	0.2		_
A	Nil	N	м	- - 0.6			XX SM	SILTY SANDY CLAY F tree roots, grave				MD) A	0.5	2316/23/	0.5		-
F	Image: Spectra in the second secon								own, medium nedium dense	grained, minor shell a, no smell.		M	D	1.5	2316/23/	1.5 + 25		- 1.0 -
	1.5 Borehole term - -									on sand fill.								2.0
				- 3.0 - - - - - -														3.0
				_ 4.0 _ _ _ _														- 4.0 - - -
	N N BH E E E HA H S H PT P A A	Natura Existi Backh Excav Hand Hand Push t Auger	al expos ng exca oe buci ator auger spade ube	sure S avation S ket R N	UPPORT H Shoring C Shotcret B Rock Bo il No supp	e X Not Its <u>¥</u> Wat - √ Wat → Wat	e obse measu er leve er outf er inflo	rrved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re Iow WI Liquid limit	w VS oderate S gh F sfusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B E Dense U U D I se M M Ux T	uger s Bulk san Indistu Disturbo Toisturbo Tube sa	irbed sample ed sample e content ample (x mi	p S D D n) F V	Standard S Vane sh CP Dynan penetro D Field dei /S Water sa	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTIC Y USCS N Agricultural	
	(rte Martens & As	ns			Př	MARTENS & 6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 870 WEB: http://www.marten	67				gine	ering oreho	Log - le	

CL	IEN	Т	M	anidis I	Roberts	S										124			
PR	OJE	СТ	Settlement Cit			vices			LOGGED	GT/JF	CHECKED)	JF/AN				of 1		
SI			Se	ttlemen			y Ce	ntre, Port Macquarie	1	Quaternary Alluvium	VEGETAT	-	None			PROJECT NO	0. P09023	316	
					Hydraulic	Auger 4.5m depth			EASTING NORTHING	NA	RL SURFA		NA North Eas	•		SLOPE	0-1%		
				ION DA		4.511 depth		MA			AGFEGT		NOTITEAS			IG & TEST			
МЕТНОD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, r particle characteristics, org	PTION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY			ŝ			LTS AND	ATIONS	
Α	Nil	N	-	0.1			GM	BITUM	IEN/ROAD B	ASE)						
A	NII N D							SILTY SAND FILL	- Light brow	n/brown, gravels.		м	D					- - -	
А	A NIL N M						SAND FILL – Light bro fragmer	own, medium nts, medium c			Μ	D				5 = <0.005	- - 1.0 - - -		
А	Nil	N 2.0 V Y	м	- - 2.0 - - - 2.5			SP	SAND – Light gre minor shell fragmen				L		. 2.0			at 2.0m belo	- - 2.0 w ground level. - - - -	
A	Nil	-	w	_ _ 2.9			CL	SANDY CLAY - Dark <u>c</u> slight sulfur oc			s		A	2.8	2316/24/	2.8		-	
А	Nil	-	w	3.0 - - - 3.6			SW	SAND - Grey w dense,	ith minor clay , medium gra			м	D					3 <u>.0</u> - - - -	
А	Nil	-	w	- - 4.0 - -			SM	SILTY SAND - Da strong sulfur c				Μ	ID					- - 4 <u>.0</u> - -	
N E E F F F	K E BH Ba E Ex HA Ha B Ha PT Pu	atural xisting ckhoe cavat and au and sp sh tub ger	expos g exca e buck or iger oade oe	sure SH wation SC aet RE Nil	JPPORT Shotrett Skotcrett Rock Bo No supp	lts ⊻ Wat ort √ Wat → Wat	measu er lev er out er infl	erved D Dry L Lo irred M Moist M Mu el W Wet H Hig Wp Plastic limit R Re flow WI Liquid limit	TRATION CON w VS oderate S gh F efusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B I Dense U D I se M M Ux	Auger Bulk sa Undist Disturt Moistur Tube s	urbed sampl bed sampl re content ample (x	NG p s nple V e E mm) F	Standard SVane sh OCP Dynan penetri D Field de VS Water s	enetrometer d penetration te ear nic cone ometer nsity	SYMBO SOIL D	- 4.5 SIFICATION DLS AND DESCRIPTION JSCS Agricultural	
				rte Martens & Ass		Ltd . 2009			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten				Ξng	-	ering oreho	-	g -	
	IEN		-	anidis I						COMMENCED	4/5/09	COMPLET		/5/09			REF	BH25	
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PR SIT	OJE	СТ	_	ngineer				Ce	ntre, Port Macquarie	LOGGED	GT/JF Quaternary	CHECKED		F/AN			Sheet 1 PROJECT N		
-		ΝT	56	ulemen	Hydrau			Ce		EASTING	Alluvium NA	RL SURFA		IA			PROJECTIN	0. 10902310	
EXC						X 1.	.5m depth				NA	ASPECT	Ν	orth East				0-1%	
┝	EX	CA	AT	ION DA				z	MA	TERIAL D	ΑΤΑ		<u> </u>		S/		IG & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		R	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STF nottling, colour, p anics, secondary ntamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	۵		ILTS AND OBSERVATION	S
A	Nil	N	-	0.15				GM	ASPHALT AND	ROAD BAS	E GRAVELS		D	А	0.2	2316/25/	0.2		_
А	Nil	III N - 0.15 VII N D - 0.4 0.4 III N M - 0.4 -				XX SM	SILTY SANI gravels	D FILL - Yello and shells (2			MD)					-		
A	Nil	N	M	-					SAND FILL – Light bro fragmen	own, medium ts, medium (MD	A 2 A		2316/25/ 2316/25/			- - - - - - - - - - - - - - - - - - -
		SP - - - -			Borehole termin	ated at 1.5m	on sand fill.								- - 2.0 -				
																-			
													- 3.0 - - -						
															- - 4.0 -				
N X B H S	Na Ex H Ba Ex A Ha Ha	N D						e obse measu er leve er out	erved D Dry L Lo red M Moist M Mo el W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F fusal St VSt H	ISISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A B Dense U D se M	Auger sa Bulk san Undistur Disturbe Moisture	& TESTIN ample nple bed sample d sample content mple (x mn	ף S D D	p Pocket p S Standard S Vane sh DCP Dynan penetro D Field dea VS Water si	nic cone ometer nsity	CLASSIFICATI SYMBOLS ANI SOIL DESCRIF Y USCS N Agricultu	D PTION
A	Au	ger		r				K		•									
						5		ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87/ WEB: http://www.marten	67	ES AN			gine	ering oreho	g Log - ole	

С	IEN	т	M	anidis I	Rober	ts				COMMENCED	4/5/09	COMPLET	ED	4/5/09			REF	BH26	٦
	ROJE	СТ		ngineer				0		LOGGED	GT/JF Quaternary	CHECKER		JF/AN			Sheet 1		
	TE UIPME	NT	Se	ttiemen	Hydraul			Ce	ntre, Port Macquarie	GEOLOGY	Alluvium	VEGETAT RL SURF		None NA			PROJECT NO	P0902316	┥
EX				SIONS	Ø 0.1m		4m depth			NORTHING	NA	ASPECT		North Ea			SLOPE	0-1%	_
	EX	CA		ION DA		_			MA	TERIAL D	ATA	1	1		1	SAMPLIN	IG & TEST	ING	_
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		×	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY			ТҮРЕ	DEPTH (M)		LTS AND OBSERVATIONS	
A	Nil	N	-	- 0.13				GM	ASPHALT AND	ROAD BAS	E GRAVELS		0		A	0.2 2316/26/	0.2		_
А	Nil	N	D	_ 0.3		. X. Y.		XX SM		D FILL - Yello and shells (2			м	D					-
A	Nil	N	М	- - - - - - - - - - - - 1.4				XX SP	SAND FILL – Light bro fragments, med				м	D		1.0 2316/26/		1	
		atural	T / ME expos	ure S⊦	JPPORT I Shoti	ıg	WATER N None X Not I		rved D Dry L Lo	IRATION CON W VS	SISTENCY DENSITY VerySoft VL VeryLos	ose A		G & TES sample	TING	pp Pocket p S Standar	enetrometer d penetration test	CLASSIFICATION SYMBOLS AND	
	HA Ha S Ha PT Pu	caval and au and sp sh tub uger ncrete	uger pade pe		I No su		-⊣ Wate			VSt H	Stiff D Dense Very Stiff VD Very De Hard Friable	nse M I	Moistu	ed samp re conten ample (x	ıt	DCP Dynar penetr FD Field de WS Water s	ometer nsity	Y USCS N Agricultural	
	20					ΕX	KCAVATIO	ON LO	DG TO BE READ IN CONJU			PORT NOT	ES AN	ND ABB	BREVIA	ATIONS			
				rte Martens & Ass			1.2009			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marter				En		ering oreho	Log - le	

