Shoalhaven City Council

C/- Set Consulting Pty Ltd

# Geotechnical Assessment- Lot 1, DP1021332 and Lot 458, DP1063107 George Evans Rd, Mundamia, NSW

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

P0102863JR02V01
December 2012

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

# Contents

# 1 Overview

## 1.1 Assessment Overview

Martens & Associates Pty Ltd (MA) have been commissioned to carry out a geotechnical assessment to support the subdivision of Lot 1, DP1021332 and Lot 458, DP1063107 (the 'site').

The purpose of this assessment is to investigate the site's geotechnical features, constraints and any possible geotechnical risk involved with future development plans (subdivision for residential purposes).

## 1.2 Development Proposal

At the time of reporting, the following details regarding components of the development proposal were available:

- Proposed subdivision into residential allotments.
- Internal road network with associated stormwater drainage.
- Sewerage, water, power and gas infrastructure to service the development.

# 2 Site Description

## 2.1 Location and Existing Landuse

The 15.5ha (approx.) site is located at George Evans Road, Mundamia within the Shoalhaven Local Government Area (LGA) and is surrounded by predominantly underdeveloped bushland and rural land (Figure 1).

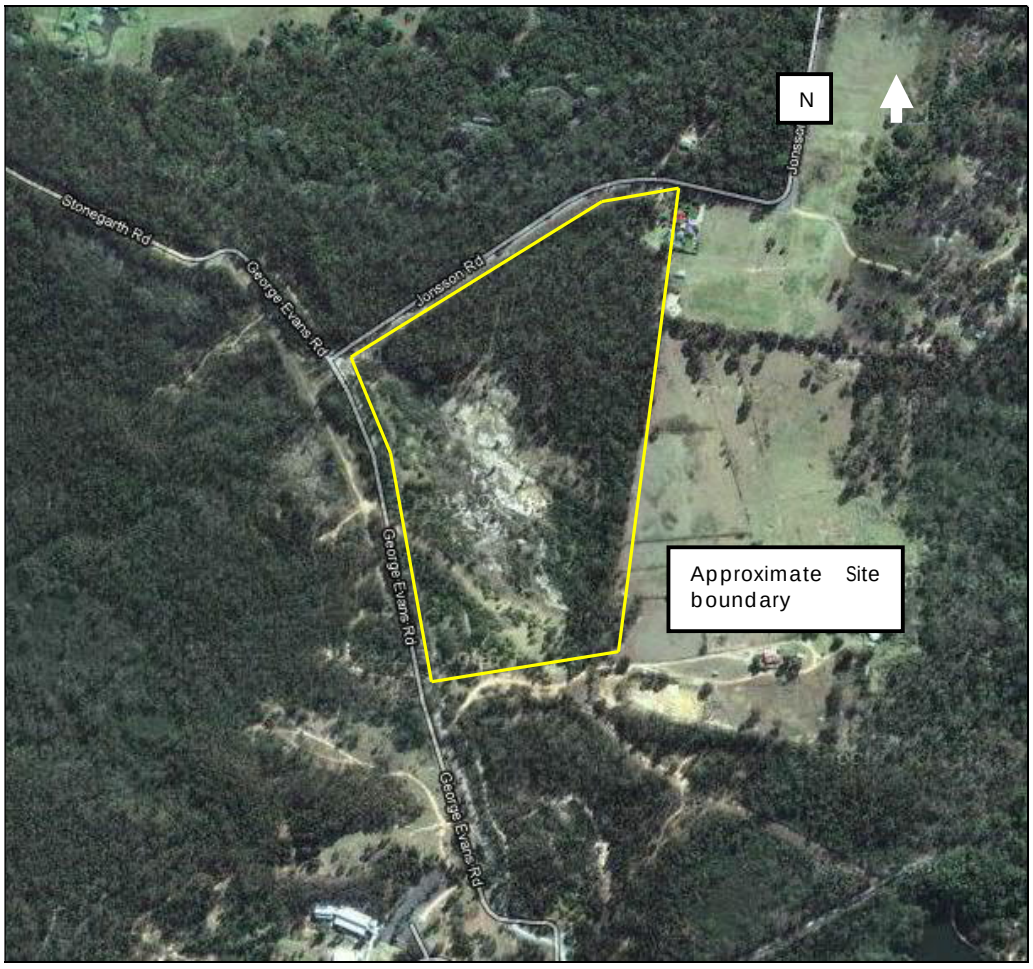


Figure 1: Site location

The site consists of a large area of disturbed land (towards the centre) primarily as the result of its past use as a quarry / gravel pit.

## 2.2 Topography and Drainage

Previous site use as a quarry / gravel pit has reshaped the natural site surface. The site falls to its centre which consists of a flat (slopes <5%) exposed sandstone surface. Drainage is facilitated by a manmade channel that runs north and exits the site under Jonsson Rd.

## 2.3 Groundwater

Site groundwater conditions are described as follows:

- Groundwater was observed in one test pit (TP108) and moist soil conditions reported in test pits located in the site's south.
- All other boreholes and test pits provided no indication of groundwater prior to termination depth.

A hydrogelocial assessment for the Mundamia urban release area was completed by Martens and Associates in February 2011 (Martens ref: P1002761JR01V02). Two groundwater monitoring wells GMB2 (south) and GMB4 (north) were installed on the site as part of this study (Figure 2). The following is summarised from the 4 month well monitoring period:

- GMB2 was saturated above the soil/rock interface for the whole of the monitoring perid.
- GMB4 remained dry above the soil/rock interface throughout the whole of the monitoring period. This is expected given that the silty gravely layer above the rock is considered to be highly permeable.

Given the site geological characteristics, ephemeral (temporary) groundwater is likely to occur in regions of the site's south in less permeable soils (sandy clay fill). A shallow (<2m) permanent groundwater table is not expected on site.

## 2.4 Geology and Soil Landscapes

Geological survey of NSW geology sheet (Wollongong 5609) maps the site being underlain by Nowra Sandstone, a subgroup of the Megalong Conglomerate Group geology.

# 3 Geotechnical Assessment

## 3.1 Field Investigations

Site inspection undertaken on 19 - 20 September 2012 included the following:

- General walkover inspection of site and nearby areas to review local geology, topography and vegetation.
- Excavation of fourteen boreholes using a truck mounted hydraulic drilling rig and hand auger to determine the nature of subsurface materials.
- Excavation of thirteen test pits using backhoe.
- Excavation of thirteen boreholes / test pits with the use of a hand auger and spade
- Collection of 32 soils samples for Atterberg Limits, Shrinkage Index, pH, emersion aggregate class, particle size distribution, CBR analysis and soil agresstivity.

Location of sub-surface investigations are documented on the site plan provided in Attachment A

## 3.2 Subsurface Conditions

Subsurface conditions have been divided into geotechnical land units (Table 1). Due to the size of the site and scope of investigation, division into geotechnical units is broad and variability exists within units. A plan outlining each units is available in Attachment A.

Table 1: Geotechnical land units

| Unit | Relevant BH/TP/SS | Description |
|---|---|---|
| 1 | TP102 - TP105, TP108, TP111, TP112, TP113, BH116, BH120, BH138 | Surface fill (0.0 – 2.3) - clay, silty and sandy clay with inclusions: Builders rubble, concrete, timber, steel, PVC pipe, fibrous sheeting, glass. |
| 2 | BH115, SS114, SS119, SS122, TP123 | Predominantly exposed sandstone from previous quarrying and soil stripping. <20% of the area contains shallow silty sand topsoil. |

| Unit | Relevant BH/TP/SS | Description |
|---|---|---|
| 3 | BH101, BH106, BH107, BH109, BH110, TP117, TP118, TP124, TP125, TP126 – TP128, BH129, BH130, TP131, BH132, BH133, TP134, TP137 | Natural soil profile – Clayey gravely sands and sandy clays overlaying weathered sandstone. Stiff clays encountered in the site's south (BH101 and BH106). Depth to weathered sandstone is variable across the unit from 0.4 – 1.1 m. |

## 3.3 Soil Stockpiles

Four soil stockpiles were identified during site investigations and are summarised in Table 2. Stockpile locations are highlighted on site testing plan in Attachment A

Table 2: Site stockpiles

| Stockpile Description | Associated BH / TP | Material Description |
|---|---|---|
| Likely imported material from unknown origin. | TP111, TP112, TP113, BH120, BH138 | Silty clay / sand inclusions:<br>Building rubble, PVC pipe, glass, concrete, sandstone gravel. |
| Likely derived from site natural soil material as a result of excavation or site regrading. | TP134, TP136, TP137 | Gravely clayey sands overlaying weathered sandstone |

## 3.4 Soil and Rock Strength Properties

Soil and rock strength properties have been estimated based on borehole derived soil profile data, *in-situ* DCP testing results and auger refusal characteristics (Table 3 and Table 4). Methods are approximate and preliminary. Should further details or higher bearing pressures be required for foundation design purposes, additional testing is required.

Table 3: Preliminary depth to 100kPa strata

| Geotechnical land unit | Approximate depth (m) to 100kPa allowable bearing pressure [1] |
|---|---|
| 1 | NA [2] |
| 2 | 0.1 - 0.3 [3] |
| 3 | 0.2 - 0.8 |

Notes:
[1] Depth based on DCP 'N' counts and borehole logs.
[2] No bearing pressure allowed for fill. See Section 4.
[3] Surface sandstone present in land unit.

Table 4: Preliminary rock strength properties.

| Material description [1] | $D_d$ [2] (kN/m³) | $\phi$ [3] (º) | ABC [4] (kPa) |
|---|---|---|---|
| Extremely Weak Sandstone | 19 | 30 | 150 |
| Weak Sandstone | 22 | 32 | 400 |
| Weak to Medium Strong Sandstone | 24 | 34 | 750 |

Notes:
[1] Depth of material and detailed description is available in BH / TP logs available in Attachment B.
[2] *In situ* Unit Weight.
[3] Estimate of effective friction angle ± 3°.
[4] Allowable End Bearing Capacity based on Df/B ration <1.5

## 3.5 Preliminary Foundation Classification

Table 5 outlines the foundation classification for the various geotechnical units. Due to the size and variable nature that exists within the land units, these classifications are considered preliminary in nature.

Table 5: Preliminary foundation classification.

| Geotechnical land unit | Classification[1] |
|---|---|
| 1 | Class P |
| 2 | Class A |
| 3 | Class A - Where depth to rock is <1m<br>Class S - Where depth to rock is >1m<br>Class H1- Site areas that contain natural stiff clays (BH101 and BH106). |

Notes:
[1] Classification based on AS2870 Residential slab and footing (2011)

## 3.6 Slope Stability

Based on site grades and underlying geology, slope stability is not considered to be a geotechnical constraint for the site. No sign of recent or relic mass movement on site were noted during the onsite investigation. Stability modelling was not part of the scope for this assessment.

## 3.7 Laboratory Analytical Results

### 3.7.1 Particle size distribution

Particle size distribution was conducted on two samples from geotechnical land unit 3 (2863/117/1.0 and 2863/118/0.3). Testing confirmed soil classification of 'SC' based on the Unified Classification System for both samples.

### 3.7.2 Atterberg Limits

Soil samples from two boreholes containing site natural clays were tested for Atterberg Limits to determine shrink swell potential with varied moisture levels (Table 6).

Table 6: Atterberg Limit laboratory data.

| Sample ID [1] | Liquid Limit (%) | Rating [2] | Plasticity Index (%) | Rating [3] |
|---|---|---|---|---|
| 2863/101/0.25 | 65 | High | 40 | High |
| 2863/106/0.4 | 65 | High | 40 | High |

Notes:
[1] Project#/Borehole#/Depth(m).
[2] Based on Table 3.5 of Interpreting Soil Test Results (2007) – Ratings for compressibility and shrink-swell potential based on liquid limit.
[3] Based on Table 3.4 of Interpreting Soil Test Results (2007) – Ratings for compressibility and shrink-swell potential based on plasticity index.

Atterberg test indicate a range of high shrink swell potential in site natural clays.

### 3.7.3 Emerson aggregate class

Soil samples from four boreholes across the site were tested for soil erodibility to determine the level of sediment erosion in urban areas (Table 7).

Table 7: Emerson aggregate class laboratory data.

| Sample ID[1] | Emerson Aggregate Class | Sediment Export Factor[2] |
|---|---|---|
| 2863/103/0.4 | 4 | Moderate |
| 2863/109/0.05 | 8 | Low |
| 2863/118/1.0 | 4 | Moderate |
| 2863/128/0.2-0.3 | 4 | Moderate |

Notes:
[1] Project#/Borehole#/Depth(m)
[2] Based on Table 4.6 of Interpreting Soil Test Results (2007). - Sediment export risk levels derived from USCS classification and emersion class.

Emerson aggregate class results indicate a low to moderate potential for erodibility across the site.

## 3.8 Acid Sulfate Assessment

### 3.8.1 Acid Sulfate Mapping

A review of Shoalhaven City Council acid sulfate soils (ASS) mapping indicates that the site is classified as 'No known occurrence' of ASS.

### 3.8.2 pH screening

Fifteen soil samples were screened using field and oxidised pH (Table 8).

Table 8: pH and pH ox testing

| Sample ID | pH | pH ox |
|---|---|---|
| 2863/103/0.4 | 5.4 | 3.7 |
| 2863/105/0.2 | 5.0 | 2.9 |
| 2863/105/0.6 | 4.8 | 3.0 |
| 2863/SS114 | 6.9 | 3.8 |
| 2863/115/0.05 | 4.9 | 3.4 |
| 2863/117/0.05 | 5.1 | 2.6 |
| 2863/117/0.3 | 5.7 | 3.7 |
| 2863/117/1.0 | 5.2 | 4.0 |
| 2863/123/0.1 | 5.3 | 3.3 |
| 2863/125/0.05 | 4.7 | 2.1 |
| 2863/128/0.05 | 5.7 | 3.7 |
| 2863/129/0.05 | 4.5 | 2.0 |
| 2863/129/0.2 | 5.5 | 3.5 |
| 2863/133/0.05 | 5.2 | 1.9 |

| Sample ID | pH | pH ox |
|---|---|---|
| 2863/134/0.2 | 4.7 | 2.7 |

Initial pH results indicated a potential for ASS on site and additional laboratory analysis was undertaken.

### 3.8.3 sPOCUS Analysis

sPOCUS analysis was undertaken on all fifteen samples and results are presented in Table 9.

Table 9: sPOCUS analysis

| Sample ID | Testing Location | Sample Depth (m) | Soil Type | $pH_{KCL}$[1] | $pH_{OX}$[2] | TPA (mol H+/t)[3] | TSA (mol H+/t)[4] | $S_{POS}$ (%S oxidisable)[5] |
|---|---|---|---|---|---|---|---|---|
| 2863/103/0.4 | 103 | 0.4 | Fill - clay | 4.3 | 3.6 | 32 | <5 | 0.03 |
| 2863/105/0.2 | 105 | 0.2 | Fill- clayey silt | 4.2 | 3.7 | 140 | 87 | 0.06 |
| 2863/105/0.6 | 105 | 0.6 | Clayey sand | 3.9 | 3.6 | 55 | <5 | 0.006 |
| 2863/SS114 | 114 | 0.05 | Silty Sand | 6.7 | 3.6 | <5 | <5 | 0.04 |
| 2863/115/0.05 | 115 | 0.05 | Sandy clay | 4.3 | 3.3 | 32 | 7 | 0.03 |
| 2863/117/0.05 | 117 | 0.05 | Silty sand | 4.3 | 2.7 | 180 | 140 | 0.02 |
| 2863/117/0.3 | 117 | 0.3 | Clayey sand | 4.5 | 3.8 | 12 | <5 | 0.01 |
| 2863/117/1.0 | 117 | 1.0 | Sandy clay | 4.2 | 3.9 | 47 | <5 | 0.04 |
| 2863/123/0.1 | 123 | 0.1 | Sand | 4.3 | 4.0 | 12 | <5 | <0.005 |
| 2863/125/0.05 | 125 | 0.05 | Silty sand | 4.4 | 3.0 | 100 | 65 | 0.01 |
| 2863/128/0.05 | 128 | 0.05 | Silty sand | 4.6 | 3.7 | 7 | <5 | 0.006 |
| 2863/129/0.05 | 129 | 0.05 | Silty sand | 3.8 | 2.5 | 260 | 220 | 0.009 |
| 2863/129/0.2 | 129 | 0.2 | Silty sand | 4.8 | 3.6 | <5 | <5 | 0.007 |
| 2863/133/0.05 | 133 | 0.05 | Gravely sand | 4.1 | 2.5 | 300 | 260 | 0.03 |
| 2863/134/0.2 | 134 | 0.2 | Gravely sand | 3.8 | 3.0 | 120 | 87 | 0.007 |
| Guideline Limit (Action Criteria) | | | Course Texture | - | - | 18 | 18 | 0.03 |
| | | | Medium Texture | - | - | 36 | 18 | 0.06 |

Notes:
[1] Actual pH;
[2] Post peroxide oxidation pH;
[3] Total Potential Acidity;
[4] Total Sulfidic Acidity;
[5] Percentage oxidisable sulfur.

### 3.8.4 Acid Sulfate Soil Discussion

Laboratory results indicate that levels are above the Acid Sulfate Soils Management Advisory Committee (ASSMAC) guidelines (bolded in Table 9) and as a condition of consent, an ASS management plan should be prepared. Location of samples above the ASSMAC guidelines are distributed widely across the site in both natural and fill horizons with no identified pattern of distribution. Given the sites location and residual soil landscape on rock, the origin of soil potential acidity is likely the underlying geology.

## 3.9 Soil Aggressivity and Salinity

Test of soil salinity levels and aggressivity to buried structural elements is summarised in Table 10.

Table 10: Soil salinity and aggressivity

| Sample ID | Sample Depth | Description | $SO_4$ [1] (mg/kg) | Cl [2] (mg/kg) | pH [3] | EC (dS / m) | ECe (dS / m) | Salinity Level [4] | Aggressivity Level [5] | Exposure Rating [6] |
|---|---|---|---|---|---|---|---|---|---|---|
| 2863/117/1.0 | 1.0 | Sandy clay | 32 | 40 | 4.8 | 0.029 | 0.25 | Non saline | Non aggressive | A1 |
| 2863/103/0.4 | 0.4 | Fill- clay | 53 | 49 | 5.5 | 0.051 | 0.44 | Non saline | Non aggressive | A1 |
| 2863/125/0.05 | 0.05 | Silty sand | 24 | 45 | 4.8 | 0.040 | 0.92 | Non saline | Non aggressive | A1 |
| 2863/118/0.3 | 0.3 | Clayey sand | 21 | 28 | 5.3 | 0.018 | 0.15 | Non saline | Non aggressive | A1 |
| 2863/128/0.3 | 0.3 | Clayey sand | 9 | 5 | 5.4 | 0.029 | 0.67 | Non saline | Non aggressive | A1 |

Notes:
[1] Sulphate 1:5 soil:water
[2] Chloride 1:5 soil:water
[3] pH 1:5 soil:water
[4] Hazelton *et al.* (2007) Table 5.32.
[5] AS2159 Pilling- Design and installation (2009)
[6] AS3600 Concrete structures (2009)

## 3.10 CBR Testing

5 soil samples were collected for CBR testing to assess their performance as pavement subgrade materials (Table 11).