CLIEN	IT	N	lanidis	Roberts	i			COMMENCED	4/5/09	COMPLET	ED	4/5/09		REF BH27
PROJ	ЕСТ	ГЕ	nginee	ring serv	vices			LOGGED	GT/JF	CHECKED)	JF/AN		Sheet 1 of 2
SITE		Se	ttleme	nt City S	hopping	j Cei	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium	VEGETAT	ION	None		PROJECT NO. P0902316
EQUIPME				Hydraulic A	-			EASTING	NA	RL SURFA		NA		
EXCAVA				Ø 0.1m X 7	7.5m depth					ASPECT		North East		
						z	IN A	TERIAL D		1			5/	AMPLING & TESTING
METHOD SUPPORT	WATER	MOISTURE	DEPTH (M)	L M H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, m particle characteristics, orga		asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ΤΥΡ	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
A Nil			 0.2 0.5			XX G XX S M XX S M	SILTY SAND FILL – I	EN/ROAD B Dark brown, i minor grave	red, medium dense,		м			-
A Nil	1.4 ⊻		- - - - - - - - - - - - - - - -			XX SP	SAND FILL – Light bro fragmen	own, medium ts, medium c			м	A D	1.0	2316/27/ 1.0 Ground water observed at 1.4m below ground level.
A Nil	I -	w	- 1.9			SP	SAND – Grey, i minor shell fr				M			-
A Nil	I -	w	2.0 - - 2.4			CL	SANDY CLAY - Dark g strong	rey, medium sulfur odour		S				
A Nil	1 -	w	- - 3.0 3.2			SP	SAND - Grey wi dense,	ith minor clay medium gra			L		2.7	2316/27/ 2.7
A Nil	-	w				SM	SILTY SAND - Da strong sulfur o				м	D A		2316/27/ 3.5 2316/27/ 4.0 4.
X E BH B E E HA H S H PT P	PMEN Natural Existin Backho Excava Hand a Hand s Push tu Auger	l expos ng exca be buck ator nuger spade ibe	ure S vation S let F N	SUPPORT SUPPORT SH Shoting SC Shotcrete B Rock Bol Iii No suppo	ts 👽 Wat	e obse measu ter leve ter outf	MOISTURE PENET rved D Dry L Lor red M Moist M Mc W Wet H Hig Wp Plastic limit R Re ow Wi Liquid limit	w VS oderate S gh F fusal St VSt H	WM, Wet. SISTENCY DENSITY Very Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A B Dense U D se M	Auger s Bulk sa Undistu Disturb Vioistur	& TESTI ample	p Sole V E m) F	4.5 p Pocket penetrometer S Standard penetration test S Vane shear OCP Dynamic cone penetrometer D Field density VS Water sample
	m	Pa	rte	e ns ssociates Pty. L		ON LO		MARTENS & 6/37 Hornsby, ione: (02) 9476	HACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten	67	ES AN			gineering Log - Borehole

С	LIEN	Т	M	anidis	Roberts	\$			COMMENCED	4/5/09		COMPLET	ED 4	/5/09			REF	F	3H27	
Ρ	ROJ	ЕСТ	E	ngineer	ing ser	vices			LOGGED	GT/JF		CHECKED)]	IF/AN			Sheet 2			
S	ТΕ		Se	ttlemen	t City S	Shopping	Cer	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium		VEGETAT		lone			PROJECT N	ю. РО	902316	
EC	UIPM	ENT			Hydraulic	Auger			EASTING	NA		RL SURFA	CE N	١A						
EX				SIONS		7.5m depth			NORTHING	NA		ASPECT	١	North East			SLOPE	0-1%	•	
_)			ION DA				MA	TERIAL D			1			SA	MPLIN	IG & TES	TING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks and minor cor	, oxidation, nponents,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	Δ	RESU DDITIONAL	JLTS A . OBSE		
A	Nil	-	w	4.5 - - - - - - - - - - - - -				SILTY SAN	D - Dark bro	vn, wet.			МС	A	5.5	2316/27/	5.5			4.5 - - 5.0 - - - - - - - - - - - - - - - - - - -
	N N BH E E E HA F S F	PMEN Jaturai Existin Jackhoo Jand au Jand au Jand au Jand su	expos g exca e buck tor uger pade	ure SI vation So et RI	JPPORT H Shoring C Shotret B Rock Bo I No supp	olts 👽 Wate	neasur er level er outfl	rved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	TRATION CON w VS oderate S ph F fusal St VSt H	SISTENCY Very Soft Soft Firm Stiff Very Stiff Hard Friable	nd. DENSITY VL Very Loo L Loose MD Medium D D Dense VD Very Dens	ose A A B E Dense U I D I se M M	Auger s Bulk sar Jndistu Disturbe Moisture		pr S V D) FI	Pocket p Standard Svane sh CP Dynam penetid der S Water si S Water si S Water si	enetrometer i penetration te ear nic cone meter sisty	SY	-	
	A A	Auger		r		→ vvate	SI INNO	vv	F	IIIIII					vv	o vvater sa	ampie			
\vdash	UC C	oncret	e Core	1		EXCAVATIO		OG TO BE READ IN CONJU		ACCOMP	ANYING REP	ORT NOT	ES AN		VIATI	ONS				_
-		/							MARTENS &				T.					,		
	(rte	NS	l td. 2009			6/37	Leighton P NSW 2077 9999 Fax:	lace Australia (02) 9476 876			E	ng		ering oreho	-	og -	

CLIEN	ΙТ		М	anidis	Roberts	6			COMMENCED	5/5/09	COMPLET	ED 5/5/	09		REF BH28
PROJ	EC	т	Er	nginee	ring ser	vices			LOGGED	GT/JF	CHECKED	JF//	۹N		Sheet 1 of 2
SITE		_	Set	tlemer	nt City S	Shopping	g Ce	ntre, Port Macquarie	GEOLOGY	Quaternary Alluvium	VEGETATI	ON Nor	ne		PROJECT NO. P0902316
EQUIPME					Hydraulic	-			EASTING	NA	RL SURFA				
						7.5m depth		84.4			ASPECT	Nor	th East		
EX				ON DA			7	MA	TERIAL D	AIA			_	SA	MPLING & TESTING
METHOD SUPPORT	WATED	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STF nottling, colour, p anics, secondary ntamination, odo	lasticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
A Ni		N	-	- 0.2			xx	ASPHA	ALT/ROAD E	BASE		D			
A Nil	1	N	м	- - - 0.7			XX SP	SAND FILL – moist, medium				MD			
A Nil	۸	N	М	- - <u>1.0</u> 1.1			XX SP	SAND FILL – Gr med	rey, moist, m dium grainec			MD			14
A Nil	٢	N	м	- - - -			XX SP	SAND FILL – (Wit dark grey, moist, mo				MD	A	1.5	2316/28/1.5
				- 2.0 - 2.2									A	2.0	2316/28/2.0 2
A Nil	N 2. \		М	- - - 2.7			XX SP	SAND FILL – Brown	n, red, moist,	medium grained.		MD	A	2.5	2316/28/2.5 Ground water observed at 2.7m below ground level
A Nil		-	vv	- - <u>3.0</u> - - 3.3			CL	SANDY CLAY - Dark g strong sulfur o			S		A	2.9	2316/28/2.9 SPOS = 0.31
A Nil	-	-	w	- - - - - 4 <u>.</u> 0			SP	SAND - Light grey, wet,	medium de	nse, medium grained.		MD	A	3.5	2316/28/3.5
X E BH B E E HA H S H PT P	latur Exist ackh xcav land land ush t	ral ex ting e hoe b vator l aug d spa tube er	xposi excav bucke r er ide	ure SI vation S(at RI Ni	JPPORT H Shoring C Shotcrete B Rock Bo I No supp	e X Noti lts ∏V Wat	e obse measu ær leve ær outf	rved D Dry L Lov red M Moist M Mo el W Wet H Hig Wp Plastic limit R Ret low WI Liquid limit	w VS oderate S gh F fusal St VSt H	ISISTENCY DENSITY Very Soft VL Very Lot Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B B Dense U L D D nse M M	PLING & uuger san Bulk samp Disturbed Disturbed Ioisture c ube sam	iple le ed sample sample ontent	pr S V D D	2316/28/4.5 CLASSIFICATION Standard penetration test S Vane shear CP Dynamic cone penetrometer D Field density S Water sample
						EXCAVATIO	ON LO	OG TO BE READ IN CONJU	INCTION WIT	H ACCOMPANYING RE	PORT NOT	ES AND	ABBRI	EVIAT	IONS
(rte Martens & As				Ph	MARTENS & 6/37 Hornsby, one: (02) 947	ASSOCIATES PTY LTD ' Leighton Place NSW 2077 Australia 6 9999 Fax: (02) 9476 8' WEB: http://www.marter	767			_	nineering Log - Borehole

CLIE	ENT	Г	M	anidis	Roberts	S			COMMENCED	5/5/09		COMPLETED	5/5/09	I		REF BH28
PRO	JE	СТ			ring ser				LOGGED	GT/JF		CHECKED	JF/AN			Sheet 2 of 2
SITE			Set	tleme	-		g Ce	entre, Port Macquarie		Quaternary Alluvium		VEGETATION	-			PROJECT NO. P0902316
EQUIP				010110	Hydraulic	-			EASTING	NA		RL SURFACE				SLOPE 0-1%
EXCA						7.5m depth		МА	NORTHING			ASPECT	North	East	54	SLOPE 0-1%
	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIF Soil type, texture, structure, n particle characteristics, orga	PTION OF STR	ATA asticity, rocks, oxidatio and minor components	on, s,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
A N	Jil	-	w	4.5 5.0			SP	SAND - Light grey, wet,	medium den	se, medium grai	ined.		MD	A	5.0	4.5 - - - - - - - - - - - - - - - - - - -
A N	VII	-	w	 5.5 			SP		ht grey, brow nse, medium g				MD			-
АМ	Nil	-		- - 6.0 - - - 6.5			SP	SAND - Red/brown, (possibly co	wet, dense, i offee rock/as	nedium grained, depth).	I,		D	A	6.0	- 2316/28/ 6.0 <u>6.0</u> - - - 2316/28/ 6.5
A N	Jil	-	w	- - - 7.0 - - - - 7.5			SP	SAND - Grey, we	it, dense, me	dium grained.			D	A	7.5	- - - 7.0 - - - - - - - - - - - - - - - - - - -
				- - - 8 <u>0</u> - - - - -				Borehole termir	nated at 7.5m	n on sands.						- - 8.0 - - - - -
N BH E HA S PT A	Na Ex Ex Ha Ha Pus Au	itural kisting ckhoe cavat nd au nd sp sh tub ger	/ MET exposing excar e buck or iger oade	ure S vation S et R N	UPPORT H Shoring C Shotcret B Rock Bo iii No supp	ie X Not hits ⊻ Wa ⊸ Wa ┣ Wa	e obs measi ter lev ter out ter infl	erved D Dry L Lo Ired M Moist M Mo el W Wet H Hig Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S fusal St VSt H UNCTION WITH	Soft L Lo Firm MD Mi Stiff D De Very Stiff VD Ve Hard Friable	/ery Loose oose ledium De lense ery Dense	e A Aug B Bulk ense U Und D Dist e M Mois Ux Tub	NG & TE er sample isturbed sa isturbed sa isture cont e sample	e sample mple tent (x mm	pp S VS DO DO FE W	
(ns ssociates Pty.	Ltd . 2009			6/37 Hornsby, I ione: (02) 9476	Leighton Place NSW 2077 Austral 9999 Fax: (02) 94 WEB: http://www.n	ilia 1476 876			Ē	ng	ineering Log - Borehole

_	IEN		-	anidis	Robert	S			COMMENCED	5/5/09	COMPLET		/5/09			REF	BH29	
		СТ	-	ngineer			••••	De et Marana de	LOGGED	GT/JF Quaternary	CHECKED		F/AN			Sheet 1		
SI	I E JIPMEI	NT	Se	ttlemen	Hydraulic		Cent	re, Port Macquarie	GEOLOGY EASTING	Alluvium	VEGETAT RL SURFA	_	one A			PROJECT NO	D. P0902316	
			DIMEN	SIONS		(1.4m depth			NORTHING	NA	ASPECT	-	orth East			SLOPE	0-1%	
	EX	CA۱	/AT	ION DA				МА	TERIAL DA	ATA				SA	MPLIN	IG & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, m particle characteristics, orga	PTION OF STR nottling, colour, pla anics, secondary a ntamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		LTS AND OBSERVATION	5
A	Nil	N	-	- - 0.3		,	xx	BITUMEN A	ND ROAD BA	ASE.		D	А	0.3	2316/29/	0.3		-
A	Nil	N	м	 0.6			XX SM		ID FILL – Bro 10mm, appro			L	A	0.6	2316/29/	0.6		-
А	Nil	N	м	- - 1.0 - - - 1.4			XX SP	SAND FILL – Light bro fragmen	wn, medium ts, medium c	grained, minor shell lense.		MD	A		2316/29/ 2316/29/			- - 1.0 - -
				-				Borehole termin	ated at 1.4m	on sand fill.								
				 2.0 														 2.0
				-														-
																		- 3.0 - - -
				- - 4.0 - -														- - 4.0 - -
N E E F A	I Na I E I Ba I Ba I A I A I A I A I A I A I A	atural xisting ckhoe cavat ind au and sp sh tub iger	expos g exca e buck or ger ger oade	ure SI vation S(et RI Ni	JPPORT H Shoring C Shotcre 3 Rock B I No sup	ete X Not me olts <u>¥</u> Water → Water → Water	easured level outflov	ed D Dry L Lov d M Moist M Mo W Wet H Hig Wp Plastic limit R Rei	w VS oderate S yh F fusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Lo Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very De Hard Friable	ose A A B E Dense U U D I nse M M Ux T	Auger sa Bulk sam Jndisturl Disturbe Aoisture Tube sar	nple bed sample d sample content mple (x mm)	PF S D FI W	Standard S Vane sh CP Dynan penetro D Field de S Water sa	nic cone ometer nsity	CLASSIFICATI SYMBOLS ANN t SOIL DESCRIF Y USCS N Agricultur	D TION
				rte Martens & As				Ph	MARTENS & . 6/37 Hornsby, one: (02) 9476	ACCOMPANYING RE ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marter	'67	_3 ANI			jine	ering oreho	, Log - de	

СГ	IEN'	Г	М	anidis F	Robei	rts				COMMENCED	5/5/09		COMPLET	ED 5	5/5/09			REF	В	H30	٦
PF	OJE	СТ		ngineeri						LOGGED	GT/JF		CHECKED		JF/AN				of 1		
Sľ			Se					Cer	ntre, Port Macquarie		Quaternary Alluvium		VEGETAT	-	Mulch			PROJECT N	IO . P09	02316	
						llic Auger				EASTING NORTHING	NA NA		RL SURFA		NA North East			SLOPE	0-1%		
				ION DAT		1.411	ueptii		MA				AGPEOT	'	NOTITEAS	SA		G & TES			_
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION		GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, 1 particle characteristics, org	PTION OF STF	ATA asticity, rocks, and minor con	, oxidation, nponents,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	ŝ			JLTS AN		
А	Nil	N	м	- - - - 0.8				XX SM	SILTY SAND FILL – D)ark brown, re	oots, mino	r gravels.		L	A		2316/30/ 2316/30/				
А	Nil	N	м	 1.0 1.1				XX SP	SAND FILL – Light bro fragmer	own, medium nts, medium o		minor shell		ME	A	1.0	2316/30/	1.0			1.0
А	Nil	N	м	- - 1.4				XX SM	SILTY SAND F gravels (1-15	ILL – Orange mm, approx :	/brown, 20%).			ME	A	1.4	2316/30/	1.4			-
1	E	atural e	exposi excav	ure SH vation SC	IPPORT Shori Shoti	ng i rete)		e obse measuu	rved D Dry L Lo red M Moist M M	TRATION CON w VS oderate S	SISTENCY Very Soft Soft	d fill. DENSITY VL Very Loo L Loose MD Medium E	se A A B B	luger s Bulk sar		p S	p Pocket p Standard	enetrometer penetration te:	SYN		
S F A	T Pu	and sp sh tub iger	ade e	r		Đ	✓ Wate → Wate	er inflo		H F	Very Stiff Hard Friable	VD Very Dens	Ux T	ube sa	e content ample (x mi	v	penetro D Field der /S Water sa	nsity	N	Agricultural	_
				rte Martens & Ass		5			Pt	MARTENS & 6/37	ASSOCIAT Leighton Pl NSW 2077 9999 Fax:	ES PTY LTD lace Australia (02) 9476 876	57				gine	ering	-	og -	

Dynamic Cone Penetrometer Test Log Summary



6 / 37 Leighton Place, Hornsby, NSW 2159, Ph: (02) 9476 9999 Fax: (02) 9476 8767, mail@martens.com.au, www.martens.com.au

		0011101110111	City S-Center, Pc	macqualic	DCP Group	Reference	10	02316
Client			Manidis Roberts	5	Log	Date	4/0	5/2009
Logged	by		GT/JF					
					-			
Checked			JF/AN					
Comme	nts							
				TEST DATA				
Depth Interval (m)	DCP 8	DCP 5	DCP 1	DCP 28	DCP 14	DCP 16	DCP 18	Geomean
0.15	2	29	4	25	3	12	18	9
0.30	2	4	2	38	8	28	12	8
0.45	4	9	3	23 32	4	12	2	6
0.75	15	11	3	33	14	13	10	12
0.90	11	29	3	28	21	28	10	15
1.05	14	28	2	12	18	32	9	13
1.20	13	25	2	10	13	34	10	12
1.35	12	18	2	15 32	12	35 30	14	12
1.50	9	14	5	27	9	23	14	15
1.80	10	12	4	21	5	20	9	10
1.95	14	9	1	21	4	18	10	8
2.10	17	5	1	21	3	13	14	7
2.25 2.40	9	6	2	18	3	5	14	6
2.40	4	5	6	18	6	3	12	6
2.70	4	5	12	11	7	5	17	8
2.85	3	6	10	8	4	6	15	7
3.00	7	8	4	18	9	6	14	8
3.15	7	7	4	26	14	7	5	8
3.30 3.45	12 23	7	5	31 24	16	4 5	2	8
3.60	26	11	7	30	17	7	3	11
3.75	28	11	7	22	18	11	3	12
3.90	32	9	12	25	16	15	4	14
4.05	32	10	21	26	16	14	11	17
4.20	34	14	20	26	15	11	15	18
4.35 4.50	40	20 18	20	40 36	14	11	16	21
4.65		15	21	21	10	11	15	15
4.80		12	22	14	11	24	20	16
4.95		21	23	14	11	31	21	19
5.10		55	21	12	12	41	18	22
5.25 5.40			20	20 36	16 35	60 refused at5.20m	18	23 25
5.55			14	38	45	1610360 013.2011	27	23
5.70			13	36	refused at5.50m		25	23
5.85			14	41			28	25
6.00			14	33			21	21
6.15			15	36			20	22
6.30			22	45	_		24	29
6.45			20			ļ	27	23
6.60			24	<u> </u>	+	<u>↓ </u>	32	28
6.75 6.90			21			<u> </u>	31 24	26 26
7.05			28 26		+	<u>├</u> ────┤	24 20	28
7.20			26		1	├	20	23
7.35			28			<u> </u>	23	24
7.50			27	1	1	<u> </u>	22	24
7.65			26				25	25
7.80			22				22	22
7.95			22				18	20
8.10			27	ļ	<u> </u>		21	24
8.25			28			<u> </u>	18	22
8.40 8.55			24 25			╞─────┤	12	17 23
8.70			23		1	╂─────╂	21	23
8.85			24	1	1	<u>† </u>	16	20
9.00			24				21	22
9.15			25				21	23
9.30			24				20	22
9.45 9.60						<u>├</u>	19 21	19 21
		1		1	-		۷1	Z1////
7.00								

Dynamic	Cone	Penetror	neter Tes	st Log Su	mmary	C		15 neers since 1989
		6,	/ 37 Leighton Place, I	Hornsby, NSW 2159, P	h: (02) 9476 9999 Fax	: (02) 9476 8767, mail	@martens.com.au, w	ww.martens.com.au
		e		+ • • • • •			- BACC	0017
Site		Settlement (City S-Center, Por	t Macquarie	DCP Group		P090	
Clie			Manidis Roberts		Log	Date	4/05/	2009
Logge Checke			GT/JF JF/AN					
Comm			JIAN					
Comm	ents							
				TEST DATA				
Depth Interval (m)	DCP 27							Geomean
0.15 0.30	- 17							17
0.45	33							33
0.60	40							40
0.75	38 21							38 21
1.05	16							16
1.20	15							15
1.35	10							10
1.50	8							8
1.80	15							15
1.95	15							15
2.10	17							17
2.25 2.40	13 20							13 20
2.55	17							17
2.70	10							10
2.85	11							11
3.00 3.15	19 25							19 25
3.30	27							27
3.45	25							25
3.60 3.75	22 25							22 25
3.90	19							19
4.05	17							17
4.20 4.35	25 38							25 38
4.50	38							35
4.65	47							47
4.80	41							41
4.95 5.10	16 16							16 16
5.25	17							17
5.40	12							12
5.55 5.70	12							12
5.85	13							14
6.00	19							19
6.15	24							24
6.30 6.45	40 45							40 45
							<u> </u>	
					1		1	