Table 11: CBR test results.

| Borehole | Sample Depth (m) | Soil Description | CBR value |
|---|---|---|---|
| BH106 | 0.3 - 0.5 | Clay | 2 |
| BH110 | 0.2 - 0.4 | Clayey sand | 12 |
| BH117 | 0.2 - 0.5 | Clayey sand | 4.5 |
| BH125 | 0.1 - 0.4 | Sandy Clay | 13 |
| BH128 | 0.2 - 0.4 | Clayey Sand | 11 |

A preliminary design CBR value of 4.5 is recommended for site course grained material while a design value of 2 is recommended for site clays. Due to the low CBR value and high shrink swell potential (Section 3.4.2), site natural clays are not recommended for use as subgrade material.

# 4 Discussion

## 4.1 Geotechnical Constraints

A summary of potential geotechnical constraints is provided in Table 12.

Table 12: Geotechnical constraints

| Potential Constraint | Discussion | Outcome / Recomendation |
|---|---|---|
| Shallow groundwater | o Monitoring (Section 2.3) indicates that no shallow(<2m) permanent ground water table exists.<br>o A temporary groundwater table between the soil and rock interface is likely to be encountered. | o During construction works, measures to manage shallow intermittent groundwater are required. |
| Soil erosion | o Emerson aggregate testing from samples across the site indicates a low to moderate potential for erodibility. | o Soil erosion controls have been outlined in Section 5 and should be implemented during the construction phase. |
| Acid sulfate soil | o Shoalhaven City Council mapping indicates 'No known occurrence' of ASS.<br>o Laboratory analysis found potential ASS. | o Acid sulfate management plan should be prepared |

| Potential Constraint | Discussion | Outcome / Recomendation |
|---|---|---|
| Salinity | o Soil aggressivity levels have been assessed against AS2159 Piling – Design and installation (2009) exposure rating criteria returning a nonaggressive rating.<br>o Salinity levels of samples analyses are classified as 'Non saline' | o Preliminary site assessment indicates that salinity and aggressivity will not pose a problem for the development.<br>o Should development design call for deep pilling, further laboratory testing is recommend. |
| Onsite Fill | o Fill of unknown origin or quality identified on site (land unit 1) | o Preliminary assessment of this material indicates that this material is geotechnically unsuitable for reuse as engineered fill onsite.<br>o See MA ref: P1002863JR01V01 for contamination assessment. |
| Shallow Sandstone | o Exposed sandstone from previous quarrying activities.<br>o Variability of site natural soils | o Site regrading shall be required to achieve a developable surface. Importation of material is likely to be required for this purpose.<br>o Where fill is imported or site regrading undertaken, works and material selection shall ensure that a profile hydrogeologically consistent with the existing natural profile is achieved. Design of the imported profile and final material specifications shall be undertaken by MA following preparation of project grading plan. |

## 4.2 Adequacy

From a geotechnical perspective, it is considered that that the site is suitable for the proposed development, subject to the recommendations outlined in this report.

# 5 General Recommendations

General site geotechnical recommendations are summarised in Table 13.

Table 13: Geotechnical recommendations

| Geotechnical Issue | Recommendations |
|---|---|
| Earthworks | o Identified contaminated materials in fill are to be separately stockpiled for treatment, site entombment or offsite disposal. Any material for off-site disposal is to be waste classified before removal.<br>o Natural soils and extremely weak to weak sandstone should be readily excavated using conventional earthmoving equipment.<br>o Higher strength sandstone shall most effectively be excavated using a hydraulic hammer. Where hydraulic hammer is proposed, within 20m of any structure, a vibration monitoring plan shall be prepared and implemented.<br>o Excavation of any bedrock to be inspected by a geotechnical engineer at 1.0 m depth increments.<br>o All excavation work should be completed with reference to the Code of Practice 'Excavation Work', Cat. No. 312 dated 31 March 2000 by Workcover.<br>o All site earthworks should be undertaken in accordance with AS3798.<br>o If the development requires the importation of fill, it is to be free from organic materials, other contaminants and deleterious substances and have a maximum particle size not exceeding 100 mm.<br>o Site soils from geotechnical land units 2 and 4 are considered most appropriate for reuse onsite as engineered fill however further compaction / CBR testing should be undertaken.<br>o Engineered fill should be placed in 150 – 200mm layers.<br>o Temporary (less than two weeks) batter of 1V:2H should be used when excavating soil material.<br>o Permanent soil/fill batters are to be 1V:3H.<br>o Permanent batters in very weak to weak sandstone to be not steeper than 1V:1H.<br>o Permanent batters in weak to medium strong sandstone to be not steeper than 8V:1H. |

| Geotechnical Issue | Recommendations |
|---|---|
| Importation of Fill | Changes to the site soil profile through the importation of engineered fill and site regrading must be compatible with the proposed stormwater recharge system proposed in MA Hydrogeological report( MA ref: P1002761JR01V02 June 2011).<br><br>Specific material requirements and methodology to be confirmed by MA following preparation of grading plans. |
| Groundwater | It is considered that the proposed development is unlikely to intercept a permanent groundwater table and dewatering is unlikely to be required. If ephemeral groundwater is collected at the soil/rock interface after periods of substantial or prolonged rainfall, sump and pump methods are considered to be appropriate for dewatering during construction All site discharges should be passed through a filter material prior to release off-site. Groundwater ingress should be monitored during excavation by a geotechnical engineer. |
| Soil Erosion Control | Removal of soil overburden should be performed in a manner that reduces the risk of sedimentation occurring in the Council stormwater system and on neighbouring lands. All spoil on site should be properly controlled by erosion control measures to prevent transportation of sediments off-site. Appropriate soil erosion control methods in accordance with Landcom (2004) are required. |

# 6 References


Acid Sulfate Soil Management Advisory Committee (1998). *Acid Sulfate Soil Manual*.

Australian Standard (2009) 3600 *Concrete structures*

Australian Standard (1984) 1289.F3.2 *Determination of the Penetration Resistance of a Soil using the 9 kg Dynamic Cone Penetrometer.*

Australian Standard 1796 (1993) *Geotechnical Site Investigations.*

Australian Standard 2159 (2009) Piling – Design and installation.

Australian Standard 3798 (2007) *Guidelines on earthworks for commercial and residential developments.*

Australian Standard 4678 (2002) Earth Retaining Structures .

Das, B.M. (1994) *Principles of Foundation Engineering.*

Geological Survey of NSW, Department of Minerals and Energy (1991), Geological Series: 1:100,000, Wollongong Sheet.

Hazelton, P and Murphy, B. (2007) *Interpreting Soil Test Results : What do all the numbers mean?*

Landcom (2004) Managing Urban Stormwater: Soils and Construction, Vol 1, 4th edition.

Martens & Associates Pty Ltd (2011) *Hydrogeological Assessment: Proposed Sub-division, Mundamia Release Area, Mundamia NSW*, document reference P1002761JR01V02.

# 7 Attachment A – Site Testing Plans


## KEY

- BH 105 — BOREHOLE LOCATION
- TP 105 — TEST PIT LOCATION
- SS 105 — SURFACE SAMPLE LOCATION
- SITE BOUNDARY
- 3 — APPROXIMATE GEOTECHNICAL LAND UNIT
- FILL STOCKPILE – LIKLEY IMPORTED MATERIAL FROM UNKNOWN SOURCE
- STOCKPILE – LIKLEY SITE SOIL MATERIAL
- APPROXIMATE GEOTECHNICAL LAND UNIT BOUNDARY

PAGE BAR SCALE

0 30 60 90 120 150

UNITS – METRES

SCALE – 1:1500 @ A1 1:3000 @ A3



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|---|---|---|---|
| **Martens & Associates Pty Ltd** ABN 85 070 240 890 | | **Environment \| Water \| Wastewater \| Geotechnical \| Civil \| Management** | |
| Drawn: | BM | **GEOTECHNICAL TESTING AND LAND UNITS** | Drawing No./ID: **1002863JD01V01** |
| Approved: | JF | | |
| Date: | 15.10.12 | | |
| Scale @A3: | 1:3000 | 6/37 Leighton Place, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au | Project: P1002863 \| File: JD01V01 \| Revision: A |

# 8 Attachment B – Test Pit / Borehole logs

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | COMMENCED | 19.09.12 | COMPLETED | 19.09.12 | **REF** | **BH101** |
| **PROJECT** | Geotechnical and Contamination Assessment | LOGGED | BM/JF | CHECKED | JF | Sheet | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | GEOLOGY | Sandstone | VEGETATION | Grass | PROJECT NO. | P1002863 |
| **EQUIPMENT** | Truck mounted rig | EASTING | NA | RL SURFACE | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 5.5m depth | NORTHING | NA | ASPECT | North | SLOPE | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.1 | | | SM | TOP SOIL - SILTY SAND - Brown, with organics. | | L | A | 0.05 | 2863/101/0.05 |
| | | | | | | | | | | | A | 0.2 | 2863/101/0.2 |
| | | | | | | | | | | | B | 0.25 | 2863/101/0.25 |
| V | Nil | N | D | | | | CL | CLAY - Red, with grey mottles, low plasticity. | St | | | | |
| | | | | | | | | | | | A | 0.5 | 2863/101/0.5 |
| | | | | 0.7 | | | | | | | | | |
| | | | | | | | | | | | A | 0.75 | 2863/101/0.75 |
| V | Nil | N | D | 1.0 | | | EW | EXTREMELY WEAK WEATHERED SANDSTONE - Clay like properties, with iron stone inclusions. | | | B | 1.0 | 2863/101/1.0 |
| | | | | 1.4 | | | | | | | | | 1.0 |
| | | | | | | | | | | | B | 1.5 | 2863/101/1.5 |
| V | Nil | N | D | 2.0 | | | W | WEAK SANDSTONE - Brown/red, course grained sand. | | | | | 2.0 |
| | | | | 2.4 | | | | | | | | | |
| V | Nil | N | D | | | | EW | EXTREMELY WEAK WEATHERED SANDSTONE - Light grey, very easy drilling. | | | | | |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 3.2 | | | | | | | | | |
| V | Nil | N | D | | | | S | WEAK TO MEDIUM STONG - Brown/red. | | | | | |
| | | | | 3.8 | | | | | | | | | |
| | | | | 4.0 | | | | Borehole terminated at 3.8m on sandstone. | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP102** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.9m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | | | | XX | FILL - Organic clayey silt, brown, with sandstone cobbles and boulders, some asphalt, concrete and clay inclusions. | | | E | 0.3 | 2863/102/ 0.3 |
| | | | | | | | | | | | E | 0.5 | 2863/102/ 0.5 |
| | | | | 0.9 | | | | | | | | | |
| | | | | 1.0 | | | | | | | | | 1.0 |
| BH | Nil | N | D | | | | XX | FILL - Mix of clayey sand, silty sand, clay, with building and demolishing waste (steel, PVC pipe, PE pipe, bricks, concrete), sandstone boulders, timber and other organics, tin, plastic bags, fibre cement sheeting. | | | E | 1.5 | 2863/102/ 1.5 + DUP2 |
| | | | | 1.9 | | | | | | | | | |
| | | | | 2.0 | | | | Test pit terminated at 1.9m on medium strong sandstone. | | | | | 2.0 |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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mail@martens.com.au WEB: http://www.martens.com.au


**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP103** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 2.2m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | | | | XX | FILL - CLAY/SILTY CLAY LAYERS - Orange/brown, moist, soft to firm, gravels and cobble inclusions (10-20%). | | | E | 0.25 | 2863/103/ 0.25 |
| | | | | 1.0 | | | | | | | | | CBR @ 1.0m 1.0 |
| BH | Nil | N | D | | | | XX | FILL - Mix of clayey sand, silty sand, clay, with building and demolishing waste (steel, PVC pipe, PE pipe, bricks, concrete), sandstone boulders, timber and other organics, tin, plastic bags, fibre cement sheeting. | | | M | 1.1 | 2863/103/ ASB1 (fibre cement sheeting) |
| | | | | | | | | | | | E | 1.2 | 2863/103/ 1.2 |
| | | | | | | | | | | | E | 1.8 | 2863/103/ 1.8 + DUP1 |
| | | | | 2.0 | | | | | | | | | 2.0 |
| | | | | 2.2 | | | | Test pit terminated at 2.2m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP104** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.0m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | | | | XX | FILL - Silty clay, some sand and gravels, sandstone cobbles and boulders, organics, treated pine, bricks, steel and fibre cement sheeting inclusions. | | | M<br>M<br>E<br>E | 0.1<br>0.2<br>0.3<br>0.6 | 2863/103/ ASB2<br>2863/103/ ASB3<br>2863/103/ 0.3<br>2863/103/ 0.6 |
| | | | | 0.7 | | | | | | | | | |
| BH | Nil | N | D | | | | SP | SAND - Brown grading orange, moist, with gravels (5-20mm, 20%). | | | E<br>B | 0.8<br>0.8 | 2863/103/ 0.8<br>2863/103/ 0.8 |
| | | | | 0.95 | | | | | | | | | |
| BH | Nil | N | D | 1.0 | | | EW | EXTREMELY WEAK SANDSTONE - Light grey, moist, clayey sand texture. | | | | | |
| | | | | | | | | Test pit terminated at 1.0m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP105** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.6m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | M | 0.5 | | | XX | FILL - Organic clayey silt, gravels, cobbles and some plastic. | | | E | 0.2 | 2863/105/ 0.2 |
| BH | Nil | N | M | 1.0 | | | SC | CLAYEY SAND - Grey/red mottles, moist, some sandstone gravels and cobbles. | | | E | 0.6 | 2863/105/ 0.6 |
| | | | | 1.6 | | | | Grades to extremely weak sandstone. | | | B | 1.2 | 2863/105/ 1.2 |
| | | | | 2.0 | | | | Test pit terminated at 1.6m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Excavation***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH106** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 4.0m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.1 | | | SM | TOP SOIL - SILTY SAND - Brown, with organics. | | | A | 0.05 | 2863/106/0.05 |
| | | | | | | | | | | | A | 0.2 | 2863/106/0.2 |
| | | | | | | | | | | | | | CBR @ 0.3m |
| | | | | | | | | | | | B | 0.4-0.5 | 2863/106/0.4-0.5 |
| V | Nil | N | D | | | | CL | CLAY - Dark brown, with minor gravels (5mm, 5-10%). | | | A | 0.5 | 2863/106/0.5 |
| | | | | 0.85 | | | | Grading to<br>CLAY - Red/brown, with orange mottles, sandstone gravels (10mm, 5%). | | | | | |
| | | | | 1.0 | | | | | | | | | 1.0 |
| | | | | | | | | | | | B | 1.2 | 2863/106/1.2 |
| V | Nil | N | D | | | | EW | EXTREMELY WEAK SANDSTONE - Red, with grey mottles. | | | | | |
| | | | | 2.0 | | | | | | | | | 2.0 |
| | | | | 2.3 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | | | | | | | | B | 3.0 | 2863/106/3.0 |
| V | Nil | N | D | | | | W | WEAK SANDSTONE - Red/brown, with sandstone gravels. | | | | | |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | | | | | Borehole terminated at 4.0m on weak sandstone. | | | | | |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH107** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Tress and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 2.8m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.05 | | x x x | - | TOP SOIL - Brown, gravelly sand, sandstone gravels (5-30mm, 10%). | | | A | 0.05 | 2863/107/0.05 |
| | | | | | | | | | | | A | 0.2 | 2863/107/0.2 |
| V | Nil | N | D | | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | | | |
| | | | | 0.5 | | | | | | | | | |
| | | | | 1.0 | | | | | | | B | 1.0 | 2863/107/1.0 |
| V | Nil | N | D | | | | MS | MEDIUM STRONG SANDSTONE - Red/brown. | | | | | |
| | | | | 2.0 | | | | | | | B | 2.0 | 2863/107/2.0 |
| | | | | 2.3 | | | | | | | | | |
| V | Nil | N | D | | | | MS | MEDIUM STRONG SANDSTONE - Grey, with quartzite gravels. | | | B | 2.5 | 2863/107/2.5 |
| | | | | 2.8 | | | | V-Bit refusal at 2.8m in medium strong sandstone. | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP108** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 2.3m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | | SAMPLING & TESTING | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | | |
| | | N | D | | | | | | | | E | 0.25 | 2863/108/ 0.25 | |
| | | N | M | 1.5 | | | | | | | | | | |
| BH | Nil | N | M | 1.0 | | | XX | FILL - Organic silty clay, brown, some sand and gravels, pieces of concrete (100-500mm), plastic and steel. | | | E | 1.0 | 2863/108/ 1.0 | 1.0 |
| | | 2.0 ▽ | | 2.0 | | | | | | | E | 2.0 | 2863/108/ 2.0 | 2.0 |
| | | Y | W | 2.3 | | | | Test pit terminated at 2.3m due to groundwater and test pit collapse. | | | | | | |
| | | | | 3.0 | | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
▽ Water level
◁ Water outflow
▷ Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Excavation***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH109** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Tress and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.9m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.1 | | | SM | TOP SOIL - SILTY SAND - Gravels (5-50mm, 10%). | | | A | 0.05 | 2863/109/0.05 |
| V | Nil | N | D | 0.4 | | | SP | GRAVELLY SAND - Light brown, gravels (5-50mm, 10-20%). | | | A | 0.2 | 2863/109/0.2 |
| V | Nil | N | D | 0.9 | | | MS | MEDIUM STRONG SANDSTONE - Light brown grading to dark brown with depth. | | | B | 0.6 | 2863/109/0.6 |
| | | | | 1.0 | | | | V-Bit refusal at 0.9m on sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH110** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 2.6m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.1 | | | SM | TOP SOIL - SILTY SAND - Gravels (5-50mm, 10%). | | | A | 0.05 | 2863/110/0.05 |
| | | | | | | | | | | | A | 0.2 | 2863/110/0.2<br>CBR10 @ 0.2-0.4m |
| V | Nil | N | D | 1.0 | | | SP | GRAVELLY SAND - Light brown, gravels (5-50mm, 10-20%). | | | B | 0.75 | 2863/110/0.75 |
| | | | | 1.6 | | | | | | | | | 1.0 |
| V | Nil | N | D | 2.0 | | | MS | MEDIUM STRONG SANDSTONE - Red/dark brown, iron stone inclusions. | | | B | 1.8 | 2863/110/1.8 |
| | | | | 2.2 | | | | | | | | | 2.0 |
| V | Nil | N | D | 2.6 | | | MS | MEDIUM STRONG SANDSTONE | | | B | 2.4 | 2863/110/2.4 |
| | | | | | | | | V-Bit refusal at 2.6m on medium strong sandstone. | | | | | |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP111** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.8m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | M | 0.8 | | | XX | FILL - Silty sand, orange brown, dry, minor organics, some sandstone cobbles and boulders. | | | E | 0.25 | Test pit undertaking into stockpile.<br>2863/111/ 0.25 |
| | | | | 1.0 | | | | Test pit terminated at 0.8m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Excavation***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP112** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.8m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | M | 0.8 | | | XX | FILL - Silty clay/sandy clay, dry, minor builders rubble (bricks PVC pipe, concrete), some plastic and glass bottles. | | | E | 0.5 | Test pit undertaking into stockpile.<br>2863/112/ 0.5 |
| | | | | 1.0 | | | | Test pit terminated at 0.8m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Excavation***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP113** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.9m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | M | 0.9 | | | XX | FILL - Silty clay/clayey sand, brown, dry, minor builders rubble (bricks PVC pipe, concrete), some plastic. | | | E | 0.4 | 2863/112/ 0.4 |
| | | | | 1.0 | | | | Test pit terminated at 0.9m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