13 Attachment D – Laboratory Results





Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 enquiries@envirolabservices.com.au www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 28732

Client: Martens & Associates 6/37 Leighton Place Hornsby NSW 2077

Attention: Gray Taylor

Sample log in details:

Your Reference: No. of samples: Date samples received: Date completed instructions received:

P0902316, Port Macquarie 73 Soils

07/05/09 07/05/09

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data. Samples were analysed as received from the client. Results relate specifically to the samples as received. Results are reported on a dry weight basis for solids and on an as received basis for other matrices. Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: 15/05/09 Date of Preliminary Report: Not Issued Issue Date: 13/05/09 NATA accreditation number 2901. This document shall not be reproduced except in full. This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Results Approved By:

David Springer Business Development & Quality Manager

Jacinta/Hurst Operations Manager

Envirolab Reference: **Revision No:**



vTPH & BTEX in Soil						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
vTPH C6 - C9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	124	131	128	127	131

vTPH & BTEX in Soil						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
vTPH C6 - C9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	122	113	121	120	121



sTPH in Soil (C10-C36)						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
TPH C10 - C14	mg/kg	<50	<50	<50	<50	<50
TPH C15 - C28	mg/kg	<100	<100	<100	<100	<100
TPH C29 - C36	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	104	101	104	106	88
sTPH in Soil (C10-C36)						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 8
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
TPH C10 - C14	mg/kg	<50	<50	<50	<50	<50
TPH C15 - C28	mg/kg	<100	<100	<100	<100	<100
	1	1	1	1	1	1

<100

103

<100

101

<100

105

<100

111

<100

85

mg/kg

%

TPH C29 - C36

Surrogate o-Terphenyl

PAHs in Soil						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
				301	301	
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	96	91	94	95	99

PAHs in Soil						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
		301	301	301	301	301
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	96	100	95	98	97

Organochlorine Pesticides in soil						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	94	97	98	97	101

Organochlorine Pesticides in soil						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	104	92	97	101	97



Organochlorine Pesticides in soil						
Our Reference:	UNITS	28732-74	28732-75	28732-76	28732-77	28732-78
Your Reference		Composite 4/0.5 + 12/0.4 + 13/0.5	Composite 9/2.7 + 18/3.0	Composite 16/0.2 + 21/0.2 + 25/0.2	Composite 17/0.2 + 18/0.2 + 10/0.2	Composite 19/0.5 + 20/0.5 + 26/0.5
Composite Reference Date Sampled Type of sample		11+12+13 04/05/09 & 05/05/09 Soil	14+15 04/05/09 & 05/05/09 Soil	16+17+18 04/05/09 & 05/05/09 Soil	19+20+21 04/05/09 & 05/05/09 Soil	22+23+24 04/05/09 & 05/05/09 Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	99	88	95	98	96



Client Reference:

P0902316, Port Macquarie

Organochlorine Pesticides in soil			
Our Reference:	UNITS	28732-79	28732-80
Your Reference		Composite 15/0.5 + 22/0.5 + 23/0.5	Composite 11/0.2 + 12/0.2 + 15/0.25
Composite Reference		25+26+27	28+29+30
Date Sampled Type of sample		04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil
Date extracted	-	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009
НСВ	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	95	95



Your Reference Composite Reference	Organophosphorus Pesticides						
Composite Reference Date Sampled Type of sample	Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Date Sampled Type of sample O4/05/09 & 05/05/09 O4/05/09 & 05/05/			2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0
Type of sample 05/05/09 Soil 05/05/0	•		-	-	-	-	-
Number Soil <	•						
Date analysed - 11/05/2009 <td>rype of sample</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	rype of sample						
Diazinon mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Dimethoate mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 Chlorpyriphos-methyl mg/kg <0.1	Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Chlorpyriphos-methyl mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX % 94 97 98 97 101 Organophosphorus Pesticides Our Reference: Your Reference UNITS 28732-6 28732-7 28732-8 28732-9 28732-9 28732-10 Composite Reference	Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Organophosphorus Pesticides Our Reference: UNITS 28732-6 28732-7 28732-8 28732-9 28732-9 28732-10 Your Reference 2316/22/3.0 2316/13/2.8 2316/13/4.2 2316/13/4.2 2316/13/4.2 2316/13/4.2 2316/16/3.0 2316/24/2 Composite Reference -	Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Our Reference: UNITS 28732-6 28732-7 28732-8 28732-9 28732-1 Your Reference 2316/22/3.0 2316/13/2.8 2316/13/4.2	Surrogate TCLMX	%	94	97	98	97	101
Your Reference 2316/22/3.0 2316/13/2.8 2316/13/2.8 2316/13/4.2 2316/16/3.0 2316/24/2 Composite Reference - <td>Organophosphorus Pesticides</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Organophosphorus Pesticides						
Composite Reference Image: Composite Reference Image: Composite Reference Image: Composite Reference Image: Composite Ref	Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Date Sampled Type of sample O4/05/09 & 05/05/09 Soil O4/05/09 & 05/05/09 Soil O4/05/09 & 05/05/09 Soil O4/05/09 & 05/05/09 Soil O4/05/09 & 05/05/09 Soil O4/05/09 & 05/05/09 Soil Date extracted - 11/05/2009 11/0			2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2
Type of sample 05/05/09 Soil 05/05/0	·		-	-	-	-	-
Number Soil <	·						
Date analysed - 11/05/2009 <td>rype of sample</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	rype of sample						
Diazinon mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1 <0.1	Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Dimethoate mg/kg <0.1 <0.1 <0.1 <0.1 <0.1 Chlorpyriphos-methyl mg/kg <0.1	Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Chlorpyriphos-methyl mg/kg <0.1 <0.1 <0.1 <0.1	Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
	Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
	Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
	Ronnel	ma/ka	<01	<01	<01	<01	<01

<0.1

<0.1

<0.1

<0.1

104

<0.1

<0.1

<0.1

<0.1

92

<0.1

<0.1

<0.1

<0.1

97

<0.1

<0.1

<0.1

<0.1

101

Chlorpyriphos

Fenitrothion

Bromophos-ethyl

Ethion

Surrogate TCLMX

mg/kg

mg/kg

mg/kg

mg/kg

%

ACCREDITED FOR TECHNICAL COMPETENCE <0.1

<0.1

<0.1

<0.1

97

Organophosphorus Pesticides						
Our Reference:	UNITS	28732-74	28732-75	28732-76	28732-77	28732-78
Your Reference		Composite 4/0.5 + 12/0.4 + 13/0.5	Composite 9/2.7 + 18/3.0	Composite 16/0.2 + 21/0.2 + 25/0.2	Composite 17/0.2 + 18/0.2 + 10/0.2	Composite 19/0.5 + 20/0.5 + 26/0.5
Composite Reference		11+12+13	14+15	16+17+18	19+20+21	22+23+24
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 8
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	99	88	95	98	96

Organophosphorus Pesticides			
Our Reference:	UNITS	28732-79	28732-80
Your Reference		Composite	Composite
		15/0.5 +	11/0.2 +
		22/0.5 +	12/0.2 +
Osma site Deferre		23/0.5	15/0.25
Composite Reference		25+26+27	28+29+30
Date Sampled		04/05/09 & 05/05/09	04/05/09 & 05/05/09
Type of sample		Soil	Soil
Date extracted	-	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009
Diazinon	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	95	95

PCBs in Soil						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	94	97	98	97	101

PCBs in Soil						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	104	92	97	101	97



Acid Extractable metals in soil						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 8
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/200
Arsenic	mg/kg	6	5	7	6	4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	8	13	11	24	5
Copper	mg/kg	6	8	7	9	3
Lead	mg/kg	4	6	8	6	4
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	6	8	15	3
Zinc	mg/kg	17	20	32	18	20

Acid Extractable metals in soil						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Arsenic	mg/kg	7	15	<4	6	8
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	5	39	6	11	34
Copper	mg/kg	10	15	1	4	10
Lead	mg/kg	1	12	1	3	7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	28	6	13	25
Zinc	mg/kg	8	45	6	11	26



Client Reference:

P0902316, Port Macquarie

Acid Extractable metals in soil						
Our Reference:	UNITS	28732-69	28732-70	28732-71	28732-72	28732-74
Your Reference		2316/Z3	2316/Z10	2316/Z11	2316/Z12	Composite 4/0.5 + 12/0.4 + 13/0.5
Composite Reference		-	-	-	-	11+12+13
Date Sampled Type of sample		04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil
Date digested	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Arsenic	mg/kg	6	8	7	4	7
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	11	24	11	28	13
Copper	mg/kg	7	10	4	6	14
Lead	mg/kg	4	6	3	5	4
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	14	15	17	3
Zinc	mg/kg	17	21	13	21	14
Acid Extractable metals in soil						
Our Reference:	UNITS	28732-75	28732-76	28732-77	28732-78	28732-79
Your Reference		Composite 9/2.7 + 18/3.0	Composite 16/0.2 + 21/0.2 + 25/0.2	Composite 17/0.2 + 18/0.2 + 10/0.2	Composite 19/0.5 + 20/0.5 + 26/0.5	Composite 15/0.5 + 22/0.5 + 23/0.5
Composite Reference		14+15	16+17+18	19+20+21	22+23+24	25+26+27
Date Sampled Type of sample		04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil	04/05/09 & 05/05/09 Soil
Date digested	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Arsenic	mg/kg	12	7	7	<4	5
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	20	15	10	12	16
Copper	mg/kg	5	8	9	1	7
Lead	mg/kg	4	5	11	1	5
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	12	5	7	10	11
Zinc	mg/kg	24	14	42	5	10