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|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH115** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | NA | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.3m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | M | 0.15 | | | CL | SANDY CLAY - Light brown. | | | A | 0.05 | 2863/115/ 0.05 |
| HA | Nil | N | M | 0.3 | | | W | WEAK, EXTREMELY WEATHERED SANDSTONE - Grey, clay like properties | | | A | 0.2 | 2863/115/ 0.2 |
| | | | | | | | | Borehole terminated at 0.3m on sandstone. | | | | | |
| | | | | 1.0 | | | | | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

**EQUIPMENT / METHOD**
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

**SUPPORT**
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

**WATER**
N None observed
X Not measured
Water level
Water outflow
Water inflow

**MOISTURE**
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

**PENETRATION**
L Low
M Moderate
H High
R Refusal

**CONSISTENCY**
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

**DENSITY**
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

**SAMPLING & TESTING**
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

**CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION**
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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Hornsby, NSW 2077 Australia
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mail@martens.com.au WEB: http://www.martens.com.au

***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH116** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.5m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.2 | | | XX | FILL - Gravelly clayey sand, brown, with blue metal gravels inclusion (5-10%). | | | A<br>A<br>A | 0.05<br>0.15<br>0.2 | 2863/115/0.05<br>2863/115/0.15<br>2863/115/0.2 |
| HA | Nil | N | M | 0.5 | | | EW | EXTREMELY WEAK SANDSTONE - Orange and brown mottles. | | | | | |
| | | | | 1.0 | | | | Borehole terminated at 0.5m on sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP117** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 2.3m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.1 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | E | 0.05 | 2863/117/ 0.05 |
| | | | | | | | | | | | B | 0.2-0.5 | 2863/117/ 0.2-0.5<br>CBR @ 0.2-0.5m |
| BH | Nil | N | D | | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E | 0.3 | 2863/117/ 0.3 |
| | | | | 0.5 | | | | | | | | | |
| | | | | | | | | | | | B | 0.6 | 2863/117/ 0.6 |
| | | | | 1.0 | | | | | | | E<br>B | 1.0<br>1.0 | 2863/117/ 1.0<br>2863/117/ 1.0 |
| BH | Nil | N | D | | | | CL | SANDY CLAY - Orange/grey/red mottles, moist. | | | | | |
| | | | | 2.0 | | | | Grades to | | | | | |
| BH | Nil | N | D | | | | EW | EXTREMELY WEAK SANDSTONE - Grey, with ferruginised gravels. | | | | | |
| | | | | 2.3 | | | | Test pit terminated at 2.3m (bucket refusal) on medium strong sandstone. | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP118** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.1m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.1 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | E | 0.05 | 2863/118/ 0.05 |
| BH | Nil | N | D | 0.5 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E<br>B | 0.3<br>0.3 | 2863/118/ 0.3<br>2863/118/ 0.3 |
| BH | Nil | N | D | 0.95 | | | CL | SANDY CLAY - Orange/grey/red mottles, moist.<br>Grades to | | | | | |
| BH | Nil | N | D | 1.0<br>1.1 | | | EW | EXTREMELY WEAK SANDSTONE - Grey, with gravels.<br>Test pit terminated at 1.1m on weak sandstone. | | | E<br>B | 1.0<br>1.0 | 2863/118/ 1.0<br>2863/118/ 1.0 |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH120** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 1.6m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 1.0 | | | XX SM | FILL - SILTY SAND - Light brown, with minor sandstone gravels (5-10mm, 5%), building waste (brick, steel), glass and plastic. | | | A | 0.05 | 2863/120/0.05 |
| | | | | | | | | | | | A | 0.2 | 2863/120/0.2 |
| | | | | 1.6 | | | | Borehole terminated at 0.3m on silty sand fill. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH121** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | NA | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.7m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.1 | | | SP | SAND - Light brown, sandstone gravels (5-50mm, 10%). | | | A | 0.05 | 2863/121/0.05 |
| HA | Nil | N | D | 0.4 | | | W | WEAK WEATHERED SANDSTONE - Light brown, gravels. | | | A | 0.2 | 2863/121/0.2 |
| HA | Nil | N | D | 0.6 | | | MS | WEAK TO MEDIUM STRONG SANDSTONE - Light brown/grey. | | | A<br>B | 0.5<br>0.5 | 2863/121/0.5<br>2863/121/0.5 |
| HA | Nil | N | D | 0.7 | | | S | MEDIUM STRONG SANDSTONE - Light brown, quartzite gravels. | | | | | |
| | | | | 1.0 | | | | Refusal at 0.7m on strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH123** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | NA | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.45m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.15 | | | SP | SAND - Light brown/grey, wet. | | | A | 0.05 | 2863/123/ 0.05 |
| HA | Nil | N | D | 0.45 | | | EW | EXTREMELY WEAK, EXTREMELY WEATHERED SANDSTONE - Grey/orange, large grained sand. | | | A<br>A | 0.2<br>0.4 | 2863/123/ 0.2<br>2863/123/ 0.4 |
| | | | | 1.0 | | | | Borehole terminated at 0.45m on sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP124** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.8m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| S | Nil | N | D | 0.25 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E | 0.05 | 2863/124/ 0.05 |
| | | | | | | | | | | | E | 0.3 | 2863/124/ 0.3 |
| S | Nil | N | D | 0.8 | | | EW | EXTREMELY WEATHERED SANDSTONE | | | | | |
| | | | | 1.0 | | | | Test pit terminated at 0.8m on medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP125** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Spade | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.6m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| S | Nil | N | D | 0.05 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | A | 0.05 | 2863/125/ 0.05 |
| S | Nil | N | D | 0.4 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | A | 0.3 | 2863/125/ 0.3 + DUP3<br>CBR 125 0.1-0.4 |
| S | Nil | N | D | 0.6 | | | SP | GRAVELLY SAND - Gravels (5-50mm, 30/40%) - Light brown, moist. | | | | | |
| | | | | | | | | Test pit terminated at 0.6m on gravelly sand. | | | | | |

1.0 2.0 3.0 4.0 4.5

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP126** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 2.5m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.8 | | | XX | FILL - Gravelly/clayey sand, orange/brown, moist, gravels (5-20mm, 20-30%), some cobbles. | | | E | 0.25 | 2863/126/ 0.25 |
| | | | | | | | | | | | | | New organic layer at 0.8m. |
| BH | Nil | N | D | 1.0<br>1.2 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E<br>B | 0.9<br>1.0 | 2863/126/ 0.9<br>2863/126/ 1.0 1.0 |
| BH | Nil | N | D | 1.8 | | | SC | GRAVELLY/CLAYEY SAND - Orange/brown, moist, gravels (5-20mm, 30-40%).<br>Grades to | | | | | |
| BH | Nil | N | D | 2.0<br>2.5 | | | EW | EXTREMELY WEAK SANDSTONE - Grey, coarse grained sandstone with conglomerate rounded quartz. | | | B<br>B | 2.0<br>2.4 | 2863/126/ 2.0 2.0<br>2863/126/ 2.4 |
| | | | | 3.0<br>4.0<br>4.5 | | | | Test pit terminated at 2.5m on extremely weak sandstone. | | | | | 3.0<br>4.0<br>4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | COMMENCED | 19.09.12 | COMPLETED | 19.09.12 | **REF** | **TP127** |
| **PROJECT** | Geotechnical and Contamination Assessment | LOGGED | BM/JF | CHECKED | JF | Sheet | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | GEOLOGY | Sandstone | VEGETATION | Trees and shrubs | PROJECT NO. | P1002863 |
| **EQUIPMENT** | Backhoe | EASTING | NA | RL SURFACE | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.4m | NORTHING | NA | ASPECT | North | SLOPE | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.1 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | E | 0.05 | 2863/127/ 0.05 |
| BH | Nil | N | D | 0.4 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E<br>B | 0.3<br>0.3 | 2863/127/ 0.3<br>2863/127/ 0.3 |
| BH | Nil | N | D | 1.0 | | | SC | GRAVELLY/CLAYEY SAND - Orange/brown, moist, gravels (5-20mm, 30-40%). | | | | | 1.0 |
| | | | | 1.1 | | | | Grades to | | | | | |
| BH | Nil | N | D | 1.4 | | | EW | EXTREMELY WEAK SANDSTONE - Grey, coarse grained sandstone with conglomerate rounded quartz. | | | E<br>B | 1.2<br>1.2 | 2863/127/ 1.2<br>2863/127/ 1.2 |
| | | | | | | | | Test pit terminated at 1.4m (bucket refusal) on weak to medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | 2.0 |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP128** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.3m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.1 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | E | 0.05 | 2863/128/ 0.05 |
| | | | | | | | | | | | B | 0.2-0.3 | 2863/128/ 0.2-0.3 |
| BH | Nil | N | D | | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E | 0.3 | 2863/128/ 0.3<br>CBR @ 0.2-0.4m |
| | | | | | | | | | | | B | 0.2-0.4 | 2863/128/ 0.2-0.4 |
| | | | | 0.5 | | | | | | | | | |
| BH | Nil | N | D | | | | CL | SANDY CLAY - Orange/grey/red mottles, moist. | | | | | |
| | | | | 1.0 | | | | | | | B | 1.0 | 2863/128/ 1.0 |
| | | | | 1.1 | | | | Grades to | | | | | |
| BH | Nil | N | D | | | | EW | EXTREMELY WEAK SANDSTONE - Grey, with ferruginised gravels. | | | | | |
| | | | | 1.3 | | | | Test pit terminated at 1.3m on weak sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

**EQUIPMENT / METHOD**
N Natural exposure; S Spade; BH Backhoe bucket; HA Hand auger; A Auger; CC Concrete Corer; V V-Bit; TC Tungsten Carbide Bit; PT Push tube

**SUPPORT**
SH Shoring; SC Shotcrete; RB Rock Bolts; Nil No support

**WATER**
N None observed; X Not measured; Water level; Water outflow; Water inflow

**MOISTURE**
D Dry; M Moist; W Wet; Wp Plastic limit; Wl Liquid limit

**PENETRATION**
L Low; M Moderate; H High; R Refusal

**CONSISTENCY**
VS Very Soft; S Soft; F Firm; St Stiff; VSt Very Stiff; H Hard; F Friable

**DENSITY**
VL Very Loose; L Loose; MD Medium Dense; D Dense; VD Very Dense

**SAMPLING & TESTING**
A Auger sample; B Bulk sample; U Undisturbed sample; D Disturbed sample; M Moisture content; Ux Tube sample (x mm); E Environmental sample; pp Pocket penetrometer; S Standard penetration test; VS Vane shear; DCP Dynamic cone penetrometer; FD Field density; WS Water sample

**CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION**
Y USCS; N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS



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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH129** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø70mm X 0.7m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.1 | | | SM | TOP SOIL - SILTY SAND - Light brown, minor organics. | | | A | 0.05 | 2863/129/0.05 |
| HA | Nil | N | D | 0.4 | | | SM | SILTY SAND - Brown, with minor organics. | | | A | 0.25 | 2863/129/0.25 |
| HA | Nil | N | D | 0.7 | | | SP | GRAVELLY SAND - Gravels (5-50mm, 30/40%) - Light brown, moist. | | | | | |
| | | | | 1.0 | | | | Borehole terminated at 0.7m on gravely sand. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH130** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø70mm X 0.6m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.05 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | E | 0.05 | 2863/130/0.05 |
| HA | Nil | N | D | 0.5 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | E | 0.25 | 2863/130/0.25 |
| HA | Nil | N | D | 0.6 | | | SP | GRAVELLY SAND - Gravels (5-50mm, 30/40%) - Light brown, moist. | | | | | |
| | | | | 1.0 | | | | Borehole terminated at 0.6m (refusal) on gravely sand. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

martens



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mail@martens.com.au WEB: http://www.martens.com.au

**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP131** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | 1 of 1 |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.3m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.05 | | | SM | ORGANIC SILTY SAND - Brown, dry, rootlets. | | | A | 0.05 | 2863/131/ 0.05 + DUP4 |
| BH | Nil | N | D | 0.4 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | A | 0.25 | 2863/131/ 0.25 |
| | | | | | | | | | | | B | 0.5 | 2863/131/ 0.5 |
| BH | Nil | N | D | 1.0 | | | SP | GRAVELLY SAND - Gravels (5-50mm, 30/40%) - Light brown, moist. | | | | | 1.0 |
| | | | | 1.05 | | | | Grades to | | | | | |
| BH | Nil | N | D | 1.3 | | | EW | EXTREMELY WEAK SANDSTONE - Light grey, sandy clay properties, sandstone gravels and cobbles. | | | B | 1.2 | 2863/131/ 1.2 |
| | | | | 2.0 | | | | Test pit terminated at 1.3m on weak sandstone. | | | | | 2.0 |
| | | | | 3.0 | | | | | | | | | 3.0 |
| | | | | 4.0 | | | | | | | | | 4.0 |
| | | | | 4.5 | | | | | | | | | 4.5 |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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mail@martens.com.au WEB: http://www.martens.com.au

**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH132** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Hand Auger | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø70mm X 0.5m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| HA | Nil | N | D | 0.1 | | | XX | FILL - Sand, with gravels (5-50mm, 30-40%), brown/orange. | | | A | 0.05 | 2863/132/0.05 |
| HA | Nil | N | D | 0.2 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | A | 0.2 | 2863/132/0.2 |
| HA | Nil | N | D | 0.5 | | | SP | SAND, WITH GRAVELS AND CLAY- Orange/brown. | | | | | |
| | | | | 1.0 | | | | Borehole terminated at 0.5m (refusal) on sandy gravels. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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**Engineering Log - Borehole**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | Shoalhaven City Council | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH133** |
| **PROJECT** | Geotechnical and Contamination Assessment | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 0.85m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.05 | | | SM | TOP SOIL - SILTY SAND - Dark brown, organics. | | | A | 0.05 | 2863/133/0.05 |
| V | Nil | N | D | 0.4 | | | SP | GRAVELY SAND - Dark brown. | | | A | 0.3 | 2863/133/0.3 |
| V | Nil | N | D | 0.6 | | | SP | GRAVELY SAND - Light brown, with quartzite gravel, grading to extremely weathered rock. | | | B | 0.5 | 2863/133/0.5 |
| V | Nil | N | D | 0.85 | | | W | WEAK WEATHERED SANDSTONE. | | | | | |
| | | | | 1.0 | | | | V-Bit refusal at 0.85m on weak to medium strong sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Borehole***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP136** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 0.6m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.6 | | | XX | FILL - SILTY SAND - Light brown, gravels (5-10mm, 10%). | | | A<br>B | 0.05<br>0.5 | 2863/136/ 0.05<br>2863/136/ 0.5 |
| | | | | 1.0 | | | | Test pit terminated at 0.6m on silty sand. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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***Engineering Log - Excavation***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **TP137** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Trees and shrubs | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Backhoe | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | 3.0m X 1.0m X 1.2m | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | 5-10% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| BH | Nil | N | D | 0.3 | | | XX | FILL - Sand, with minor clay, gravels (5-20mm, 10%), light brown. | | | A | 0.15 | 2863/137/ 0.15 |
| BH | Nil | N | D | 0.35 | | | SC | SILTY SAND - Brown, with minor organics, charcoal. | | | A | 0.35 | 2863/137/ 0.35 |
| BH | Nil | N | D | 0.7 | | | SC | CLAYEY SAND - Orange/yellow, moist, fine grained, minor gravels (5-10mm, 5%). | | | B<br>A | 0.5<br>0.5 | 2863/137/ 0.5<br>2863/137/ 0.5 |
| BH | Nil | N | D | 1.0 | | | SP | GRAVELLY SAND - Gravels (5-50mm, 30/40%) - Light brown, moist. | | | | | |
| | | | | 1.1 | | | | Grades to | | | | | |
| BH | Nil | N | D | 1.2 | | | EW | EXTREMELY WEAK SANDSTONE - Light grey, sandy clay properties, sandstone gravels and cobbles. | | | | | |
| | | | | | | | | Test pit terminated at 1.2m on weak sandstone. | | | | | |
| | | | | 2.0 | | | | | | | | | |
| | | | | 3.0 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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**Engineering Log - Excavation**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CLIENT** | **Shoalhaven City Council** | **COMMENCED** | 19.09.12 | **COMPLETED** | 19.09.12 | **REF** | **BH138** |
| **PROJECT** | **Geotechnical and Contamination Assessment** | **LOGGED** | BM/JF | **CHECKED** | JF | **Sheet** | **1 of 1** |
| **SITE** | **Lot 1/DP1021332 and Lot 458/DP1063107 George Evans Rd, Mundamia** | **GEOLOGY** | Sandstone | **VEGETATION** | Grass | **PROJECT NO.** | P1002863 |
| **EQUIPMENT** | Truck mounted rig | **EASTING** | NA | **RL SURFACE** | NA | | |
| **EXCAVATION DIMENSIONS** | Ø95mm X 1.6m depth | **NORTHING** | NA | **ASPECT** | North | **SLOPE** | <5% |

| EXCAVATION DATA | | | | | | MATERIAL DATA | | | | SAMPLING & TESTING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHOD | SUPPORT | WATER | MOISTURE | DEPTH (M) | PENETRATION RESISTANCE (L M H R) | GRAPHIC LOG | CLASSIFICATION | DESCRIPTION OF STRATA<br>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour. | CONSISTENCY | DENSITY INDEX | TYPE | DEPTH (M) | |
| V | Nil | N | D | 0.1 | | | XX | FILL - Organics silt, with gravel, dry. | | | E | 0.05 | 2863/138/ 0.05 |
| V | Nil | N | D | 0.9 | | | XX | FILL - Gravelly/clayey sand, angular gravels (5-20mm, 10-20%), moist. | | | E | 0.5 | 2863/138/ 0.5 |
| V | Nil | N | D | 1.0<br>1.6 | | | EW | EXTREMELY WEAK SANDSTONE - Gravely sand properties, coarse grained, rounded quartzite gravels. | | | E<br>B | 1.0<br>1.4 | 2863/138/ 1.0<br>2863/138/ 1.4 |
| | | | | 2.0<br>3.0<br>4.0<br>4.5 | | | | Borehole terminated at 1.6m (V-bit refusal) on weak sandstone. | | | | | |