Acid Extractable metals in soil		
Our Reference:	UNITS	28732-80
Your Reference		Composite
		11/0.2 +
		12/0.2 +
		15/0.25
Composite Reference		28+29+30
Date Sampled		04/05/09 &
Type of sample		05/05/09 Soil
		3011
Date digested	-	11/05/2009
Date analysed	-	11/05/2009
Arsenic	mg/kg	5
Cadmium	mg/kg	<0.5
Chromium	mg/kg	13
Copper	mg/kg	10
Lead	mg/kg	4
Mercury	mg/kg	<0.1
Nickel	mg/kg	2
Zinc	mg/kg	11

Envirolab Reference: 28732 **Revision No:**



Client Reference:

P0902316, Port Macquarie

Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-7	28732-8	28732-32	28732-33	28732-3
Your Reference		2316/13/2.8	2316/13/4.2	2316/1/3.3	2316/1/4.5	2316/1/7
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/0
		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Date analysed	-	11/05/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Electrical Conductivity 1:5 soil:water	μS/cm	230	120	160	140	110
Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-35	28732-36	28732-37	28732-39	28732-4
Your Reference		2316/1/9.0	2316/5/2.0	2316/5/2.5	2316/5/4.5	2316/5/5
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/0
		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Date analysed	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Electrical Conductivity 1:5 soil:water	µS/cm	100	190	130	290	230
Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-41	28732-42	28732-43	28732-44	28732-4
Your Reference		2316/5/6.0	2316/8/2.0	2316/8/4.0	2316/8/6.0	2316/8/7
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/0
		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Date analysed	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Electrical Conductivity 1:5 soil:water	µS/cm	300	59	110	900	1,100
Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-46	28732-47	28732-48	28732-50	28732-5
Your Reference		2316/13/4.2	2316/14/0.5	2316/14/1.5	2316/14/9.0	2316/16/
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/0 Soil
Date prepared	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Date analysed	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/20
Electrical Conductivity 1:5 soil:water	µS/cm	120	330	92	450	110

Envirolab Reference: 28732 **Revision No:**



Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-53	28732-55	28732-58	28732-59	28732-60
Your Reference		2316/16/5.0	2316/18/2.0	2316/24/1.4	2316/24/4.5	2316/25/1.0
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/2009
Date analysed	-	11/08/2009	11/08/2009	11/08/2009	11/08/2009	11/08/2009
Electrical Conductivity 1:5 soil:water	µS/cm	190	99	56	170	54
Miscellaneous Inorg - soil						
Our Reference:	UNITS	28732-61	28732-62	28732-64	28732-67	28732-68
Your Reference		2316/27/1.0	2316/27/4.0	2316/28/1.0	2316/28/6.0	2316/28/7.
Composite Reference		-	-	-	-	-
Composite Reference Date Sampled		- 04/05/09 &				
		- 04/05/09 & 05/05/09				
Date Sampled						
Date Sampled		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09 Soil
Date Sampled Type of sample	 -	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09

				1		1
Moisture						
Our Reference:	UNITS	28732-1	28732-2	28732-3	28732-4	28732-5
Your Reference		2316/11/0.4	2316/9/0.25	2316/19/0.2	2316/23/0.2	2316/29/0.3
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
		301	301	301	301	301
Date prepared	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Moisture	%	8.3	9.1	9.8	15	4.7
•• • •						1
Moisture						
Our Reference:	UNITS	28732-6	28732-7	28732-8	28732-9	28732-10
Your Reference		2316/22/3.0	2316/13/2.8	2316/13/4.2	2316/16/3.0	2316/24/2.8
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil	05/05/09 Soil
		3011	301	301	3011	301
Date prepared	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Moisture	%	21	33	20	24	28
NA- :						1
Moisture		00700.00	00700 70	00700 74	00700 70	00700 74
Our Reference:	UNITS	28732-69	28732-70	28732-71	28732-72	28732-74
Your Reference		2316/Z3	2316/Z10	2316/Z11	2316/Z12	Composite 4/0.5 + 12/0.4 + 13/0.5
Composite Reference			_			11+12+13
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09 &	05/05/09	05/05/09	04/03/09 & 05/05/09
		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
Moisture	%	8.3	27	23	19	6.9
Moisture						
Our Reference:	UNITS	28732-75	28732-76	28732-77	28732-78	28732-79
Your Reference		Composite	Composite	Composite	Composite	Composite
		9/2.7 + 18/3.0	16/0.2 + 21/0.2 +	17/0.2 + 18/0.2 +	19/0.5 + 20/0.5 +	15/0.5 + 22/0.5 +
			21/0.2 + 25/0.2	10/0.2 +	20/0.5 + 26/0.5	22/0.5 +
Composite Reference		14+15	16+17+18	19+20+21	20/0.5	25+26+27
Date Sampled		04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &	04/05/09 &
Type of sample		05/05/09	05/05/09	05/05/09	05/05/09	05/05/09
1 • • • • • • • • • • • • • • • • • • •		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009
		1		1		
Date analysed	-	11/05/2009	11/05/2009	11/05/2009	11/05/2009	11/05/2009

Moisture		
Our Reference:	UNITS	28732-80
Your Reference		Composite
		11/0.2 +
		12/0.2 +
		15/0.25
Composite Reference		28+29+30
Date Sampled		04/05/09 &
Type of sample		05/05/09
		Soil
Date prepared	-	11/05/2009
Date analysed	-	11/05/2009
Moisture	%	9.7



sPOCAS						
Our Reference:	UNITS	28732-31	28732-32	28732-35	28732-38	28732-43
Your Reference		2316/1/2.5	2316/1/3.3	2316/1/9.0	2316/5/4.0	2316/8/4.0
Composite Reference		-	-	-	-	-
Date Sampled Type of sample		04/05/09 & 05/05/09	04/05/09 & 05/05/09	04/05/09 & 05/05/09	04/05/09 & 05/05/09	04/05/09 8 05/05/09
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared		8/05/2009	8/05/2009	8/05/2009	8/05/2009	8/05/2009
Date analysed		8/05/2009	8/05/2009	8/05/2009	8/05/2009	8/05/2009
pH kcl	pH units	9.3	7.3	6.2	6.7	6.9
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5
	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
s-TAA pH 6.5						
pH ox	pH units	5.4	3.3	2.6	2.0	2.3
TPA pH 6.5	moles H ⁺ /t	<5.0	80	110	685	143
s-TPA pH 6.5	%w/w S	<0.01	0.13	0.18	1.1	0.23
TSA pH 6.5	moles H ⁺ /t	<5.0	80	109	685	143
s-TSA pH 6.5	%w/w S	<0.01	0.13	0.17	1.1	0.23
ANCE	% CaCO3	<0.05	<0.05	<0.05	<0.05	<0.05
a-ANCE	moles H ⁺ /t	<5	<5	<5	<5	<5
s-ANCE	%w/w S	<0.05	<0.05	<0.05	<0.05	<0.05
SKCI	%w/w S	0.009	0.014	0.016	0.089	0.026
Sp	%w/w	0.052	0.23	0.30	1.5	0.41
Spos	%w/w	0.044	0.22	0.29	1.4	0.39
a-Spos	moles H ⁺ /t	27	138	179	866	243
Сакси	%w/w	0.073	0.084	0.019	0.092	0.041
Сар	%w/w	0.13	0.11	0.027	0.13	0.064
Сал	%w/w	0.057	0.022	0.007	0.039	0.022
Мдксі	%w/w	<0.005	0.019	0.007	0.036	<0.005
MgP	%w/w	<0.005	0.019	0.008	0.043	0.005
MgA	%w/w	<0.005	<0.005	<0.005	0.007	<0.005
SRAS	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Sнсі	%w/w S	0.007	0.014	0.012	0.077	0.024
Snas	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
a-Snas	moles H ⁺ /t	<5	<5	<5	<5	<5
s-Snas	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
a-Net Acidity	moles H ⁺ /t	27	99	180	745	176
Liming rate	kg CaCO3/t	2.0	7.5	14	56	13
a-Net Acidity without ANCE	moles H ⁺ /t	NA	NA	NA	NA	NA
Liming rate without ANCE	kg CaCO3/t	NA	NA	NA	NA	NA



sPOCAS						
Our Reference:	UNITS	28732-45	28732-49	28732-52	28732-54	28732-56
Your Reference		2316/8/7.5	2316/14/3.0	2316/16/1.0	2316/16/6.0	2316/18/4.5
Composite Reference		-	-	-	-	-
Date Sampled Type of sample		04/05/09 & 05/05/09				
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared		8/05/2009	8/05/2009	8/05/2009	8/05/2009	8/05/2009
Date analysed		8/05/2009	8/05/2009	8/05/2009	8/05/2009	8/05/2009
pH kcl	pH units	6.7	8.6	9.7	7.4	8.6
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH ox	pH units	3.6	2.4	6.6	3.1	2.6
TPA pH 6.5	moles H ⁺ /t	17	130	<5.0	120	155
s-TPA pH 6.5	%w/w S	0.028	0.21	<0.01	0.19	0.25
TSA pH 6.5	moles H ⁺ /t	17	130	<5.0	120	155
s-TSA pH 6.5	%w/w S	0.028	0.21	<0.01	0.19	0.25
ANCE	% CaCO3	<0.05	<0.05	0.2	<0.05	<0.05
a-ANCE	moles H ⁺ /t	<5	<5	50	<5	<5
s-ANCe	%w/w S	<0.05	<0.05	0.08	<0.05	<0.05
SKCI	%w/w S	0.028	0.042	0.007	0.020	0.042
Sp	%w/w	0.10	0.47	0.015	0.31	0.63
Spos	%w/w	0.075	0.43	0.008	0.29	0.58
a-Spos	moles H ⁺ /t	47	267	<5.0	180	365
Саксі	%w/w	0.043	0.075	0.087	0.047	0.12
Сар	%w/w	0.047	0.17	0.31	0.063	0.27
СаА	%w/w	<0.005	0.092	0.22	0.016	0.15
Мдксі	%w/w	0.056	0.005	<0.005	0.016	0.018
Мдр	%w/w	0.058	0.007	0.010	0.018	0.025
MgA	%w/w	<0.005	<0.005	0.006	<0.005	0.007
SRAS	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Shci	%w/w S	0.024	0.030	0.012	0.024	0.039
Snas	%w/w S	< 0.005	< 0.005	0.005	< 0.005	< 0.005
a-Snas	moles H ⁺ /t	<5	<5	<5	<5	<5
s-Snas	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
a-Net Acidity	moles H ⁺ /t	27	176	<10	140	225
Liming rate	kg CaCO3/t	2.0	13	<0.75	11	17
a-Net Acidity without ANCE	moles H ⁺ /t	NA	NA	<10	NA	NA
Liming rate without ANCE	kg CaCO3/t	NA	NA	<0.75	NA	NA