EQUIPMENT / METHOD
N Natural exposure
S Spade
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
E Environmental sample
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

martens



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mail@martens.com.au WEB: http://www.martens.com.au

**Engineering Log - Borehole**

# 9 Attachment C - Laboratory Analytical Certificates

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# Material Test Report

**Report No: SYD1212245**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15022 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 101 |
| **Depth** | 0.25m |
| **Soil Description** | CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | N/A | |
| Mould Length (mm) | | 0 | |
| Crumbling | | No | |
| Curling | | No | |
| Liquid Limit (%) | AS 1289.3.1.1 | 65 | |
| Method | | Four Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 25 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 40 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212251**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15028 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 118 |
| **Depth** | 1.0m |
| **Soil Description** | CLAY: grey |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Emerson Class Number | AS 1289.3.8.1 | 4 | |
| Soil Description | | CLAY: Grey | |
| Type of Water | | Distilled | |
| Temperature of Water (°C) | | 21 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212252**
**Issue No: 1**

| | |
|---|---|
| **Client:** | Martens Consulting Engineers<br>Unit 6 / 37 Leighton Place<br>Hornsby NSW 2077 |
| **Project:** | 2116124 P1002863 |

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Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15029 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 128 |
| **Depth** | 0.2-0.3m |
| **Soil Description** | SAND: light brown with clay |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Emerson Class Number | AS 1289.3.8.1 | 4 | |
| Soil Description | | SAND: Light Brown | |
| Type of Water | | Distilled | |
| Temperature of Water (°C) | | 21 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212241**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15018 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | CBR 110 |
| **Depth** | |
| **Soil Description** | Sandy CLAY / Clayey SAND trace gravel |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.83 | |
| Standard Optimum Moisture Content (%) | | 17.5 | |
| Oversize Sieve (mm) | | -19.0 | |
| Oversize Material (%) | | 0 | |
| CBR At 2.5 | AS 1289.6.1.1 | 14 | |
| CBR At 5.0 | | 12 | |
| Laboratory Moisture Ratio | | 99 | |
| Laboratory Density Ratio | | 99 | |
| Moisture Content Top 30mm (%) | | 18.9 | |
| Moisture Content of Remaining Depth (%) | | 17.4 | |
| Swell (%) | | 0.1 | |
| Dry Density After Soaking (t/m³) | | 1.815 | |
| Oversize Material | | Excluded | |
| Oversize Material (%) | | 3.1 | |
| Surcharge Mass (g) | | 4.5 | |
| Compactive Effort | | Standard | |
| Period of Soaking (Days) | | 4 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212242**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15019 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | CBR 117 |
| **Depth** | |
| **Soil Description** | CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.89 | |
| Standard Optimum Moisture Content (%) | | 13.0 | |
| Oversize Sieve (mm) | | -19.0 | |
| Oversize Material (%) | | 0 | |
| CBR At 2.5 | AS 1289.6.1.1 | 4.0 | |
| CBR At 5.0 | | 4.5 | |
| Laboratory Moisture Ratio | | 101 | |
| Laboratory Density Ratio | | 98 | |
| Moisture Content Top 30mm (%) | | 14.6 | |
| Moisture Content of Remaining Depth (%) | | 14.5 | |
| Swell (%) | | 0.0 | |
| Dry Density After Soaking (t/m³) | | 1.847 | |
| Oversize Material | | Replaced | |
| Oversize Material (%) | | 0.0 | |
| Surcharge Mass (g) | | 4.5 | |
| Compactive Effort | | Standard | |
| Period of Soaking (Days) | | 4 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212248**
**Issue No: 1**

| | |
|---|---|
| **Client:** | Martens Consulting Engineers<br>Unit 6 / 37 Leighton Place<br>Hornsby NSW 2077 |
| **Project:** | 2116124 P1002863 |

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Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15025 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 103 |
| **Depth** | 0.4m |
| **Soil Description** | CLAY: brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Emerson Class Number | AS 1289.3.8.1 | 4 | |
| Soil Description | | CLAY: Brown | |
| Type of Water | | Distilled | |
| Temperature of Water (°C) | | 21 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212240**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15017 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | CBR 106 |
| **Depth** | |
| **Soil Description** | CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.67 | |
| Standard Optimum Moisture Content (%) | | 18.0 | |
| Oversize Sieve (mm) | | -19.0 | |
| Oversize Material (%) | | 0 | |
| CBR At 2.5 | AS 1289.6.1.1 | 2.0 | |
| CBR At 5.0 | | 2.0 | |
| Laboratory Moisture Ratio | | 99 | |
| Laboratory Density Ratio | | 99 | |
| Moisture Content Top 30mm (%) | | 25.1 | |
| Moisture Content of Remaining Depth (%) | | 24.2 | |
| Swell (%) | | 3.8 | |
| Dry Density After Soaking (t/m³) | | 1.590 | |
| Oversize Material | | Excluded | |
| Oversize Material (%) | | 0.0 | |
| Surcharge Mass (g) | | 4.5 | |
| Compactive Effort | | Standard | |
| Period of Soaking (Days) | | 4 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212243**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15020 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | CBR 125 |
| **Depth** | |
| **Soil Description** | Sandy CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.83 | |
| Standard Optimum Moisture Content (%) | | 13.5 | |
| Oversize Sieve (mm) | | -19.0 | |
| Oversize Material (%) | | 0 | |
| CBR At 2.5 | AS 1289.6.1.1 | 11 | |
| CBR At 5.0 | | 13 | |
| Laboratory Moisture Ratio | | 97 | |
| Laboratory Density Ratio | | 98 | |
| Moisture Content Top 30mm (%) | | 15.9 | |
| Moisture Content of Remaining Depth (%) | | 14.9 | |
| Swell (%) | | 0.0 | |
| Dry Density After Soaking (t/m³) | | 1.797 | |
| Oversize Material | | Excluded | |
| Oversize Material (%) | | 0.0 | |
| Surcharge Mass (g) | | 4.5 | |
| Compactive Effort | | Standard | |
| Period of Soaking (Days) | | 4 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212246**
**Issue No: 1**

| | |
|---|---|
| **Client:** | Martens Consulting Engineers<br>Unit 6 / 37 Leighton Place<br>Hornsby NSW 2077 |
| **Project:** | 2116124 P1002863 |

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D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15023 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 106 |
| **Depth** | 0.4m |
| **Soil Description** | CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | N/A | |
| Mould Length (mm) | | 0 | |
| Crumbling | | No | |
| Curling | | No | |
| Liquid Limit (%) | AS 1289.3.1.1 | 65 | |
| Method | | Four Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 25 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 40 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212244**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863

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Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15021 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | CBR 128 |
| **Depth** | |
| **Soil Description** | Sandy CLAY |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.95 | |
| Standard Optimum Moisture Content (%) | | 11.5 | |
| Oversize Sieve (mm) | | -19.0 | |
| Oversize Material (%) | | 0 | |
| CBR At 2.5 | AS 1289.6.1.1 | 8 | |
| CBR At 5.0 | | 11 | |
| Laboratory Moisture Ratio | | 99 | |
| Laboratory Density Ratio | | 97 | |
| Moisture Content Top 30mm (%) | | 14.0 | |
| Moisture Content of Remaining Depth (%) | | 13.6 | |
| Swell (%) | | 0.1 | |
| Dry Density After Soaking (t/m³) | | 1.885 | |
| Oversize Material | | Excluded | |
| Oversize Material (%) | | 0.0 | |
| Surcharge Mass (g) | | 4.5 | |
| Compactive Effort | | Standard | |
| Period of Soaking (Days) | | 4 | |

## Comments

N/A

**Sydney Laboratory**
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# Material Test Report

**Report No: SYD1212250**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15027 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | 26.5 Max |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 118 |
| **Depth** | 0.3m |
| **Soil Description** | Clayey SAND : yellow brown |

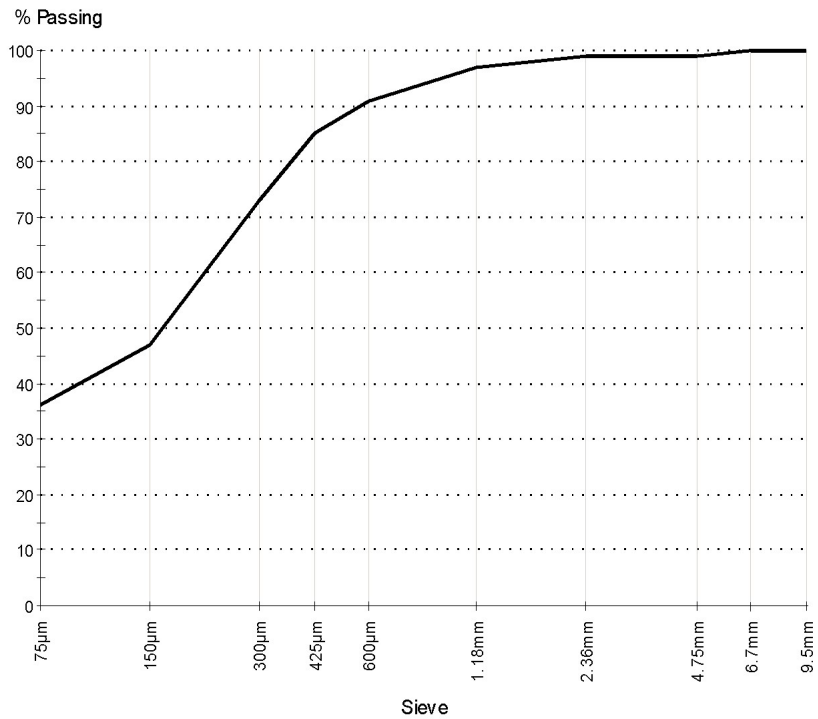
## Other Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Emerson Class Number | AS 1289.3.8.1 | 4 | |
| Soil Description | | clayey SAND | |
| Type of Water | | Distilled | |
| Temperature of Water (°C) | | 21 | |

## Particle Size Distribution

**Method:** AS 1289.3.6.1
**Drying by:** Oven

**Note:** Sample Washed




| Sieve Size | % Passing | Limits |
|---|---|---|
| 9.5mm | 100 | |
| 6.7mm | 100 | |
| 4.75mm | 99 | |
| 2.36mm | 99 | |
| 1.18mm | 97 | |
| 600µm | 91 | |
| 425µm | 85 | |
| 300µm | 73 | |
| 150µm | 47 | |
| 75µm | 36 | |

## Comments

N/A

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# Material Test Report

**Report No: SYD1212247**
**Issue No: 1**

| | |
|---|---|
| **Client:** | Martens Consulting Engineers<br>Unit 6 / 37 Leighton Place<br>Hornsby NSW 2077 |
| **Project:** | 2116124 P1002863 |

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D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 16/10/2012



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15024 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 109 |
| **Depth** | 0.05m |
| **Soil Description** | CLAY: brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Emerson Class Number | AS 1289.3.8.1 | 8 | |
| Soil Description | | CLAY: Brown | |
| Type of Water | | Distilled | |
| Temperature of Water (°C) | | 21 | |

## Comments

N/A

**Sydney Laboratory**
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# Material Test Report

**Report No: SYD1212249**
**Issue No: 1**

**Client:** Martens Consulting Engineers
Unit 6 / 37 Leighton Place
Hornsby NSW 2077

**Project:** 2116124 P1002863



## Sample Details

| | |
|---|---|
| **Sample ID** | SYD12-15026 |
| **Client Sample ID** | |
| **Date Sampled** | 24/09/2012 |
| **Specification** | 26.5 Max |
| **Location** | P1002863 |
| **Sampled By** | Sampled by client |
| **Boring No.** | 117 |
| **Depth** | 1.0m |
| **Soil Description** | Clayey SAND with gravel (see |

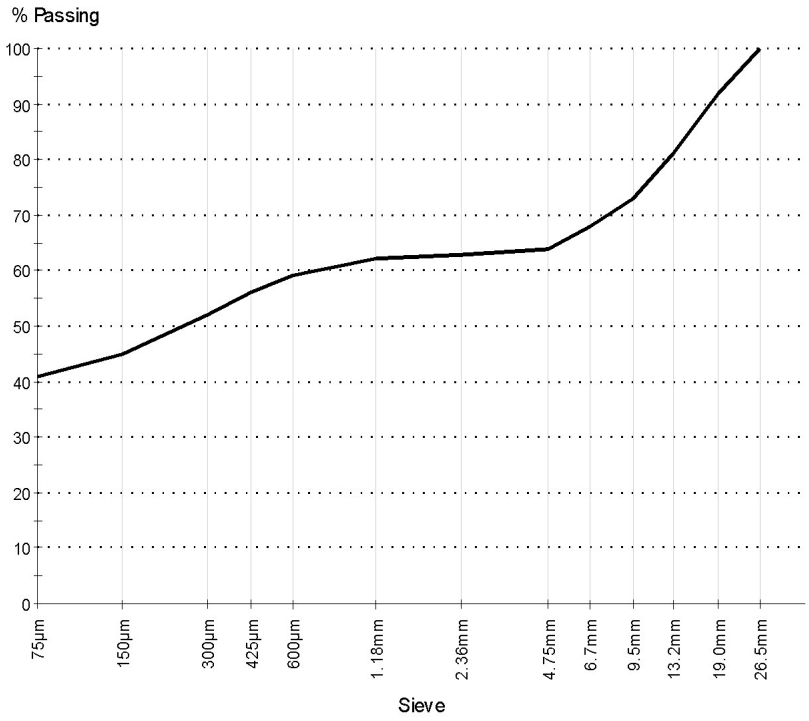
## Other Test Results

| Description | Method | Result | Limits |
|---|---|---|---|

## Particle Size Distribution

**Method:** AS 1289.3.6.1
**Drying by:**

**Note:** Sample Washed




| Sieve Size | % Passing | Limits |
|---|---|---|
| 26.5mm | 100 | |
| 19.0mm | 92 | |
| 13.2mm | 81 | |
| 9.5mm | 73 | |
| 6.7mm | 68 | |
| 4.75mm | 64 | |
| 2.36mm | 63 | |
| 1.18mm | 62 | |
| 600µm | 59 | |
| 425µm | 56 | |
| 300µm | 52 | |
| 150µm | 45 | |
| 75µm | 41 | |

## Comments

Insufficient sample mass to comply with minimum mass requirements. Gravel portion may be over represented due to small sample mass

**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 79298

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

**Attention:** Ben McGiffin

**Sample log in details:**

| | |
|---|---|
| Your Reference: | **2863-soil and material sampling-Mura** |
| No. of samples: | 50 Soils, 3 Materials |
| Date samples received / completed instructions received | 24/09/2012, 25/09/1224/09/2012, 25/09/12 |

**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: / Issue Date: | 3/10/12 | / | 3/10/12 |
| Date of Preliminary Report: | Not issued | | |

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NATA
ACCREDITED FOR TECHNICAL COMPETENCE

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 87 | 99 | 99 | 100 | 99 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-9 | 79298-11 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/118 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 99 | 100 | 99 | 93 | 109 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-13 | 79298-14 | 79298-15 | 79298-16 | 79298-19 |
| Your Reference | ---------- | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 | 2863/125 |
| Depth | ---------- | - | - | 0.15 | 0.25 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 105 | 95 | 81 | 101 | 100 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-20 | 79298-21 | 79298-22 | 79298-23 | 79298-24 |
| Your Reference | ---------- | 2863/Dup3 | 2863/101 | 2863/107 | 2863/121 | 2863/137 |
| Depth | ---------- | - | 0.05 | 0.05 | 0.05 | 0.15 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 105 | 99 | 103 | 105 | 124 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-25 | 79298-26 | 79298-27 | 79298-28 | 79298-29 |
| Your Reference | ---------- | 2863/102 | 2863/Dup2 | 2863/103 | 2863/SS114 | 2863/105 |
| Depth | ---------- | 1.5 | - | 1.2 | - | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 102 | 96 | 96 | 101 | 107 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-31 | 79298-32 | 79298-33 | 79298-34 | 79298-35 |
| Your Reference | ---------- | 2863/108 | 2863/136 | 2863/123 | 2863/120 | 2863/138 |
| Depth | ---------- | 1.0 | 0.2 | 0.1 | 0.2 | 0.5 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 107 | 111 | 108 | 104 | 117 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-36 | 79298-37 | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/116 | 2863/111 | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.05 | 0.25 | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 96 | 107 | 104 | 110 | 108 |

| vTRH & BTEX in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-46 | 79298-47 | 79298-48 | 79298-49 | 79298-51 |
| Your Reference | ---------- | MA Blank 1 | MA Spike 1 | MA Blank 2 | MA Spike 2 | 2863/126 |
| Depth | ---------- | - | - | - | - | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | <25 | [NA] | <25 | [NA] | <25 |
| Benzene | mg/kg | <0.2 | 101% | <0.2 | 107% | <0.2 |
| Toluene | mg/kg | <0.5 | 101% | <0.5 | 107% | <0.5 |
| Ethylbenzene | mg/kg | <1 | 102% | <1 | 106% | <1 |
| m+p-xylene | mg/kg | <2 | 101% | <2 | 105% | <2 |
| o-Xylene | mg/kg | <1 | 101% | <1 | 106% | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 109 | 103 | 103 | 104 | 114 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | 110 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 140 | <100 | 110 | 120 | <100 |
| *Surrogate* o-Terphenyl | % | 89 | 86 | 84 | 88 | 86 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-9 | 79298-11 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/118 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 | 150 | 150 | <100 | <100 |
| *Surrogate* o-Terphenyl | % | 83 | 92 | 88 | 86 | 86 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-13 | 79298-14 | 79298-15 | 79298-16 | 79298-19 |
| Your Reference | ---------- | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 | 2863/125 |
| Depth | ---------- | - | - | 0.15 | 0.25 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| *Surrogate* o-Terphenyl | % | 86 | 83 | 76 | 80 | 81 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-20 | 79298-21 | 79298-22 | 79298-23 | 79298-24 |
| Your Reference | ---------- | 2863/Dup3 | 2863/101 | 2863/107 | 2863/121 | 2863/137 |
| Depth | ---------- | - | 0.05 | 0.05 | 0.05 | 0.15 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| *Surrogate* o-Terphenyl | % | 85 | 83 | 73 | 77 | 83 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-25 | 79298-26 | 79298-27 | 79298-28 | 79298-29 |
| Your Reference | ---------- | 2863/102 | 2863/Dup2 | 2863/103 | 2863/SS114 | 2863/105 |
| Depth | ---------- | 1.5 | - | 1.2 | - | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | 130 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 180 | 240 | 110 | <100 | 100 |
| *Surrogate* o-Terphenyl | % | 83 | 82 | 85 | 85 | 67 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-31 | 79298-32 | 79298-33 | 79298-34 | 79298-35 |
| Your Reference | ---------- | 2863/108 | 2863/136 | 2863/123 | 2863/120 | 2863/138 |
| Depth | ---------- | 1.0 | 0.2 | 0.1 | 0.2 | 0.5 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| *Surrogate* o-Terphenyl | % | 66 | 77 | 75 | 65 | 79 |

| sTRH in Soil (C10-C36) | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-36 | 79298-37 | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/116 | 2863/111 | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.05 | 0.25 | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 610 | <100 | <100 | <100 | 120 |
| *Surrogate* o-Terphenyl | % | 72 | 72 | 71 | 72 | 67 |

| sTRH in Soil (C10-C36) | | |
|---|---|---|
| Our Reference: | UNITS | 79298-51 |
| Your Reference | ---------- | 2863/126 |
| Depth | ---------- | 0.25 |
| Date Sampled | | 19/09/2012 |
| Type of sample | | Soil |
| Date extracted | - | 27/09/2012 |
| Date analysed | - | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 |
| *Surrogate* o-Terphenyl | % | 81 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| 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-$d_{14}$ | % | 91 | 95 | 97 | 95 | 98 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-9 | 79298-11 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/118 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| 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-$d_{14}$ | % | 94 | 95 | 97 | 99 | 93 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-13 | 79298-14 | 79298-15 | 79298-16 | 79298-19 |
| Your Reference | ---------- | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 | 2863/125 |
| Depth | ---------- | - | - | 0.15 | 0.25 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| 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-$d_{14}$ | % | 99 | 80 | 84 | 87 | 90 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-20 | 79298-21 | 79298-22 | 79298-23 | 79298-24 |
| Your Reference | ---------- | 2863/Dup3 | 2863/101 | 2863/107 | 2863/121 | 2863/137 |
| Depth | ---------- | - | 0.05 | 0.05 | 0.05 | 0.15 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| 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 | 0.4 | <0.1 | <0.1 | <0.1 |
| Pyrene | mg/kg | <0.1 | 0.4 | <0.1 | <0.1 | <0.1 |
| Benzo(a)anthracene | mg/kg | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 |
| Chrysene | mg/kg | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 |
| Benzo(b+k)fluoranthene | mg/kg | <0.2 | 0.3 | <0.2 | <0.2 | <0.2 |
| Benzo(a)pyrene | mg/kg | <0.05 | 0.27 | <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-$d_{14}$ | % | 93 | 93 | 79 | 87 | 92 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-25 | 79298-26 | 79298-27 | 79298-28 | 79298-29 |
| Your Reference | ---------- | 2863/102 | 2863/Dup2 | 2863/103 | 2863/SS114 | 2863/105 |
| Depth | ---------- | 1.5 | - | 1.2 | - | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| Naphthalene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | mg/kg | <0.1 | <0.1 | 0.5 | <0.1 | <0.1 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fluorene | mg/kg | <0.1 | <0.1 | 0.4 | <0.1 | <0.1 |
| Phenanthrene | mg/kg | 0.2 | 0.2 | 7.6 | <0.1 | 0.3 |
| Anthracene | mg/kg | <0.1 | <0.1 | 1.9 | <0.1 | <0.1 |
| Fluoranthene | mg/kg | 0.3 | 0.5 | 11 | <0.1 | 0.6 |
| Pyrene | mg/kg | 0.3 | 0.5 | 8.7 | <0.1 | 0.7 |
| Benzo(a)anthracene | mg/kg | 0.1 | 0.2 | 4.2 | <0.1 | 0.3 |
| Chrysene | mg/kg | 0.2 | 0.2 | 3.5 | <0.1 | 0.4 |
| Benzo(b+k)fluoranthene | mg/kg | 0.4 | 0.5 | 6.1 | <0.2 | 0.8 |
| Benzo(a)pyrene | mg/kg | 0.27 | 0.38 | 4.7 | <0.05 | 0.48 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | 0.2 | 2.1 | <0.1 | 0.3 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 | <0.1 | 0.4 | <0.1 | <0.1 |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | 0.2 | 1.4 | <0.1 | 0.2 |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | 91 | 92 | 93 | 94 | 77 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-31 | 79298-32 | 79298-33 | 79298-34 | 79298-35 |
| Your Reference | ---------- | 2863/108 | 2863/136 | 2863/123 | 2863/120 | 2863/138 |
| Depth | ---------- | 1.0 | 0.2 | 0.1 | 0.2 | 0.5 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| Naphthalene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.2 |
| Acenaphthylene | mg/kg | 0.1 | <0.1 | <0.1 | <0.1 | 0.5 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 |
| Fluorene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.4 |
| Phenanthrene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 4.9 |
| Anthracene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.8 |
| Fluoranthene | mg/kg | 0.2 | <0.1 | <0.1 | 0.1 | 4.0 |
| Pyrene | mg/kg | 0.2 | <0.1 | <0.1 | 0.1 | 4.1 |
| Benzo(a)anthracene | mg/kg | 0.1 | <0.1 | <0.1 | <0.1 | 1.7 |
| Chrysene | mg/kg | 0.2 | <0.1 | <0.1 | <0.1 | 1.6 |
| Benzo(b+k)fluoranthene | mg/kg | 0.4 | <0.2 | <0.2 | <0.2 | 2.3 |
| Benzo(a)pyrene | mg/kg | 0.37 | <0.05 | <0.05 | 0.1 | 2.0 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.2 | <0.1 | <0.1 | <0.1 | 0.9 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 |
| Benzo(g,h,i)perylene | mg/kg | 0.2 | <0.1 | <0.1 | <0.1 | 0.7 |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | 73 | 85 | 85 | 76 | 65 |

| PAHs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-36 | 79298-37 | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/116 | 2863/111 | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.05 | 0.25 | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 | 29/09/2012 |
| 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 | 0.3 |
| Pyrene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.3 |
| 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 | 0.3 |
| Benzo(a)pyrene | mg/kg | <0.05 | <0.05 | <0.05 | <0.05 | 0.22 |
| 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-$d_{14}$ | % | 80 | 82 | 82 | 81 | 71 |

| PAHs in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 79298-51 |
| Your Reference | ---------- | 2863/126 |
| Depth | ---------- | 0.25 |
| Date Sampled | | 19/09/2012 |
| Type of sample | | Soil |
| Date extracted | - | 27/09/2012 |
| Date analysed | - | 29/09/2012 |
| Naphthalene | mg/kg | <0.1 |
| Acenaphthylene | mg/kg | <0.1 |
| Acenaphthene | mg/kg | <0.1 |
| Fluorene | mg/kg | <0.1 |
| Phenanthrene | mg/kg | <0.1 |
| Anthracene | mg/kg | <0.1 |
| Fluoranthene | mg/kg | <0.1 |
| Pyrene | mg/kg | <0.1 |
| Benzo(a)anthracene | mg/kg | <0.1 |
| Chrysene | mg/kg | <0.1 |
| Benzo(b+k)fluoranthene | mg/kg | <0.2 |
| Benzo(a)pyrene | mg/kg | <0.05 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | <0.1 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 |
| Benzo(g,h,i)perylene | mg/kg | <0.1 |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | 61 |

| Organochlorine Pesticides in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-7 | 79298-8 | 79298-16 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/134 | 2863/133 | 2863/103 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | - | 0.05 | 0.25 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 90 | 102 | 91 | 90 | 91 |

| Organochlorine Pesticides in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 90 | 98 | 78 | 81 | 85 |

| Organochlorine Pesticides in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 84 | 73 | 63 | 74 | 85 |

| Organochlorine Pesticides in soil | | | | |
|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| HCB | mg/kg | <0.1 | <0.1 | <0.1 |
| alpha-BHC | mg/kg | <0.1 | <0.1 | <0.1 |
| gamma-BHC | mg/kg | <0.1 | <0.1 | <0.1 |
| beta-BHC | mg/kg | <0.1 | <0.1 | <0.1 |
| Heptachlor | mg/kg | <0.1 | <0.1 | <0.1 |
| delta-BHC | mg/kg | <0.1 | <0.1 | <0.1 |
| Aldrin | mg/kg | <0.1 | <0.1 | <0.1 |
| Heptachlor Epoxide | mg/kg | <0.1 | <0.1 | <0.1 |
| gamma-Chlordane | mg/kg | <0.1 | <0.1 | <0.1 |
| alpha-chlordane | mg/kg | <0.1 | <0.1 | <0.1 |
| Endosulfan I | mg/kg | <0.1 | <0.1 | <0.1 |
| pp-DDE | mg/kg | <0.1 | <0.1 | <0.1 |
| Dieldrin | mg/kg | <0.1 | <0.1 | <0.1 |
| Endrin | mg/kg | <0.1 | <0.1 | <0.1 |
| pp-DDD | mg/kg | <0.1 | <0.1 | <0.1 |
| Endosulfan II | mg/kg | <0.1 | <0.1 | <0.1 |
| pp-DDT | mg/kg | <0.1 | <0.1 | <0.1 |
| Endrin Aldehyde | mg/kg | <0.1 | <0.1 | <0.1 |
| Endosulfan Sulphate | mg/kg | <0.1 | <0.1 | <0.1 |
| Methoxychlor | mg/kg | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCMX | % | 81 | 89 | 81 |

| Organophosphorus Pesticides | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-7 | 79298-8 | 79298-16 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/134 | 2863/133 | 2863/103 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | - | 0.05 | 0.25 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 90 | 102 | 91 | 90 | 91 |

| Organophosphorus Pesticides | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 90 | 98 | 78 | 81 | 85 |

| Organophosphorus Pesticides | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| 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* TCMX | % | 84 | 73 | 63 | 74 | 85 |

| Organophosphorus Pesticides | | | | |
|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| Diazinon | mg/kg | <0.1 | <0.1 | <0.1 |
| Dimethoate | mg/kg | <0.1 | <0.1 | <0.1 |
| Chlorpyriphos-methyl | mg/kg | <0.1 | <0.1 | <0.1 |
| Ronnel | mg/kg | <0.1 | <0.1 | <0.1 |
| Chlorpyriphos | mg/kg | <0.1 | <0.1 | <0.1 |
| Fenitrothion | mg/kg | <0.1 | <0.1 | <0.1 |
| Bromophos-ethyl | mg/kg | <0.1 | <0.1 | <0.1 |
| Ethion | mg/kg | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCMX | % | 81 | 89 | 81 |

| PCBs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-7 | 79298-8 | 79298-16 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/134 | 2863/133 | 2863/103 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | - | 0.05 | 0.25 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| Arochlor 1016 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | 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 | % | 90 | 102 | 91 | 90 | 91 |

| PCBs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| Arochlor 1016 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | 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 | % | 90 | 98 | 78 | 81 | 85 |

| PCBs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| Arochlor 1016 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | 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 | % | 84 | 73 | 63 | 74 | 85 |

| PCBs in Soil | | | | |
|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil |
| Date extracted | - | 27/9/2012 | 27/9/2012 | 27/9/2012 |
| Date analysed | - | 29/9/2012 | 29/9/2012 | 29/9/2012 |
| Arochlor 1016 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1232 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1242 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1248 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1254 | mg/kg | <0.1 | <0.1 | <0.1 |
| Arochlor 1260 | mg/kg | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCLMX | % | 81 | 89 | 81 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | <4 | <4 | <4 | <4 | <4 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 12 | 12 | 19 | 3 | 19 |
| Copper | mg/kg | 1 | <1 | <1 | <1 | <1 |
| Lead | mg/kg | 6 | 5 | 6 | 4 | 6 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 2 | 1 | 1 | <1 | 1 |
| Zinc | mg/kg | 5 | 3 | 3 | 2 | 4 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-9 | 79298-11 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/118 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | <4 | <4 | <4 | <4 | <4 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 9 | 9 | 9 | 12 | 16 |
| Copper | mg/kg | <1 | <1 | 1 | <1 | <1 |
| Lead | mg/kg | 6 | 4 | 8 | 5 | 4 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | <1 | <1 | 2 | 2 | 2 |
| Zinc | mg/kg | 2 | 2 | 6 | 2 | 2 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-13 | 79298-14 | 79298-15 | 79298-16 |
| Your Reference | ---------- | 2863/117 | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 |
| Depth | ---------- | 1.0 | - | - | 0.15 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | [NA] | 5 | <4 | <4 | 7 |
| Cadmium | mg/kg | [NA] | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | [NA] | 8 | 11 | 39 | 21 |
| Copper | mg/kg | [NA] | 2 | 2 | 1 | 26 |
| Lead | mg/kg | [NA] | 8 | 9 | 7 | 14 |
| Mercury | mg/kg | [NA] | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | [NA] | 1 | 2 | 3 | 8 |
| Zinc | mg/kg | [NA] | 58 | 64 | 5 | 41 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-13 | 79298-14 | 79298-15 | 79298-16 |
| Your Reference | ---------- | 2863/117 | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 |
| Depth | ---------- | 1.0 | - | - | 0.15 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Magnesium | mg/kg | 220 | [NA] | [NA] | [NA] | [NA] |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-17 | 79298-18 | 79298-19 | 79298-20 | 79298-21 |
| Your Reference | ---------- | 2863/103 | 2863/125 | 2863/125 | 2863/Dup3 | 2863/101 |
| Depth | ---------- | 0.4 | 0.05 | 0.3 | - | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | [NA] | [NA] | <4 | 6 | 8 |
| Cadmium | mg/kg | [NA] | [NA] | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | [NA] | [NA] | 16 | 20 | 24 |
| Copper | mg/kg | [NA] | [NA] | <1 | 38 | 11 |
| Lead | mg/kg | [NA] | [NA] | 4 | 33 | 48 |
| Mercury | mg/kg | [NA] | [NA] | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | [NA] | [NA] | 2 | 8 | 5 |
| Zinc | mg/kg | [NA] | [NA] | 1 | 52 | 47 |
| Magnesium | mg/kg | 2,400 | 200 | [NA] | [NA] | [NA] |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-22 | 79298-23 | 79298-24 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/107 | 2863/121 | 2863/137 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | 0.05 | 0.05 | 0.15 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | <4 | 9 | <4 | 6 | 7 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 17 | 24 | 25 | 21 | 19 |
| Copper | mg/kg | <1 | 3 | <1 | 40 | 38 |
| Lead | mg/kg | 6 | 9 | 6 | 170 | 170 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | <1 | <1 | 1 | 7 | 7 |
| Zinc | mg/kg | 4 | 3 | 1 | 200 | 190 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | 6 | 5 | 7 | 8 | <4 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 16 | 8 | 23 | 19 | 15 |
| Copper | mg/kg | 19 | 5 | 63 | 22 | <1 |
| Lead | mg/kg | 43 | 17 | 310 | 21 | 4 |
| Mercury | mg/kg | <0.1 | <0.1 | 0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 5 | 5 | 5 | 4 | <1 |
| Zinc | mg/kg | 200 | 310 | 130 | 26 | 1 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | <4 | 9 | 9 | <4 | 5 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 3 | 30 | 32 | 21 | 23 |
| Copper | mg/kg | <1 | 14 | 20 | 3 | 44 |
| Lead | mg/kg | 5 | 67 | 33 | 6 | 10 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | <1 | 4 | 2 | 3 | 2 |
| Zinc | mg/kg | 3 | 81 | 18 | 10 | 13 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 | 79298-42 | 79298-51 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 | 2863/118 | 2863/126 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 | 0.3 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Arsenic | mg/kg | 5 | 6 | 7 | [NA] | <4 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | [NA] | <0.5 |
| Chromium | mg/kg | 9 | 17 | 22 | [NA] | 37 |
| Copper | mg/kg | 8 | 29 | 29 | [NA] | <1 |
| Lead | mg/kg | 15 | 36 | 91 | [NA] | 5 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | [NA] | <0.1 |
| Nickel | mg/kg | 4 | 6 | 6 | [NA] | <1 |
| Zinc | mg/kg | 23 | 57 | 130 | [NA] | <1 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 | 79298-42 | 79298-51 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 | 2863/118 | 2863/126 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 | 0.3 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Magnesium | mg/kg | [NA] | [NA] | [NA] | 180 | [NA] |

| Acid Extractable metals in soil | | |
|---|---|---|
| Our Reference: | UNITS | 79298-54 |
| Your Reference | ---------- | 2863/132 - Triplicate |
| Depth | ---------- | 0.05 |
| Date Sampled | | 19/09/2012 |
| Type of sample | | Soil |
| Date digested | - | 27/09/2012 |
| Date analysed | - | 27/09/2012 |
| Arsenic | mg/kg | <4 |
| Cadmium | mg/kg | <0.5 |
| Chromium | mg/kg | 15 |
| Copper | mg/kg | <1 |
| Lead | mg/kg | 6 |
| Mercury | mg/kg | <0.1 |
| Nickel | mg/kg | 2 |
| Zinc | mg/kg | 5 |
| Magnesium | mg/kg | 220 |

| Total Phenolics in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-7 | 79298-8 | 79298-16 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/134 | 2863/133 | 2863/103 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | - | 0.05 | 0.25 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | <5 | <5 | <5 | <5 | <5 |

| Total Phenolics in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | <5 | <5 | <5 | <5 | <5 |

| Total Phenolics in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | <5 | <5 | <5 | <5 | <5 |