sPOCAS						
Our Reference:	UNITS	28732-57	28732-58	28732-63	28732-65	28732-66
Your Reference		2316/24/0.5	2316/24/1.4	2316/27/5.5	2316/28/2.9	2316/28/5.0
Composite Reference		-	-	-	-	-
Date Sampled		04/05/09 & 05/05/09				
Type of sample		Soil	Soil	Soil	Soil	Soil
Data propared		8/05/2009	8/05/2009	8/05/2009	8/05/2009	8/05/2009
Date prepared	-					8/05/2009
Date analysed	-	8/05/2009	8/05/2009	8/05/2009	8/05/2009	
pH kcl	pH units	9.6	9.7	6.2	4.8	5.3
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	25	5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.040	<0.01
pH ox	pH units	6.1	6.3	2.8	3.1	2.8
TPA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	190	125
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.30	0.20
TSA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	165	120
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.26	0.19
ANCE	% CaCO ₃	<0.05	<0.05	<0.05	<0.05	<0.05
a-ANCe	moles H ⁺ /t	<5	<5	<5	<5	<5
s-ANCe	%w/w S	<0.05	<0.05	<0.05	<0.05	<0.05
Skci	%w/w S	<0.005	<0.005	0.023	0.061	0.020
SP	%w/w	0.009	<0.005	0.25	0.38	0.26
Spos	%w/w	0.005	<0.005	0.23	0.31	0.24
a-Spos	moles H ⁺ /t	<5.0	<5.0	141	196	149
Саксі	%w/w	0.070	0.076	0.044	0.046	0.026
Сар	%w/w	0.11	0.12	0.042	0.059	0.024
СаА	%w/w	0.037	0.046	<0.005	0.013	<0.005
Мдксі	%w/w	<0.005	<0.005	0.006	0.024	<0.005
Мдр	%w/w	<0.005	<0.005	0.006	0.027	<0.005
MgA	%w/w	<0.005	<0.005	<0.005	<0.005	< 0.005
SRAS	%w/w	<0.005	<0.005	<0.005	<0.005	< 0.005
Sнсі	%w/w S	0.005	< 0.005	0.030	0.078	0.022
Snas	%w/w S	< 0.005	< 0.005	0.007	0.017	< 0.005
a-Snas	moles H ⁺ /t	<5	<5	<5	7.7	<5
s-Snas	%w/w S	<0.01	<0.01	<0.01	0.012	<0.01
a-Net Acidity	moles H ⁺ /t	<10	<10	142	221	154
Liming rate	kg CaCO3/t	<0.75	<0.75	11	17	12
a-Net Acidity without ANCE	moles H ⁺ /t	NA	NA	NA	NA	NA
Liming rate without ANCE	kg CaCO3/t	NA	NA	NA	NA	NA



Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC.8	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals.20 ICP- AES	Determination of various metals by ICP-AES.
Metals.21 CV- AAS	Determination of Mercury by Cold Vapour AAS.
LAB.2	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED and Rayment & Higginson.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
LAB.64	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTPH & BTEX in Soil						Base II Duplicate II %RPD		
Date extracted	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
vTPH C6 - C9	mg/kg	25	GC.16	<25	28732-1	<25 <25	LCS-1	107%
Benzene	mg/kg	0.5	GC.16	<0.5	28732-1	<0.5 <0.5	LCS-1	112%
Toluene	mg/kg	0.5	GC.16	<0.5	28732-1	<0.5 <0.5	LCS-1	94%
Ethylbenzene	mg/kg	1	GC.16	<1.0	28732-1	<1.0 <1.0	LCS-1	110%
m+p-xylene	mg/kg	2	GC.16	<2.0	28732-1	<2.0 <2.0	LCS-1	109%
o-Xylene	mg/kg	1	GC.16	<1.0	28732-1	<1.0 <1.0	LCS-1	114%
<i>Surrogate</i> aaa- Trifluorotoluene	%		GC.16	135	28732-1	124 119 RPD: 4	LCS-1	133%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
sTPH in Soil (C10-C36)						Base II Duplicate II %RPD		
Date extracted	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
TPH C10 - C14	mg/kg	50	GC.3	<50	28732-1	<50 <50	LCS-1	126%
TPH C15 - C28	mg/kg	100	GC.3	<100	28732-1	<100 <100	LCS-1	123%
TPH C29 - C36	mg/kg	100	GC.3	<100	28732-1	<100 <100	LCS-1	118%
Surrogate o-Terphenyl	%		GC.3	110	28732-1	104 108 RPD: 4	LCS-1	116%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Date extracted	-			11/05/2 009	28732-1	11/05/2009 11/05/2009	LCS-1	11/05/2009
Date analysed	-			11/05/2 009	28732-1	11/05/2009 11/05/2009	LCS-1	11/05/2009
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	93%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	94%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	99%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	94%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	99%
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	LCS-1	108%

Envirolab Reference: 28732 Revision No: R 00

	Client Reference: P0902316, Port Macquarie									
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery		
PAHs in Soil						Base II Duplicate II %RPD				
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	28732-1	<0.2 <0.2	[NR]	[NR]		
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	28732-1	<0.05 <0.05	LCS-1	88%		
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]		
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]		
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]		
Surrogate p-Terphenyl- d14	%		GC.12 subset	99	28732-1	96 97 RPD: 1	LCS-1	95%		

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Organochlorine Pesticides in soil						Base II Duplicate II %RPD		
Date extracted	-	-		11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
НСВ	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	99%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	122%
Heptachlor	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	100%
delta-BHC	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	113%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	106%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	100%
Dieldrin	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	107%
Endrin	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	112%
pp-DDD	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	113%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	LCS-1	104%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	93	28732-1	94 96 RPD: 2	LCS-1	92%


Client Reference: P0902316, Port Macquarie

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Organophosphorus Pesticides						Base II Duplicate II %RPD		
Date extracted	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Diazinon	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	LCS-1	101%
Fenitrothion	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	LCS-1	135%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	28732-1	<0.1 <0.1	LCS-1	119%
Surrogate TCLMX	%		GC.8	93	28732-1	94 96 RPD: 2	LCS-1	92%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PCBs in Soil						Base II Duplicate II %RPD		
Date extracted	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-1	11/5/09
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	LCS-1	110%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	28732-1	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	93	28732-1	94 96 RPD: 2	LCS-1	110%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		-
Date digested	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-5	11/5/09
Date analysed	-			11/5/09	28732-1	11/05/2009 11/05/2009	LCS-5	11/5/09
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	28732-1	6 6 RPD: 0	LCS-5	105%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	28732-1	<0.5 <0.5	LCS-5	101%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	28732-1	8 14 RPD: 55	LCS-5	106%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	28732-1	6 8 RPD: 29	LCS-5	103%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	28732-1	4 5 RPD: 22	LCS-5	102%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	28732-1	<0.1 <0.1	LCS-5	104%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	28732-1	4 5 RPD: 22	LCS-5	106%

Envirolab Reference: 28732 **Revision No:**

R 00



Page 26 of 33

		Clie	ent Reference	ce: P	0902316, Port	Macquarie		
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	28732-1	17 16 RPD: 6	LCS-5	107%
				Disale	Durylia eta Ora //	Duralizate as suffs	0	On the Of
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorg - soil						Base II Duplicate II %RPD		
Date prepared	-			11/08/2 009	28732-7	11/08/2009 11/08/2009	LCS-1	11/08/2009
Date analysed	-			11/08/2 009	28732-7	11/05/2009 11/08/2009	LCS-1	11/08/2009
Electrical Conductivity	µS/cm	1	LAB.2	<1.0	28732-7	230 230 RPD: 0	LCS-1	104%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			11/05/2 009
Date analysed	-			11/05/2 009
Moisture	%	0.1	LAB.8	<0.10

1:5 soil:water

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
sPOCAS						Base II Duplicate II %RPD		-
Date prepared	-			8/5/09	28732-56	8/05/2009 8/05/2009	LCS	8/5/09
Date analysed	-			8/5/09	28732-56	8/05/2009 8/05/2009	LCS	8/5/09
рН ксі	pH units		LAB.64	5.9	28732-56	8.6 8.7 RPD: 1	LCS	101%
TAA pH 6.5	moles H ⁺ /t	5	LAB.64	<5	28732-56	<5 <5	LCS	117%
s-TAA pH 6.5	%w/w S	0.01	LAB.64	<0.01	28732-56	<0.01 <0.01	LCS	120%
pH ox	pH units		LAB.64	4.0	28732-56	2.6 2.6 RPD: 0	LCS	94%
TPA pH 6.5	moles H ⁺ /t	5	LAB.64	<5.0	28732-56	155 168 RPD: 8	LCS	93%
s-TPA pH 6.5	%w/w S	0.01	LAB.64	<0.01	28732-56	0.25 0.27 RPD: 8	LCS	93%
TSA pH 6.5	moles H ⁺ /t	5	LAB.64	<5.0	28732-56	155 168 RPD: 8	LCS	92%
s-TSA pH 6.5	%w/w S	0.01	LAB.64	<0.01	28732-56	0.25 0.27 RPD: 8	LCS	93%
ANCE	% CaCO3	0.05	LAB.64	<0.05	28732-56	<0.05 <0.05	[NR]	[NR]
a-ANCe	moles H ⁺ /t	5	LAB.64	<5	28732-56	<5 <5	[NR]	[NR]
s-ANCe	%w/w S	0.05	LAB.64	<0.05	28732-56	<0.05 <0.05	[NR]	[NR]
Sксı	%w/w S	0.005	LAB.64	<0.005	28732-56	0.042 0.038 RPD: 10	LCS	118%