| Total Phenolics in Soil | | | | |
|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil |
| Date extracted | - | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | <5 | <5 | <5 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 18 | 7.7 | 7.8 | 7.0 | 9.5 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-9 | 79298-11 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/118 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 13 | 7.1 | 17 | 11 | 9.1 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-13 | 79298-14 | 79298-15 | 79298-16 |
| Your Reference | ---------- | 2863/117 | 2863/SS119 | 2863/SS122 | 2863/116 | 2863/103 |
| Depth | ---------- | 1.0 | - | - | 0.15 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 13 | 17 | 25 | 9.7 | 24 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-17 | 79298-18 | 79298-19 | 79298-20 | 79298-21 |
| Your Reference | ---------- | 2863/103 | 2863/125 | 2863/125 | 2863/Dup3 | 2863/101 |
| Depth | ---------- | 0.4 | 0.05 | 0.3 | - | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 14 | 9.0 | 7.8 | 19 | 15 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-22 | 79298-23 | 79298-24 | 79298-25 | 79298-26 |
| Your Reference | ---------- | 2863/107 | 2863/121 | 2863/137 | 2863/102 | 2863/Dup2 |
| Depth | ---------- | 0.05 | 0.05 | 0.15 | 1.5 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 8.5 | 17 | 5.2 | 28 | 29 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-27 | 79298-28 | 79298-29 | 79298-31 | 79298-32 |
| Your Reference | ---------- | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 | 2863/136 |
| Depth | ---------- | 1.2 | - | 0.2 | 1.0 | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 18 | 31 | 23 | 23 | 4.9 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-33 | 79298-34 | 79298-35 | 79298-36 | 79298-37 |
| Your Reference | ---------- | 2863/123 | 2863/120 | 2863/138 | 2863/116 | 2863/111 |
| Depth | ---------- | 0.1 | 0.2 | 0.5 | 0.05 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 15 | 7.5 | 9.7 | 15 | 9.1 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-38 | 79298-39 | 79298-40 | 79298-42 | 79298-46 |
| Your Reference | ---------- | 2863/112 | 2863/113 | 2863/104 | 2863/118 | MA Blank 1 |
| Depth | ---------- | 0.5 | 0.4 | 0.3 | 0.3 | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 | 27/09/2012 |
| Moisture | % | 28 | 16 | 18 | 10 | 19 |

| Moisture | | | |
|---|---|---|---|
| Our Reference: | UNITS | 79298-48 | 79298-51 |
| Your Reference | ---------- | MA Blank 2 | 2863/126 |
| Depth | ---------- | - | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil |
| Date prepared | - | 27/09/2012 | 27/09/2012 |
| Date analysed | - | 27/09/2012 | 27/09/2012 |
| Moisture | % | 17 | 6.8 |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-1 | 79298-2 | 79298-3 | 79298-4 | 79298-5 |
| Your Reference | ---------- | 2863/132 | 2863/131 | 2863/Dup4 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.05 | 0.05 | - | 0.05 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 |
| Sample mass tested | g | Approx 40g | Approx 40g | Approx 40g | Approx 40g | Approx 40g |
| Sample Description | - | Brown coarse-grained soil | Brown coarse-grained soil | Brown coarse-grained soil | Brown coarse-grained soil | Brown coarse-grained soil |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg |
| Trace Analysis | - | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-6 | 79298-7 | 79298-8 | 79298-16 | 79298-25 |
| Your Reference | ---------- | 2863/130 | 2863/134 | 2863/133 | 2863/103 | 2863/102 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.25 | 1.5 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 |
| Sample mass tested | g | Approx 40g | Approx 40g | Approx 40g | Approx 40g | Approx 40g |
| Sample Description | - | Brown coarse-grained soil | Brown coarse-grained sandy soil | Brown fine-grained clayey soil | Brown coarse-grained soil | Brown fine-grained clayey soil |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg |
| Trace Analysis | - | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-26 | 79298-27 | 79298-28 | 79298-29 | 79298-31 |
| Your Reference | ---------- | 2863/Dup2 | 2863/103 | 2863/SS114 | 2863/105 | 2863/108 |
| Depth | ---------- | - | 1.2 | - | 0.2 | 1.0 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 |
| Sample mass tested | g | Approx 40g | Approx 40g | Approx 40g | Approx 40g | Approx 40g |
| Sample Description | - | Brown fine-grained clayey soil | Brown fine-grained clayey soil | Brown coarse-grained soil | Brown fine-grained soil | Brown coarse-grained clayey soil |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg |
| Trace Analysis | - | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-32 | 79298-33 | 79298-34 | 79298-35 | 79298-36 |
| Your Reference | ---------- | 2863/136 | 2863/123 | 2863/120 | 2863/138 | 2863/116 |
| Depth | ---------- | 0.2 | 0.1 | 0.2 | 0.5 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 |
| Sample mass tested | g | Approx 40g | Approx 40g | Approx 40g | Approx 40g | Approx 40g |
| Sample Description | - | Brown coarse-grained soil | Beige coarse-grained soil | Brown fine-grained clayey soil | Brown coarse-grained soil | Brown fine-grained soil & organic debris |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg |
| Trace Analysis | - | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-37 | 79298-38 | 79298-39 | 79298-40 | 79298-51 |
| Your Reference | ---------- | 2863/111 | 2863/112 | 2863/113 | 2863/104 | 2863/126 |
| Depth | ---------- | 0.25 | 0.5 | 0.4 | 0.3 | 0.25 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 | 02/10/2012 |
| Sample mass tested | g | Approx 40g | Approx 40g | Approx 40g | Approx 40g | Approx 40g |
| Sample Description | - | Brown coarse-grained soil | Brown fine-grained clayey soil | Brown fine-grained clayey soil | Brown fine-grained clayey soil | Mustard coarse-grained soil & rocks |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg | No asbestos detected at reporting limit of 0.1g/kg |
| Trace Analysis | - | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected | No respirable fibres detected |

| Asbestos ID - materials | | | | |
|---|---|---|---|---|
| Our Reference: | UNITS | 79298-43 | 79298-44 | 79298-45 |
| Your Reference | ---------- | 2863/ASB101 | 2863/ASB102 | 2863/ASB103 |
| Depth | ---------- | - | - | - |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Material | Material | Material |
| Date analysed | - | 28/09/2012 | 28/09/2012 | 28/09/2012 |
| Mass / Dimension of Sample | - | 106x82x4mm | 80x69x4mm | 135x55x4mm |
| Sample Description | - | Grey compressed fibre cement material | Grey compressed fibre cement material | Grey compressed fibre cement material |
| Asbestos ID in materials | - | Chrysotile asbestos detected | Chrysotile asbestos detected | Chrysotile asbestos detected |

| ESP/CEC | | | | | |
|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-17 | 79298-18 | 79298-42 |
| Your Reference | ---------- | 2863/117 | 2863/103 | 2863/125 | 2863/118 |
| Depth | ---------- | 1.0 | 0.4 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Exchangeable Ca | meq/100g | <0.1 | 5.2 | 0.4 | <0.1 |
| Exchangeable K | meq/100g | <0.1 | 0.5 | 0.1 | <0.1 |
| Exchangeable Mg | meq/100g | 1.5 | 6.7 | 0.81 | 0.80 |
| Exchangeable Na | meq/100g | <0.1 | <0.1 | <0.1 | <0.1 |
| Cation Exchange Capacity | meq/100g | 1.7 | 12 | 1.4 | <1.0 |
| ESP | % | 5.8 | <1.0 | 6.9 | 6.1 |

| Miscellaneous Inorg - soil | | | | | |
|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-17 | 79298-18 | 79298-42 |
| Your Reference | ---------- | 2863/117 | 2863/103 | 2863/125 | 2863/118 |
| Depth | ---------- | 1.0 | 0.4 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date prepared | - | 28/09/2012 | 28/09/2012 | 28/09/2012 | 28/09/2012 |
| Date analysed | - | 28/09/2012 | 28/09/2012 | 28/09/2012 | 28/09/2012 |
| pH 1:5 soil:water | pH Units | 4.8 | 5.5 | 4.8 | 5.3 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 29 | 51 | 40 | 18 |
| Chloride, Cl 1:5 soil:water | mg/kg | 40 | 49 | 45 | 28 |
| Sulphate, SO4 1:5 soil:water | mg/kg | 32 | 53 | 24 | 21 |

| sPOCAS field test | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-4 | 79298-7 | 79298-8 | 79298-10 | 79298-11 |
| Your Reference | ---------- | 2863/129 | 2863/134 | 2863/133 | 2863/117 | 2863/117 |
| Depth | ---------- | 0.05 | - | 0.05 | 0.05 | 0.3 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| $pH_F$ (field pH test)* | pH Units | 4.5 | 4.7 | 5.2 | 5.1 | 5.7 |
| $pH_{FOX}$ (field peroxide test)* | pH Units | 2.0 | 2.7 | 1.9 | 2.6 | 3.7 |
| Reaction Rate* | - | Moderate | Moderate | Moderate | Moderate | Moderate |

| sPOCAS field test | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-12 | 79298-17 | 79298-18 | 79298-28 | 79298-29 |
| Your Reference | ---------- | 2863/117 | 2863/103 | 2863/125 | 2863/SS114 | 2863/105 |
| Depth | ---------- | 1.0 | 0.4 | 0.05 | - | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| $pH_F$ (field pH test)* | pH Units | 5.2 | 5.4 | 4.7 | 6.9 | 5.0 |
| $pH_{FOX}$ (field peroxide test)* | pH Units | 4.0 | 3.7 | 2.1 | 3.8 | 2.9 |
| Reaction Rate* | - | Slight | Moderate | Slight | High | Moderate |

| sPOCAS field test | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-30 | 79298-33 | 79298-41 | 79298-52 | 79298-53 |
| Your Reference | ---------- | 2863/105 | 2863/123 | 2863/115 | 2863/129 | 2863/128 |
| Depth | ---------- | 0.6 | 0.1 | 0.05 | 0.2 | 0.05 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| $pH_F$ (field pH test)* | pH Units | 4.8 | 5.3 | 4.9 | 5.5 | 5.7 |
| $pH_{FOX}$ (field peroxide test)* | pH Units | 3.0 | 3.3 | 3.4 | 3.5 | 3.7 |
| Reaction Rate* | - | Slight | Slight | Moderate | Moderate | Moderate |

| Method ID | Methodology Summary |
|---|---|
| Org-016 | 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. |
| Org-003 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| Org-012 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Org-005 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. |
| Org-008 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. |
| Org-006 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. |
| Metals-020 ICP-AES | Determination of various metals by ICP-AES. |
| Metals-021 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| Inorg-030 | Total Phenolics - determined colorimetrically following disitillation, based upon APHA 22nd ED 5530 D. |
| Inorg-008 | Moisture content determined by heating at 105 deg C for a minimum of 4 hours. |
| ASB-001 | Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004. |
| Metals-009 | Determination of exchangeable cations and cation exchange capacity in soil based on Rayment and Lyons 2011. |
| Inorg-001 | pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+. |
| Inorg-002 | Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA 22nd ED 2510 and Rayment & Lyons. |
| Inorg-081 | Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110 -B. |
| Inorg-063 | pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. Based on section H, Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions. |

| QUALITY CONTROL<br>vTRH & BTEX in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-4 | 27/09/2012 |
| Date analysed | - | | | 29/09/2012 | 79298-1 | 29/09/2012 \|\| 29/09/2012 | LCS-4 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | 25 | Org-016 | <25 | 79298-1 | <25 \|\| <25 | LCS-4 | 114% |
| Benzene | mg/kg | 0.2 | Org-016 | <0.2 | 79298-1 | <0.2 \|\| <0.2 | LCS-4 | 118% |
| Toluene | mg/kg | 0.5 | Org-016 | <0.5 | 79298-1 | <0.5 \|\| <0.5 | LCS-4 | 114% |
| Ethylbenzene | mg/kg | 1 | Org-016 | <1 | 79298-1 | <1 \|\| <1 | LCS-4 | 112% |
| m+p-xylene | mg/kg | 2 | Org-016 | <2 | 79298-1 | <2 \|\| <2 | LCS-4 | 113% |
| o-Xylene | mg/kg | 1 | Org-016 | <1 | 79298-1 | <1 \|\| <1 | LCS-4 | 105% |
| *Surrogate* aaa-Trifluorotoluene | % | | Org-016 | 100 | 79298-1 | 87 \|\| 101 \|\| RPD: 15 | LCS-4 | 107% |

| QUALITY CONTROL<br>sTRH in Soil (C10-C36) | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-4 | 27/09/2012 |
| Date analysed | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-4 | 27/09/2012 |
| TRH $C_{10}$ - $C_{14}$ | mg/kg | 50 | Org-003 | <50 | 79298-1 | <50 \|\| <50 | LCS-4 | 91% |
| TRH $C_{15}$ - $C_{28}$ | mg/kg | 100 | Org-003 | <100 | 79298-1 | 110 \|\| <100 | LCS-4 | 108% |
| TRH $C_{29}$ - $C_{36}$ | mg/kg | 100 | Org-003 | <100 | 79298-1 | 140 \|\| 100 \|\| RPD: 33 | LCS-4 | 92% |
| *Surrogate* o-Terphenyl | % | | Org-003 | 72 | 79298-1 | 89 \|\| 85 \|\| RPD: 5 | LCS-4 | 93% |

| QUALITY CONTROL<br>PAHs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-4 | 27/09/2012 |
| Date analysed | - | | | 28/09/2012 | 79298-1 | 29/09/2012 \|\| 29/09/2012 | LCS-4 | 28/09/2012 |
| Naphthalene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 113% |
| Acenaphthylene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 117% |
| Phenanthrene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 100% |
| Anthracene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 100% |
| Pyrene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 114% |
| Benzo(a)anthracene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-4 | 110% |

| QUALITY CONTROL<br>PAHs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Benzo(b+k)fluoranthene | mg/kg | 0.2 | Org-012 subset | <0.2 | 79298-1 | <0.2 \|\| <0.2 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | Org-012 subset | <0.05 | 79298-1 | <0.05 \|\| <0.05 | LCS-4 | 120% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | Org-012 subset | <0.1 | 79298-1 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | | Org-012 subset | 78 | 79298-1 | 91 \|\| 101 \|\| RPD: 10 | LCS-4 | 81% |

| QUALITY CONTROL<br>Organochlorine Pesticides in soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/9/2012 | 79298-31 | 27/9/2012 \|\| 27/9/2012 | LCS-5 | 27/9/2012 |
| Date analysed | - | | | 29/9/2012 | 79298-31 | 29/9/2012 \|\| 29/9/2012 | LCS-5 | 29/9/2012 |
| HCB | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| alpha-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 109% |
| gamma-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| beta-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 123% |
| Heptachlor | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 108% |
| delta-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aldrin | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 119% |
| Heptachlor Epoxide | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 108% |
| gamma-Chlordane | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| alpha-chlordane | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan I | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDE | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 109% |
| Dieldrin | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 111% |
| Endrin | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 103% |
| pp-DDD | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 120% |
| Endosulfan II | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDT | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endrin Aldehyde | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan Sulphate | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 97% |
| Methoxychlor | mg/kg | 0.1 | Org-005 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCMX | % | | Org-005 | 94 | 79298-31 | 81 \|\| 83 \|\| RPD: 2 | LCS-5 | 61% |

| QUALITY CONTROL<br><br>Organophosphorus Pesticides | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/9/2012 | 79298-31 | 27/9/2012 \|\| 27/9/2012 | LCS-5 | 27/9/2012 |
| Date analysed | - | | | 29/9/2012 | 79298-31 | 29/9/2012 \|\| 29/9/2012 | LCS-5 | 29/9/2012 |
| Diazinon | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dimethoate | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chlorpyriphos-methyl | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Ronnel | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chlorpyriphos | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 99% |
| Fenitrothion | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 93% |
| Bromophos-ethyl | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Ethion | mg/kg | 0.1 | Org-008 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 98% |
| *Surrogate* TCMX | % | | Org-008 | 94 | 79298-31 | 81 \|\| 83 \|\| RPD: 2 | LCS-5 | 60% |
| QUALITY CONTROL<br><br>PCBs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | | | 27/9/2012 | 79298-31 | 27/9/2012 \|\| 27/9/2012 | LCS-5 | 27/9/2012 |
| Date analysed | - | | | 29/9/2012 | 79298-31 | 29/9/2012 \|\| 29/9/2012 | LCS-5 | 29/9/2012 |
| Arochlor 1016 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Arochlor 1221 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Arochlor 1232 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Arochlor 1242 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Arochlor 1248 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Arochlor 1254 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | LCS-5 | 103% |
| Arochlor 1260 | mg/kg | 0.1 | Org-006 | <0.1 | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCLMX | % | | Org-006 | 94 | 79298-31 | 81 \|\| 83 \|\| RPD: 2 | LCS-5 | 60% |
| QUALITY CONTROL<br><br>Acid Extractable metals in soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
| Date digested | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-1 | 27/09/2012 |
| Date analysed | - | | | 27/09/2012 | 79298-1 | 27/09/2012 \|\| 27/09/2012 | LCS-1 | 27/09/2012 |
| Arsenic | mg/kg | 4 | Metals-020 ICP-AES | <4 | 79298-1 | <4 \|\| 5 | LCS-1 | 94% |
| Cadmium | mg/kg | 0.5 | Metals-020 ICP-AES | <0.5 | 79298-1 | <0.5 \|\| <0.5 | LCS-1 | 94% |
| Chromium | mg/kg | 1 | Metals-020 ICP-AES | <1 | 79298-1 | 12 \|\| 29 \|\| RPD: 83 | LCS-1 | 97% |
| Copper | mg/kg | 1 | Metals-020 ICP-AES | <1 | 79298-1 | 1 \|\| <1 | LCS-1 | 95% |
| Lead | mg/kg | 1 | Metals-020 ICP-AES | <1 | 79298-1 | 6 \|\| 9 \|\| RPD: 40 | LCS-1 | 95% |
| Mercury | mg/kg | 0.1 | Metals-021 CV-AAS | <0.1 | 79298-1 | <0.1 \|\| <0.1 | LCS-1 | 101% |

| QUALITY CONTROL<br>Acid Extractable metals in soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Nickel | mg/kg | 1 | Metals-020 ICP-AES | <1 | 79298-1 | 2 \|\| 2 \|\| RPD: 0 | LCS-1 | 95% |
| Zinc | mg/kg | 1 | Metals-020 ICP-AES | <1 | 79298-1 | 5 \|\| 4 \|\| RPD: 22 | LCS-1 | 98% |
| Magnesium | mg/kg | 5 | Metals-020 ICP-AES | <5 | [NT] | [NT] | LCS-1 | 93% |

| QUALITY CONTROL<br>Total Phenolics in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 27/09/2012 | 79298-7 | 27/09/2012 \|\| 27/09/2012 | LCS-1 | 27/09/2012 |
| Date analysed | - | | | 27/09/2012 | 79298-7 | 27/09/2012 \|\| 27/09/2012 | LCS-1 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | 5 | Inorg-030 | <5 | 79298-7 | <5 \|\| <5 | LCS-1 | 81% |

| QUALITY CONTROL<br>Moisture | UNITS | PQL | METHOD | Blank |
|---|---|---|---|---|
| Date prepared | - | | | [NT] |
| Date analysed | - | | | [NT] |
| Moisture | % | 0.1 | Inorg-008 | [NT] |

| QUALITY CONTROL<br>Asbestos ID - soils | UNITS | PQL | METHOD | Blank |
|---|---|---|---|---|
| Date analysed | - | | | [NT] |

| QUALITY CONTROL<br>Asbestos ID - materials | UNITS | PQL | METHOD | Blank |
|---|---|---|---|---|
| Date analysed | - | | | [NT] |

| QUALITY CONTROL<br>ESP/CEC | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Exchangeable Ca | meq/100g | 0.1 | Metals-009 | <0.1 | 79298-12 | <0.1 \|\| <0.1 | LCS-1 | 100% |
| Exchangeable K | meq/100g | 0.1 | Metals-009 | <0.1 | 79298-12 | <0.1 \|\| <0.1 | LCS-1 | 99% |
| Exchangeable Mg | meq/100g | 0.1 | Metals-009 | <0.1 | 79298-12 | 1.5 \|\| 1.5 \|\| RPD: 0 | LCS-1 | 96% |
| Exchangeable Na | meq/100g | 0.1 | Metals-009 | <0.1 | 79298-12 | <0.1 \|\| <0.1 | LCS-1 | 99% |
| Cation Exchange Capacity | meq/100g | 1 | Metals-009 | <1.0 | 79298-12 | 1.7 \|\| 1.7 \|\| RPD: 0 | [NR] | [NR] |
| ESP | % | 1 | Metals-009 | <1.0 | 79298-12 | 5.8 \|\| 5.6 \|\| RPD: 4 | [NR] | [NR] |

| QUALITY CONTROL<br>Miscellaneous Inorg - soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base II Duplicate II %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date prepared | - | | | 28/09/2012 | [NT] | [NT] | LCS-1 | 28/09/2012 |
| Date analysed | - | | | 28/09/2012 | [NT] | [NT] | LCS-1 | 28/09/2012 |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | [NT] | [NT] | LCS-1 | 102% |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | <1 | [NT] | [NT] | LCS-1 | 106% |
| Chloride, Cl 1:5 soil:water | mg/kg | 2 | Inorg-081 | <2 | [NT] | [NT] | LCS-1 | 116% |
| Sulphate, SO4 1:5 soil:water | mg/kg | 2 | Inorg-081 | <2 | [NT] | [NT] | LCS-1 | 119% |

| QUALITY CONTROL<br>sPOCAS field test | UNITS | PQL | METHOD | Blank |
|---|---|---|---|---|
| $pH_F$ (field pH test)* | pH Units | | Inorg-063 | [NT] |
| $pH_{FOX}$ (field peroxide test)* | pH Units | | Inorg-063 | [NT] |

| QUALITY CONTROL<br>vTRH & BTEX in Soil | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-5 | 27/09/2012 |
| Date analysed | - | 79298-11 | 29/09/2012 \|\| 29/09/2012 | LCS-5 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | 79298-11 | <25 \|\| <25 | LCS-5 | 113% |
| Benzene | mg/kg | 79298-11 | <0.2 \|\| <0.2 | LCS-5 | 121% |
| Toluene | mg/kg | 79298-11 | <0.5 \|\| <0.5 | LCS-5 | 117% |
| Ethylbenzene | mg/kg | 79298-11 | <1 \|\| <1 | LCS-5 | 107% |
| m+p-xylene | mg/kg | 79298-11 | <2 \|\| <2 | LCS-5 | 109% |
| o-Xylene | mg/kg | 79298-11 | <1 \|\| <1 | LCS-5 | 100% |
| *Surrogate* aaa-Trifluorotoluene | % | 79298-11 | 109 \|\| 102 \|\| RPD: 7 | LCS-5 | 112% |

| QUALITY CONTROL<br>sTRH in Soil (C10-C36) | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-5 | 27/09/2012 |
| Date analysed | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-5 | 27/09/2012 |
| TRH $C_{10}$ - $C_{14}$ | mg/kg | 79298-11 | <50 \|\| <50 | LCS-5 | 88% |
| TRH $C_{15}$ - $C_{28}$ | mg/kg | 79298-11 | <100 \|\| <100 | LCS-5 | 102% |
| TRH $C_{29}$ - $C_{36}$ | mg/kg | 79298-11 | <100 \|\| <100 | LCS-5 | 89% |
| *Surrogate* o-Terphenyl | % | 79298-11 | 86 \|\| 85 \|\| RPD: 1 | LCS-5 | 76% |

| QUALITY CONTROL<br>PAHs in Soil | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-5 | 27/09/2012 |
| Date analysed | - | 79298-11 | 29/09/2012 \|\| 29/09/2012 | LCS-5 | 28/09/2012 |
| Naphthalene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 105% |
| Acenaphthylene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Acenaphthene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 108% |

| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Phenanthrene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 91% |
| Anthracene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluoranthene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 92% |
| Pyrene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 104% |
| Benzo(a)anthracene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chrysene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-5 | 100% |
| Benzo(b+k)fluoranthene | mg/kg | 79298-11 | <0.2 \|\| <0.2 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 79298-11 | <0.05 \|\| <0.05 | LCS-5 | 115% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 79298-11 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | 79298-11 | 93 \|\| 93 \|\| RPD: 0 | LCS-5 | 60% |

| QUALITY CONTROL Organochlorine Pesticides in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | [NT] | [NT] | 79298-32 | 27/9/2012 |
| Date analysed | - | [NT] | [NT] | 79298-32 | 29/9/2012 |
| HCB | mg/kg | [NT] | [NT] | [NR] | [NR] |
| alpha-BHC | mg/kg | [NT] | [NT] | 79298-32 | 110% |
| gamma-BHC | mg/kg | [NT] | [NT] | [NR] | [NR] |
| beta-BHC | mg/kg | [NT] | [NT] | 79298-32 | 78% |
| Heptachlor | mg/kg | [NT] | [NT] | 79298-32 | 97% |
| delta-BHC | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Aldrin | mg/kg | [NT] | [NT] | 79298-32 | 119% |
| Heptachlor Epoxide | mg/kg | [NT] | [NT] | 79298-32 | 108% |
| 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] | 79298-32 | 107% |
| Dieldrin | mg/kg | [NT] | [NT] | 79298-32 | 68% |
| Endrin | mg/kg | [NT] | [NT] | 79298-32 | 98% |
| pp-DDD | mg/kg | [NT] | [NT] | 79298-32 | 102% |
| 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] | 79298-32 | 95% |
| Methoxychlor | mg/kg | [NT] | [NT] | [NR] | [NR] |
| *Surrogate* TCMX | % | [NT] | [NT] | 79298-32 | 87% |

| QUALITY CONTROL Organophosphorus Pesticides | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | [NT] | [NT] | 79298-32 | 27/9/2012 |
| Date analysed | - | [NT] | [NT] | 79298-32 | 29/9/2012 |
| 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] | 79298-32 | 106% |
| Fenitrothion | mg/kg | [NT] | [NT] | 79298-32 | 95% |
| Bromophos-ethyl | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Ethion | mg/kg | [NT] | [NT] | 79298-32 | 106% |
| *Surrogate* TCMX | % | [NT] | [NT] | 79298-32 | 94% |
| QUALITY CONTROL PCBs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | [NT] | [NT] | 79298-32 | 27/9/2012 |
| Date analysed | - | [NT] | [NT] | 79298-32 | 29/9/2012 |
| Arochlor 1016 | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Arochlor 1221 | 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] | 79298-32 | 102% |
| Arochlor 1260 | mg/kg | [NT] | [NT] | [NR] | [NR] |
| *Surrogate* TCLMX | % | [NT] | [NT] | 79298-32 | 93% |
| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date digested | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-2 | 27/09/2012 |
| Date analysed | - | 79298-11 | 27/09/2012 \|\| 27/09/2012 | LCS-2 | 27/09/2012 |
| Arsenic | mg/kg | 79298-11 | <4 \|\| <4 | LCS-2 | 94% |
| Cadmium | mg/kg | 79298-11 | <0.5 \|\| <0.5 | LCS-2 | 95% |
| Chromium | mg/kg | 79298-11 | 16 \|\| 19 \|\| RPD: 17 | LCS-2 | 97% |
| Copper | mg/kg | 79298-11 | <1 \|\| <1 | LCS-2 | 96% |
| Lead | mg/kg | 79298-11 | 4 \|\| 4 \|\| RPD: 0 | LCS-2 | 95% |
| Mercury | mg/kg | 79298-11 | <0.1 \|\| <0.1 | LCS-2 | 99% |
| Nickel | mg/kg | 79298-11 | 2 \|\| 2 \|\| RPD: 0 | LCS-2 | 95% |
| Zinc | mg/kg | 79298-11 | 2 \|\| 2 \|\| RPD: 0 | LCS-2 | 95% |
| Magnesium | mg/kg | [NT] | [NT] | LCS-2 | 94% |

| QUALITY CONTROL Total Phenolics in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-33 | 27/09/2012 \|\| 27/09/2012 | 79298-8 | 27/09/2012 |
| Date analysed | - | 79298-33 | 27/09/2012 \|\| 27/09/2012 | 79298-8 | 27/09/2012 |
| Total Phenolics (as Phenol) | mg/kg | 79298-33 | <5 \|\| <5 | 79298-8 | 8% |
| QUALITY CONTROL Miscellaneous Inorg - soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date prepared | - | [NT] | [NT] | 79298-2 | 28/09/2012 |
| Date analysed | - | [NT] | [NT] | 79298-2 | 28/09/2012 |
| pH 1:5 soil:water | pH Units | [NT] | [NT] | 79298-2 | 102% |
| Electrical Conductivity 1:5 soil:water | µS/cm | [NT] | [NT] | 79298-2 | 106% |
| Chloride, Cl 1:5 soil:water | mg/kg | [NT] | [NT] | 79298-2 | 116% |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NT] | [NT] | 79298-2 | 119% |
| QUALITY CONTROL vTRH & BTEX in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| Date analysed | - | 79298-21 | 29/09/2012 \|\| 29/09/2012 | 79298-2 | 28/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | 79298-21 | <25 \|\| <25 | 79298-2 | 98% |
| Benzene | mg/kg | 79298-21 | <0.2 \|\| <0.2 | 79298-2 | 103% |
| Toluene | mg/kg | 79298-21 | <0.5 \|\| <0.5 | 79298-2 | 99% |
| Ethylbenzene | mg/kg | 79298-21 | <1 \|\| <1 | 79298-2 | 95% |
| m+p-xylene | mg/kg | 79298-21 | <2 \|\| <2 | 79298-2 | 96% |
| o-Xylene | mg/kg | 79298-21 | <1 \|\| <1 | 79298-2 | 89% |
| *Surrogate* aaa-Trifluorotoluene | % | 79298-21 | 99 \|\| 102 \|\| RPD: 3 | 79298-2 | 99% |
| QUALITY CONTROL sTRH in Soil (C10-C36) | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| Date analysed | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| TRH $C_{10}$ - $C_{14}$ | mg/kg | 79298-21 | <50 \|\| <50 | 79298-2 | 94% |
| TRH $C_{15}$ - $C_{28}$ | mg/kg | 79298-21 | <100 \|\| <100 | 79298-2 | 119% |
| TRH $C_{29}$ - $C_{36}$ | mg/kg | 79298-21 | <100 \|\| <100 | 79298-2 | 111% |
| *Surrogate* o-Terphenyl | % | 79298-21 | 83 \|\| 84 \|\| RPD: 1 | 79298-2 | 102% |
| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| Date analysed | - | 79298-21 | 29/09/2012 \|\| 29/09/2012 | 79298-2 | 29/09/2012 |
| Naphthalene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | 79298-2 | 102% |
| Acenaphthylene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Acenaphthene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | 79298-2 | 114% |
| Phenanthrene | mg/kg | 79298-21 | 0.1 \|\| 0.1 \|\| RPD: 0 | 79298-2 | 92% |

| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Anthracene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluoranthene | mg/kg | 79298-21 | 0.4 \|\| 0.3 \|\| RPD: 29 | 79298-2 | 93% |
| Pyrene | mg/kg | 79298-21 | 0.4 \|\| 0.3 \|\| RPD: 29 | 79298-2 | 105% |
| Benzo(a)anthracene | mg/kg | 79298-21 | 0.2 \|\| 0.1 \|\| RPD: 67 | [NR] | [NR] |
| Chrysene | mg/kg | 79298-21 | 0.2 \|\| 0.2 \|\| RPD: 0 | 79298-2 | 100% |
| Benzo(b+k)fluoranthene | mg/kg | 79298-21 | 0.3 \|\| 0.3 \|\| RPD: 0 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 79298-21 | 0.27 \|\| 0.22 \|\| RPD: 20 | 79298-2 | 120% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 79298-21 | 0.1 \|\| 0.1 \|\| RPD: 0 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 79298-21 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 79298-21 | 0.1 \|\| 0.1 \|\| RPD: 0 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-$d_{14}$ | % | 79298-21 | 93 \|\| 105 \|\| RPD: 12 | 79298-2 | 99% |

| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date digested | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | LCS-3 | 27/09/2012 |
| Date analysed | - | 79298-21 | 27/09/2012 \|\| 27/09/2012 | LCS-3 | 27/09/2012 |
| Arsenic | mg/kg | 79298-21 | 8 \|\| 8 \|\| RPD: 0 | LCS-3 | 101% |
| Cadmium | mg/kg | 79298-21 | <0.5 \|\| <0.5 | LCS-3 | 99% |
| Chromium | mg/kg | 79298-21 | 24 \|\| 23 \|\| RPD: 4 | LCS-3 | 104% |
| Copper | mg/kg | 79298-21 | 11 \|\| 11 \|\| RPD: 0 | LCS-3 | 101% |
| Lead | mg/kg | 79298-21 | 48 \|\| 47 \|\| RPD: 2 | LCS-3 | 101% |
| Mercury | mg/kg | 79298-21 | <0.1 \|\| <0.1 | LCS-3 | 104% |
| Nickel | mg/kg | 79298-21 | 5 \|\| 5 \|\| RPD: 0 | LCS-3 | 101% |
| Zinc | mg/kg | 79298-21 | 47 \|\| 43 \|\| RPD: 9 | LCS-3 | 102% |
| Magnesium | mg/kg | [NT] | [NT] | LCS-3 | 101% |

| QUALITY CONTROL vTRH & BTEX in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-32 | 27/09/2012 |
| Date analysed | - | 79298-31 | 29/09/2012 \|\| 29/09/2012 | 79298-32 | 29/09/2012 |
| vTRH $C_6$ - $C_9$ | mg/kg | 79298-31 | <25 \|\| <25 | 79298-32 | 85% |
| Benzene | mg/kg | 79298-31 | <0.2 \|\| <0.2 | 79298-32 | 92% |
| Toluene | mg/kg | 79298-31 | <0.5 \|\| <0.5 | 79298-32 | 88% |
| Ethylbenzene | mg/kg | 79298-31 | <1 \|\| <1 | 79298-32 | 81% |
| m+p-xylene | mg/kg | 79298-31 | <2 \|\| <2 | 79298-32 | 83% |
| o-Xylene | mg/kg | 79298-31 | <1 \|\| <1 | 79298-32 | 76% |
| *Surrogate* aaa-Trifluorotoluene | % | 79298-31 | 107 \|\| 111 \|\| RPD: 4 | 79298-32 | 86% |

| QUALITY CONTROL sTRH in Soil (C10-C36) | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-32 | 27/09/2012 |
| Date analysed | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-32 | 27/09/2012 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | 79298-31 | <50 \|\| <50 | 79298-32 | 88% |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | 79298-31 | <100 \|\| <100 | 79298-32 | 106% |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 79298-31 | <100 \|\| <100 | 79298-32 | 93% |
| *Surrogate* o-Terphenyl | % | 79298-31 | 66 \|\| 72 \|\| RPD: 9 | 79298-32 | 114% |
| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-32 | 27/09/2012 |
| Date analysed | - | 79298-31 | 29/09/2012 \|\| 29/09/2012 | 79298-32 | 29/09/2012 |
| Naphthalene | mg/kg | 79298-31 | <0.1 \|\| <0.1 | 79298-32 | 103% |
| Acenaphthylene | mg/kg | 79298-31 | 0.1 \|\| 0.1 \|\| RPD: 0 | [NR] | [NR] |
| Acenaphthene | mg/kg | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 79298-31 | <0.1 \|\| <0.1 | 79298-32 | 106% |
| Phenanthrene | mg/kg | 79298-31 | <0.1 \|\| 0.1 | 79298-32 | 90% |
| Anthracene | mg/kg | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluoranthene | mg/kg | 79298-31 | 0.2 \|\| 0.2 \|\| RPD: 0 | 79298-32 | 90% |
| Pyrene | mg/kg | 79298-31 | 0.2 \|\| 0.2 \|\| RPD: 0 | 79298-32 | 102% |
| Benzo(a)anthracene | mg/kg | 79298-31 | 0.1 \|\| 0.2 \|\| RPD: 67 | [NR] | [NR] |
| Chrysene | mg/kg | 79298-31 | 0.2 \|\| 0.2 \|\| RPD: 0 | 79298-32 | 98% |
| Benzo(b+k)fluoranthene | mg/kg | 79298-31 | 0.4 \|\| 0.4 \|\| RPD: 0 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 79298-31 | 0.37 \|\| 0.41 \|\| RPD: 10 | 79298-32 | 110% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 79298-31 | 0.2 \|\| 0.2 \|\| RPD: 0 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 79298-31 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 79298-31 | 0.2 \|\| 0.2 \|\| RPD: 0 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-d$_{14}$ | % | 79298-31 | 73 \|\| 83 \|\| RPD: 13 | 79298-32 | 82% |

| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date digested | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| Date analysed | - | 79298-31 | 27/09/2012 \|\| 27/09/2012 | 79298-2 | 27/09/2012 |
| Arsenic | mg/kg | 79298-31 | 8 \|\| 10 \|\| RPD: 22 | 79298-2 | 99% |
| Cadmium | mg/kg | 79298-31 | <0.5 \|\| <0.5 | 79298-2 | 97% |
| Chromium | mg/kg | 79298-31 | 19 \|\| 29 \|\| RPD: 42 | 79298-2 | 108% |
| Copper | mg/kg | 79298-31 | 22 \|\| 22 \|\| RPD: 0 | 79298-2 | 104% |
| Lead | mg/kg | 79298-31 | 21 \|\| 24 \|\| RPD: 13 | 79298-2 | 99% |
| Mercury | mg/kg | 79298-31 | <0.1 \|\| <0.1 | 79298-2 | 95% |
| Nickel | mg/kg | 79298-31 | 4 \|\| 4 \|\| RPD: 0 | 79298-2 | 100% |
| Zinc | mg/kg | 79298-31 | 26 \|\| 24 \|\| RPD: 8 | 79298-2 | 99% |
| Magnesium | mg/kg | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date digested | - | [NT] | [NT] | 79298-32 | 27/09/2012 |
| Date analysed | - | [NT] | [NT] | 79298-32 | 27/09/2012 |
| Arsenic | mg/kg | [NT] | [NT] | 79298-32 | 101% |
| Cadmium | mg/kg | [NT] | [NT] | 79298-32 | 99% |
| Chromium | mg/kg | [NT] | [NT] | 79298-32 | 104% |
| Copper | mg/kg | [NT] | [NT] | 79298-32 | 101% |
| Lead | mg/kg | [NT] | [NT] | 79298-32 | 101% |
| Mercury | mg/kg | [NT] | [NT] | 79298-32 | 104% |
| Nickel | mg/kg | [NT] | [NT] | 79298-32 | 101% |
| Zinc | mg/kg | [NT] | [NT] | 79298-32 | 102% |
| Magnesium | mg/kg | [NT] | [NT] | 79298-32 | 101% |

**Report Comments:**

Asbestos in Soil: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteriae has been exceeded for 79298-1 for Cr. Therefore a triplicate result has been issued as laboratory sample number 79298-54.

| | |
|---|---|
| Asbestos ID was analysed by Approved Identifier: | Kim Femia, Paul Ching |
| Asbestos ID was authorised by Approved Signatory: | Paul Ching |

| | | |
|---|---|---|
| INS: Insufficient sample for this test | PQL: Practical Quantitation Limit | NT: Not tested |
| NA: Test not required | RPD: Relative Percent Difference | NA: Test not required |
| <: Less than | >: Greater than | LCS: Laboratory Control Sample |

**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 batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the 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.