Envirolab Reference: Revision No:



QUALITY CONTROL	UNITS	PQL	METHOD	Blank	0902316, Port	-	Spike	Sm#	Spike %
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Бріке	Sm#	Recovery
sPOCAS						Base II Duplicate II %RPD	>		
Sp	%w/w	0.005	LAB.64	<0.005	28732-56	0.63 0.63 RPD: 0)	LCS	106%
Spos	%w/w	0.005	LAB.64	<0.005	28732-56	0.58 0.59 RPD: 2	2	LCS	103%
a-Spos	moles H ⁺ /t	5	LAB.64	<5.0	28732-56	365 368 RPD: 1		LCS	103%
Саксі	%w/w	0.005	LAB.64	<0.005	28732-56	0.12 0.11 RPD: 9)	LCS	99%
Сар	%w/w	0.005	LAB.64	<0.005	28732-56	0.27 0.25 RPD: 8	3	LCS	94%
CaA	%w/w	0.005	LAB.64	<0.005	28732-56	0.15 0.14 RPD: 7	,	[NR]	[NR]
Мдксі	%w/w	0.005	LAB.64	<0.005	28732-56	0.018 0.015 RPD:	18	LCS	98%
МgР	%w/w	0.005	LAB.64	<0.005	28732-56	0.025 0.025 RPD:	0	LCS	92%
MgA	%w/w	0.005	LAB.64	<0.005	28732-56	0.007 0.009 RPD:	25	[NR]	[NR]
SRAS	%w/w	0.005	LAB.64	<0.005	28732-56	<0.005 <0.005		[NR]	[NR]
Sнсі	%w/w S	0.005	LAB.64	<0.005	28732-56	0.039 0.042 RPD:	7	LCS	82%
Snas	%w/w S	0.005	LAB.64	<0.005	28732-56	<0.005 <0.005		[NR]	[NR]
a-Snas	moles H ⁺ /t	5	LAB.64	<5	28732-56	<5 <5		[NR]	[NR]
s-Snas	%w/w S	0.01	LAB.64	<0.01	28732-56	<0.01 <0.01		[NR]	[NR]
a-Net Acidity	moles H ⁺ /t	10	LAB.64	<10	28732-56	225 234 RPD: 4		LCS	104%
Liming rate	kg CaCO3 /t	0.75	LAB.64	<0.75	28732-56	17 18 RPD: 6		LCS	104%
a-Net Acidity without ANCE	moles H ⁺ /t	10	LAB.64	<10	28732-56	NA NA		[NR]	[NR]
Liming rate without ANCE	kg CaCO3	0.75	LAB.64	<0.75	28732-56	NA NA		[NR]	[NR]
	/t								
QUALITY CONTROL vTPH & BTEX in Soil	UNIT	S	Dup. Sm#	Base +	Duplicate Duplicate + %RPI	Spike Sm#	Spike % F	Recovery	
Date extracted	-		[NT]		[NT]	28732-2	11/5	/09	
Date analysed	-		[NT]		[NT]	28732-2	11/5	/09	
vTPH C6 - C9	mg/k	a	[NT]		[NT]	28732-2	889	%	
Benzene	mg/k		[NT]		[NT]	28732-2	899		
Toluene		-	[NT]			28732-2	869		
	mg/k				[NT]				
Ethylbenzene m+p-xylene	mg/k		[NT] [NT]		[NT] [NT]	28732-2 28732-2	879 899		
o-Xylene	mg/k		[NT]		[NT]	28732-2	929		
Surrogate aaa- Trifluorotoluene	%	3	[NT]		[NT]	28732-2	138		



QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
sTPH in Soil (C10-C36)		•	Base + Duplicate + %RPD	·	
Date extracted	-	[NT]	[NT]	28732-2	11/5/09
Date analysed	-	[NT]	[NT]	28732-2	11/5/09
TPH C10 - C14	mg/kg	[NT]	[NT]	28732-2	111%
TPH C15 - C28	mg/kg	[NT]	[NT]	28732-2	108%
TPH C29 - C36	mg/kg	[NT]	[NT]	28732-2	101%
Surrogate o-Terphenyl	%	[NT]	[NT]	28732-2	101%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
			· · ·		
Date extracted	-	[NT]	[NT]	28732-2	11/05/2009
Date analysed	-	[NT]	[NT]	28732-2	11/05/2009
Naphthalene	mg/kg	[NT]	[NT]	28732-2	96%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	28732-2	95%
Phenanthrene	mg/kg	[NT]	[NT]	28732-2	101%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	28732-2	93%
Pyrene	mg/kg	[NT]	[NT]	28732-2	99%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	28732-2	109%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	28732-2	89%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
<i>Surrogate p</i> -Terphenyl- d ₁₄	%	[NT]	[NT]	28732-2	95%



QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
Organochlorine Pesticides in soil		Bup. onii	Base + Duplicate + %RPD		
Date extracted	-	[NT]	[NT]	28732-2	11/5/09
Date analysed	-	[NT]	[NT]	28732-2	11/5/09
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	28732-2	101%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	28732-2	125%
Heptachlor	mg/kg	[NT]	[NT]	28732-2	110%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	28732-2	114%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	28732-2	107%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	28732-2	100%
Dieldrin	mg/kg	[NT]	[NT]	28732-2	108%
Endrin	mg/kg	[NT]	[NT]	28732-2	114%
pp-DDD	mg/kg	[NT]	[NT]	28732-2	114%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	28732-2	105%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	28732-2	93%



		Client Referen	ce: P0902316, Port Ma	cquarie	
QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	28732-2	11/5/09
Date analysed	-	[NT]	[NT]	28732-2	11/5/09
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	28732-2	100%
Fenitrothion	mg/kg	[NT]	[NT]	28732-2	134%
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	28732-2	123%
Surrogate TCLMX	%	[NT]	[NT]	28732-2	101%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	28732-2	11/5/09
Date analysed	-	[NT]	[NT]	28732-2	11/5/09
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	28732-2	107%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	28732-2	122%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	28732-69	11/05/2009 11/05/2009	LCS-6	11/5/09
Date analysed	-	28732-69	11/05/2009 11/05/2009	LCS-6	11/5/09
Arsenic	mg/kg	28732-69	6 6 RPD: 0	LCS-6	102%
Cadmium	mg/kg	28732-69	<0.5 <0.5	LCS-6	99%
Chromium	mg/kg	28732-69	11 10 RPD: 10	LCS-6	103%
Copper	mg/kg	28732-69	7 8 RPD: 13	LCS-6	103%
Lead	mg/kg	28732-69	4 4 RPD: 0	LCS-6	100%
Mercury	mg/kg	28732-69	<0.1 <0.1	LCS-6	103%
Nickel	mg/kg	28732-69	4 4 RPD: 0	LCS-6	103%
Zinc	mg/kg	28732-69	17 14 RPD: 19	LCS-6	104%

Envirolab Reference: 28732 Revision No:



		Client Referen	ce: P0902316, Port Ma	Icquarie	
QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	28732-41	11/08/2009 11/08/2009	LCS-2	11/08/2009
Date analysed	-	28732-41	11/08/2009 11/08/2009	LCS-2	11/08/2009
Electrical Conductivity 1:5 soil:water	µS/cm	28732-41	300 330 RPD: 10	LCS-2	102%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	28732-2	11/5/09
Date analysed	-	[NT]	[NT]	28732-2	11/5/09
Arsenic	mg/kg	[NT]	[NT]	28732-2	100%
Cadmium	mg/kg	[NT]	[NT]	28732-2	96%
Chromium	mg/kg	[NT]	[NT]	28732-2	102%
Copper	mg/kg	[NT]	[NT]	28732-2	107%
Lead	mg/kg	[NT]	[NT]	28732-2	95%
Mercury	mg/kg	[NT]	[NT]	28732-2	103%
Nickel	mg/kg	[NT]	[NT]	28732-2	100%
Zinc	mg/kg	[NT]	[NT]	28732-2	96%
QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date prepared	-	28732-53	11/08/2009 11/08/2009		
Date analysed	-	28732-53	11/08/2009 11/08/2009		
Electrical Conductivity 1:5 soil:water	µS/cm	28732-53	190 200 RPD: 5		



Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than

RPD: Relative Percent Difference	NA: Test not required	LCS: Laboratory Control Sample	NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples. **Duplicate**: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

Envirolab Reference: 28732 Revision No: R 00 OMPETENCE

>: Greater than



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CERTIFICATE OF ANALYSIS 29273

Client: Martens & Associates 6/37 Leighton Place Hornsby NSW 2077

Attention: Megan Bowling

Sample log in details:

Your Reference: No. of samples: Date samples received: Date completed instructions received:

P0902316, Port Macquarie

10 Soils 28/05/09 28/05/09

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data. Samples were analysed as received from the client. Results relate specifically to the samples as received. Results are reported on a dry weight basis for solids and on an as received basis for other matrices. Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: 5/06/09 Date of Preliminary Report: Not Issued Issue Date: 5/06/09 NATA accreditation number 2901. This document shall not be reproduced except in full. This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Results Approved By:

David Springer/

Business Development & Quality Manager

Envirolab Reference: **Revision No:**



Client Reference: P0902316, Port Macquarie

sPOCAS		00077	00070 -	00070 -	00075	00076 -
Our Reference:	UNITS	29273-1	29273-2	29273-3	29273-4	29273-5
Your Reference Type of sample		2316/2/1.0 Soil	2316/6/1.4 Soil	2316/9/1.0 Soil	2316/14/1.5 Soil	2316/16/1.5 Soil
Date Sampled		04-05/05/09	04-05/05/09	04-05/05/09	04-05/05/09	Soli 04-05/05/09
Date prepared	-	29/05/2009	29/05/2009	29/05/2009	29/05/2009	29/05/2009
Date analysed	_	29/05/2009	29/05/2009	29/05/2009	29/05/2009	29/05/2009
pH kcl	pH units	9.3	9.6	9.5	9.7	9.6
TAA pH 6.5	moles	<5	<5	<5	<5	<5
	H ⁺ /t					
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH ox	pH units	7.0	7.0	7.1	7.0	7.0
TPA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	<5.0	<5.0
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TSA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	<5.0	<5.0
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE	% CaCO ₃	0.75	0.88	0.75	0.75	0.63
a-ANCe	moles H ⁺ /t	150	175	150	150	125
s-ANCE	%w/w S	0.24	0.28	0.24	0.24	0.20
SKCI	%w/w S	0.008	<0.005	<0.005	<0.005	0.011
Sp	%w/w	0.022	0.005	0.015	0.009	0.019
Spos	%w/w	0.014	<0.005	0.014	<0.005	0.008
a-Spos	moles H ⁺ /t	8.6	<5.0	8.5	<5.0	5.0
Саксі	%w/w	0.11	0.093	0.10	0.10	0.10
Сар	%w/w	0.43	0.41	0.38	0.42	0.47
Сал	%w/w	0.32	0.32	0.27	0.32	0.36
Мдксі	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
MgP	%w/w	0.005	<0.005	<0.005	<0.005	0.007
MgA	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
SRAS	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Shci	%w/w S	0.009	<0.005	<0.005	0.007	0.011
Snas	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
a-Snas	moles H ⁺ /t	<5	<5	<5	<5	<5
s-Snas	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
a-Net Acidity	moles H ⁺ /t	<10	<10	<10	<10	<10
Liming rate	kg CaCO₃/t	<0.75	<0.75	<0.75	<0.75	<0.75
a-Net Acidity without ANCE	moles H ⁺ /t	<10	<10	<10	<10	<10
Liming rate without ANCE	kg CaCO₃/t	<0.75	<0.75	<0.75	<0.75	<0.75



Client Reference: P0902316, Port Macquarie

sPOCAS Our Reference:	UNITS	29273-6	29273-7	29273-8	29273-9	29273-10
Your Reference		2316/18/1.0	2316/18/1.5	2316/27/1.0	2316/29/1.0	2316/29/1.4
Type of sample		Soil	Soil	Soil	Soil 04-05/05/09	Soil 04-05/05/09
Date Sampled		04-05/05/09	04-05/05/09	04-05/05/09		
Date prepared	-	29/05/2009	29/05/2009	29/05/2009	29/05/2009	29/05/2009
Date analysed	-	29/05/2009	29/05/2009	29/05/2009	29/05/2009	29/05/2009
рН ксі	pH units	9.6	9.4	9.5	9.5	9.6
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH ox	pH units	7.2	7.2	6.6	7.0	7.0
TPA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	<5.0	<5.0
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TSA pH 6.5	moles H ⁺ /t	<5.0	<5.0	<5.0	<5.0	<5.0
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE	% CaCO ₃	0.75	0.63	0.2	0.50	0.4
a-ANCE	moles H ⁺ /t	150	125	50	100	75
s-ANCe	%w/w S	0.24	0.20	0.08	0.16	0.12
SKCI	%w/w S	0.008	0.024	<0.005	0.030	0.014
Sp	%w/w	0.019	0.030	0.005	0.039	0.018
Spos	%w/w	0.012	0.005	<0.005	0.008	<0.005
a-Spos	moles H ⁺ /t	7.4	<5.0	<5.0	5.1	<5.0
Саксі	%w/w	0.10	0.12	0.069	0.11	0.094
Сар	%w/w	0.45	0.44	0.097	0.34	0.25
СаА	%w/w	0.34	0.32	0.028	0.23	0.15
Мдксі	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Мдр	%w/w	<0.005	<0.005	<0.005	0.005	<0.005
MgA	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
SRAS	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Sнсі	%w/w S	0.009	0.025	<0.005	0.024	0.014
SNAS	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
a-Snas	moles H ⁺ /t	<5	<5	<5	<5	<5
s-Snas	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
a-Net Acidity	moles H ⁺ /t	<10	<10	<10	<10	<10
Liming rate	kg CaCO₃/t	<0.75	<0.75	<0.75	<0.75	<0.75
a-Net Acidity without ANCE	moles H ⁺ /t	<10	<10	<10	<10	<10
Liming rate without ANCE	kg CaCO₃/t	<0.75	<0.75	<0.75	<0.75	<0.75

ACCREDITED FOR TECHNICAL COMPETENCE

Method ID	Methodology Summary
LAB.64	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

Envirolab Reference: **Revision No:** R 00

29273



Client Reference:

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
POCAS						Base II Duplicate II %RPD		
Date prepared	-			29/5/09	29273-1	29/05/2009 29/05/2009	LCS	29/5/09
Date analysed	-			29/5/09	29273-1	29/05/2009 29/05/2009	LCS	29/5/09
рН ксі	pH units		LAB.64	5.9	29273-1	9.3 9.5 RPD: 2	LCS	103%
TAA pH 6.5	moles H⁺/t	5	LAB.64	<5	29273-1	<5 <5	LCS	109%
s-TAA pH 6.5	%w/w S	0.01	LAB.64	<0.01	29273-1	<0.01 <0.01	LCS	112%
pH ox	pH units		LAB.64	4.3	29273-1	7.0 7.0 RPD: 0	LCS	100%
TPA pH 6.5	moles H ⁺ /t	5	LAB.64	<5.0	29273-1	<5.0 <5.0	LCS	98%
s-TPA pH 6.5	%w/w S	0.01	LAB.64	<0.01	29273-1	<0.01 <0.01	LCS	98%
TSA pH 6.5	moles H ⁺ /t	5	LAB.64	<5.0	29273-1	<5.0 <5.0	LCS	98%
s-TSA pH 6.5	%w/w S	0.01	LAB.64	<0.01	29273-1	<0.01 <0.01	LCS	99%
ANCE	% CaCO3	0.05	LAB.64	<0.05	29273-1	0.75 0.63 RPD: 17	[NR]	[NR]
a-ANCE	moles H ⁺ /t	5	LAB.64	<5	29273-1	150 125 RPD: 18	[NR]	[NR]
s-ANCe	%w/w S	0.05	LAB.64	<0.05	29273-1	0.24 0.20 RPD: 18	[NR]	[NR]
Sксі	%w/w S	0.005	LAB.64	<0.005	29273-1	0.008 0.006 RPD: 29	LCS	111%
Sp	%w/w	0.005	LAB.64	<0.005	29273-1	0.022 0.021 RPD: 5	LCS	111%
Spos	%w/w	0.005	LAB.64	<0.005	29273-1	0.014 0.015 RPD: 7	LCS	112%
a-Spos	moles H ⁺ /t	5	LAB.64	<5.0	29273-1	8.6 9.3 RPD: 8	LCS	111%
Саксі	%w/w	0.005	LAB.64	<0.005	29273-1	0.11 0.10 RPD: 10	LCS	106%
Сар	%w/w	0.005	LAB.64	<0.005	29273-1	0.43 0.38 RPD: 12	LCS	100%
Са	%w/w	0.005	LAB.64	<0.005	29273-1	0.32 0.28 RPD: 13	[NR]	[NR]
Мдксі	%w/w	0.005	LAB.64	<0.005	29273-1	<0.005 <0.005	LCS	104%
Мдр	%w/w	0.005	LAB.64	<0.005	29273-1	0.005 0.005 RPD: 0	LCS	96%
MgA	%w/w	0.005	LAB.64	<0.005	29273-1	<0.005 <0.005	[NR]	[NR]
SRAS	%w/w	0.005	LAB.64	<0.005	29273-1	<0.005 <0.005	[NR]	[NR]
Sнсі	%w/w S	0.005	LAB.64	<0.005	29273-1	0.009 0.009 RPD: 0	LCS	80%
Snas	%w/w S	0.005	LAB.64	<0.005	29273-1	<0.005 <0.005	[NR]	[NR]
a-Snas	moles H ⁺ /t	5	LAB.64	<5	29273-1	<5 <5	[NR]	[NR]
s-Snas	%w/w S	0.01	LAB.64	<0.01	29273-1	<0.01 <0.01	[NR]	[NR]
a-Net Acidity	moles H ⁺ /t	10	LAB.64	<10	29273-1	<10 <10	LCS	1119
Liming rate	kg CaCO3 /t	0.75	LAB.64	<0.75	29273-1	<0.75 <0.75	LCS	1119

Envirolab Reference: 29273 **Revision No:**



Client Reference: P0902316, Port Macquarie										
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery		
sPOCAS						Base II Duplicate II %RPD				
a-Net Acidity without ANCE	moles H ⁺ /t	10	LAB.64	<10	29273-1	<10 <10	[NR]	[NR]		
Liming rate without ANCE	kg CaCO3 /t	0.75	LAB.64	<0.75	29273-1	<0.75 <0.75	[NR]	[NR]		

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job

INS: Insufficient sample for this test	NT: Not tested	PQL: PI	ractical Quantitation Limit	<: Less t	:han >: G	Freater than
RPD: Relative Percent Difference	NA: Test not re	quired	LCS: Laboratory Control S	Sample	NR: Not re	equested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples. **Duplicate**: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

Envirolab Reference: 292 Revision No: R 0