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# CERTIFICATE OF ANALYSIS 79298-B

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

**Attention:** Ben McGiffin

**Sample log in details:**

| | |
|---|---|
| Your Reference: | **2863-soil and material sampling-Mura** |
| No. of samples: | Additional Testing on 15 Soils |
| Date samples received / completed instructions received | 24/09/2012, 25/09/1211/10/12 |

**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: / Issue Date: | 19/10/12 | / | 19/10/12 |
| Date of Preliminary Report: | Not issued | | |

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

**Results Approved By:**

M. Mansfield
Matt Mansfield
Approved Signatory

| sPOCAS<br>Our Reference:<br>Your Reference<br>Depth<br>Date Sampled<br>Type of sample | UNITS<br>----------<br>---------- | 79298-B-4<br>2863/129<br>0.05<br>19/09/2012<br>Soil | 79298-B-7<br>2863/134<br>-<br>19/09/2012<br>Soil | 79298-B-8<br>2863/133<br>0.05<br>19/09/2012<br>Soil | 79298-B-10<br>2863/117<br>0.05<br>19/09/2012<br>Soil | 79298-B-11<br>2863/117<br>0.3<br>19/09/2012<br>Soil |
|---|---|---|---|---|---|---|
| Date prepared | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| Date analysed | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| pH $_{kcl}$ | pH units | 3.8 | 3.8 | 4.1 | 4.3 | 4.5 |
| TAA pH 6.5 | moles $H^+$/t | 37 | 37 | 42 | 42 | 20 |
| s-TAA pH 6.5 | %w/w S | 0.06 | 0.06 | 0.07 | 0.07 | 0.03 |
| pH $_{Ox}$ | pH units | 2.5 | 3.0 | 2.5 | 2.7 | 3.8 |
| TPA pH 6.5 | moles $H^+$/t | 260 | 120 | 300 | 180 | 12 |
| s-TPA pH 6.5 | %w/w S | 0.42 | 0.20 | 0.48 | 0.29 | 0.02 |
| TSA pH 6.5 | moles $H^+$/t | 220 | 87 | 260 | 140 | <5 |
| s-TSA pH 6.5 | %w/w S | 0.36 | 0.14 | 0.41 | 0.22 | <0.01 |
| $ANC_E$ | % $CaCO_3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| a-$ANC_E$ | moles $H^+$/t | <5 | <5 | <5 | <5 | <5 |
| s-$ANC_E$ | %w/w S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| $S_{KCl}$ | %w/w S | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| $S_P$ | %w/w | 0.01 | 0.009 | 0.03 | 0.02 | 0.01 |
| $S_{POS}$ | %w/w | 0.009 | 0.007 | 0.03 | 0.02 | 0.01 |
| a-$S_{POS}$ | moles $H^+$/t | 6 | <5 | 17 | 12 | 7 |
| $Ca_{KCl}$ | %w/w | 0.01 | 0.01 | 0.01 | 0.02 | <0.005 |
| $Ca_P$ | %w/w | 0.01 | 0.01 | 0.02 | 0.02 | <0.005 |
| $Ca_A$ | %w/w | <0.005 | <0.005 | 0.005 | <0.005 | <0.005 |
| $Mg_{KCl}$ | %w/w | <0.005 | 0.008 | 0.010 | 0.012 | 0.012 |
| $Mg_P$ | %w/w | <0.005 | 0.008 | 0.013 | 0.015 | 0.014 |
| $Mg_A$ | %w/w | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| $S_{HCl}$ | %w/w S | <0.005 | <0.005 | 0.006 | <0.005 | [NT] |
| $S_{NAS}$ | %w/w S | <0.005 | <0.005 | <0.005 | <0.005 | [NT] |
| a-$S_{NAS}$ | moles $H^+$/t | <5 | <5 | <5 | <5 | [NT] |
| s-$S_{NAS}$ | %w/w S | <0.01 | <0.01 | <0.01 | <0.01 | [NT] |
| Fineness Factor | - | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| a-Net Acidity | moles $H^+$/t | 44 | 43 | 61 | 56 | 27 |
| Liming rate | kg $CaCO_3$/t | 3.3 | 3.2 | 4.6 | 4.2 | 2.0 |
| a-Net Acidity without ANCE | moles $H^+$/t | NA | NA | NA | NA | NA |
| Liming rate without ANCE | kg $CaCO_3$/t | NA | NA | NA | NA | NA |

| sPOCAS | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 79298-B-12 | 79298-B-17 | 79298-B-18 | 79298-B-28 | 79298-B-29 |
| Your Reference | ---------- | 2863/117 | 2863/103 | 2863/125 | 2863/SS114 | 2863/105 |
| Depth | ---------- | 1.0 | 0.4 | 0.05 | - | 0.2 |
| Date Sampled | | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 | 19/09/2012 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| Date analysed | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| pH $_{kcl}$ | pH units | 4.2 | 4.3 | 4.4 | 6.7 | 4.2 |
| TAA pH 6.5 | moles $H^+$/t | 45 | 32 | 35 | <5 | 55 |
| s-TAA pH 6.5 | %w/w S | 0.07 | 0.05 | 0.06 | <0.01 | 0.09 |
| pH $_{Ox}$ | pH units | 3.9 | 3.6 | 3.0 | 3.6 | 3.7 |
| TPA pH 6.5 | moles $H^+$/t | 47 | 32 | 100 | <5 | 140 |
| s-TPA pH 6.5 | %w/w S | 0.08 | 0.05 | 0.16 | <0.01 | 0.23 |
| TSA pH 6.5 | moles $H^+$/t | <5 | <5 | 65 | <5 | 87 |
| s-TSA pH 6.5 | %w/w S | <0.01 | <0.01 | 0.10 | <0.01 | 0.14 |
| $ANC_E$ | % $CaCO_3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| a-$ANC_E$ | moles $H^+$/t | <5 | <5 | <5 | <5 | <5 |
| s-$ANC_E$ | %w/w S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| $S_{KCl}$ | %w/w S | 0.03 | <0.005 | <0.005 | <0.005 | 0.02 |
| $S_P$ | %w/w | 0.07 | 0.03 | 0.01 | 0.04 | 0.08 |
| $S_{POS}$ | %w/w | 0.04 | 0.03 | 0.01 | 0.04 | 0.06 |
| a-$S_{POS}$ | moles $H^+$/t | 25 | 20 | 6 | 24 | 40 |
| $Ca_{KCl}$ | %w/w | <0.005 | 0.14 | <0.005 | 0.06 | 0.04 |
| $Ca_P$ | %w/w | 0.01 | 0.15 | 0.005 | 0.08 | 0.05 |
| $Ca_A$ | %w/w | 0.014 | 0.019 | <0.005 | 0.018 | 0.008 |
| $Mg_{KCl}$ | %w/w | 0.017 | 0.098 | <0.005 | 0.016 | 0.012 |
| $Mg_P$ | %w/w | 0.027 | 0.11 | 0.006 | 0.024 | 0.015 |
| $Mg_A$ | %w/w | 0.009 | 0.013 | <0.005 | 0.008 | <0.005 |
| $S_{HCl}$ | %w/w S | 0.025 | 0.013 | <0.005 | [NT] | 0.027 |
| $S_{NAS}$ | %w/w S | <0.005 | 0.010 | <0.005 | [NT] | 0.011 |
| a-$S_{NAS}$ | moles $H^+$/t | <5 | <5 | <5 | [NT] | 5 |
| s-$S_{NAS}$ | %w/w S | <0.01 | <0.01 | <0.01 | [NT] | <0.01 |
| Fineness Factor | - | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| a-Net Acidity | moles $H^+$/t | 70 | 57 | 43 | 24 | 100 |
| Liming rate | kg $CaCO_3$/t | 5.2 | 4.3 | 3.2 | 1.8 | 7.5 |
| a-Net Acidity without ANCE | moles $H^+$/t | NA | NA | NA | NA | NA |
| Liming rate without ANCE | kg $CaCO_3$/t | NA | NA | NA | NA | NA |

| sPOCAS<br>Our Reference:<br>Your Reference<br>Depth<br>Date Sampled<br>Type of sample | UNITS<br>----------<br>---------- | 79298-B-30<br>2863/105<br>0.6<br>19/09/2012<br>Soil | 79298-B-33<br>2863/123<br>0.1<br>19/09/2012<br>Soil | 79298-B-41<br>2863/115<br>0.05<br>19/09/2012<br>Soil | 79298-B-52<br>2863/129<br>0.2<br>19/09/2012<br>Soil | 79298-B-53<br>2863/128<br>0.05<br>19/09/2012<br>Soil |
|---|---|---|---|---|---|---|
| Date prepared | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| Date analysed | - | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 | 15/10/2012 |
| pH $_{kcl}$ | pH units | 3.9 | 4.3 | 4.3 | 4.8 | 4.6 |
| TAA pH 6.5 | moles $H^+$/t | 62 | 25 | 25 | 12 | 17 |
| s-TAA pH 6.5 | %w/w S | 0.10 | 0.04 | 0.04 | 0.02 | 0.03 |
| pH $_{Ox}$ | pH units | 3.6 | 4.0 | 3.3 | 3.6 | 3.7 |
| TPA pH 6.5 | moles $H^+$/t | 55 | 12 | 32 | <5 | 7 |
| s-TPA pH 6.5 | %w/w S | 0.09 | 0.02 | 0.05 | <0.01 | 0.01 |
| TSA pH 6.5 | moles $H^+$/t | <5 | <5 | 7 | <5 | <5 |
| s-TSA pH 6.5 | %w/w S | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 |
| $ANC_E$ | % $CaCO_3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| a-$ANC_E$ | moles $H^+$/t | <5 | <5 | <5 | <5 | <5 |
| s-$ANC_E$ | %w/w S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| $S_{KCl}$ | %w/w S | 0.009 | <0.005 | 0.005 | <0.005 | <0.005 |
| $S_P$ | %w/w | 0.01 | <0.005 | 0.02 | 0.007 | 0.008 |
| $S_{POS}$ | %w/w | 0.006 | <0.005 | 0.02 | 0.007 | 0.006 |
| a-$S_{POS}$ | moles $H^+$/t | <5 | <5 | 11 | <5 | <5 |
| $Ca_{KCl}$ | %w/w | <0.005 | 0.01 | 0.01 | <0.005 | <0.005 |
| $Ca_P$ | %w/w | 0.006 | 0.01 | 0.02 | <0.005 | <0.005 |
| $Ca_A$ | %w/w | <0.005 | <0.005 | 0.005 | <0.005 | <0.005 |
| $Mg_{KCl}$ | %w/w | 0.005 | 0.006 | 0.013 | <0.005 | 0.008 |
| $Mg_P$ | %w/w | 0.006 | 0.006 | 0.014 | <0.005 | 0.009 |
| $Mg_A$ | %w/w | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| $S_{HCl}$ | %w/w S | 0.007 | <0.005 | 0.009 | <0.005 | <0.005 |
| $S_{NAS}$ | %w/w S | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| a-$S_{NAS}$ | moles $H^+$/t | <5 | <5 | <5 | <5 | <5 |
| s-$S_{NAS}$ | %w/w S | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fineness Factor | - | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| a-Net Acidity | moles $H^+$/t | 66 | 27 | 37 | 17 | 21 |
| Liming rate | kg $CaCO_3$/t | 5.0 | 2.0 | 2.8 | 1.2 | 1.6 |
| a-Net Acidity without ANCE | moles $H^+$/t | NA | NA | NA | NA | NA |
| Liming rate without ANCE | kg $CaCO_3$/t | NA | NA | NA | NA | NA |

| Method ID | Methodology Summary |
|---|---|
| Inorg-064 | sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. |

| QUALITY CONTROL<br>sPOCAS | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base \|\| Duplicate \|\| %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date prepared | - | | | 15/10/2012 | 79298-B-4 | 15/10/2012 \|\| 15/10/2012 | LCS-1 | 15/10/2012 |
| Date analysed | - | | | 15/10/2012 | 79298-B-4 | 15/10/2012 \|\| 15/10/2012 | LCS-1 | 15/10/2012 |
| pH kcl | pH units | | Inorg-064 | [NT] | 79298-B-4 | 3.8 \|\| 3.8 \|\| RPD: 0 | LCS-1 | 98% |
| TAA pH 6.5 | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | 37 \|\| 25 \|\| RPD: 39 | LCS-1 | 97% |
| s-TAA pH 6.5 | %w/w S | 0.01 | Inorg-064 | <0.01 | 79298-B-4 | 0.06 \|\| 0.04 \|\| RPD: 40 | [NR] | [NR] |
| pH ox | pH units | | Inorg-064 | [NT] | 79298-B-4 | 2.5 \|\| 2.5 \|\| RPD: 0 | LCS-1 | 104% |
| TPA pH 6.5 | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | 260 \|\| 260 \|\| RPD: 0 | LCS-1 | 96% |
| s-TPA pH 6.5 | %w/w S | 0.01 | Inorg-064 | <0.01 | 79298-B-4 | 0.42 \|\| 0.41 \|\| RPD: 2 | [NR] | [NR] |
| TSA pH 6.5 | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | 220 \|\| 230 \|\| RPD: 4 | LCS-1 | 96% |
| s-TSA pH 6.5 | %w/w S | 0.01 | Inorg-064 | <0.01 | 79298-B-4 | 0.36 \|\| 0.37 \|\| RPD: 3 | [NR] | [NR] |
| $ANC_E$ | % $CaCO_3$ | 0.05 | Inorg-064 | <0.05 | 79298-B-4 | <0.05 \|\| <0.05 | [NR] | [NR] |
| a-$ANC_E$ | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | <5 \|\| <5 | [NR] | [NR] |
| s-$ANC_E$ | %w/w S | 0.05 | Inorg-064 | <0.05 | 79298-B-4 | <0.05 \|\| <0.05 | [NR] | [NR] |
| $S_{KCl}$ | %w/w S | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | LCS-1 | 97% |
| $S_P$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | 0.01 \|\| 0.01 \|\| RPD: 0 | LCS-1 | 112% |
| $S_{POS}$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | 0.009 \|\| 0.01 \|\| RPD: 11 | LCS-1 | 118% |
| a-$S_{POS}$ | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | 6 \|\| 7 \|\| RPD: 15 | LCS-1 | 118% |
| $Ca_{KCl}$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | 0.01 \|\| 0.01 \|\| RPD: 0 | LCS-1 | 98% |
| $Ca_P$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | 0.01 \|\| 0.01 \|\| RPD: 0 | [NR] | [NR] |
| $Ca_A$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | [NR] | [NR] |
| $Mg_{KCl}$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | LCS-1 | 93% |
| $Mg_P$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| 0.005 | [NR] | [NR] |
| $Mg_A$ | %w/w | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | [NR] | [NR] |
| $S_{HCl}$ | %w/w S | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | [NR] | [NR] |
| $S_{NAS}$ | %w/w S | 0.005 | Inorg-064 | <0.005 | 79298-B-4 | <0.005 \|\| <0.005 | [NR] | [NR] |
| a-$S_{NAS}$ | moles $H^+$/t | 5 | Inorg-064 | <5 | 79298-B-4 | <5 \|\| <5 | [NR] | [NR] |
| s-$S_{NAS}$ | %w/w S | 0.01 | Inorg-064 | <0.01 | 79298-B-4 | <0.01 \|\| <0.01 | [NR] | [NR] |
| Fineness Factor | - | 1.5 | Inorg-064 | <1.5 | 79298-B-4 | 1.5 \|\| 1.5 \|\| RPD: 0 | [NR] | [NR] |
| a-Net Acidity | moles $H^+$/t | 10 | Inorg-064 | <10 | 79298-B-4 | 44 \|\| 34 \|\| RPD: 26 | LCS-1 | 117% |
| Liming rate | kg $CaCO_3$/t | 0.75 | Inorg-064 | <0.75 | 79298-B-4 | 3.3 \|\| 2.5 \|\| RPD: 28 | LCS-1 | 116% |

| QUALITY CONTROL<br>sPOCAS | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base II Duplicate II %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| a-Net Acidity without ANCE | moles $H^+$/t | 10 | Inorg-064 | <10 | 79298-B-4 | NA \|\| NA | [NR] | [NR] |
| Liming rate without ANCE | kg $CaCO_3$/t | 0.75 | Inorg-064 | <0.75 | 79298-B-4 | NA \|\| NA | [NR] | [NR] |

| QUALITY CONTROL<br>sPOCAS | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD |
|---|---|---|---|
| Date prepared | - | 79298-B-33 | 15/10/2012 \|\| 15/10/2012 |
| Date analysed | - | 79298-B-33 | 15/10/2012 \|\| 15/10/2012 |
| pH $_{kcl}$ | pH units | 79298-B-33 | 4.3 \|\| 4.3 \|\| RPD: 0 |
| TAA pH 6.5 | moles $H^+$/t | 79298-B-33 | 25 \|\| 27 \|\| RPD: 8 |
| s-TAA pH 6.5 | %w/w S | 79298-B-33 | 0.04 \|\| 0.04 \|\| RPD: 0 |
| pH $_{Ox}$ | pH units | 79298-B-33 | 4.0 \|\| 4.1 \|\| RPD: 2 |
| TPA pH 6.5 | moles $H^+$/t | 79298-B-33 | 12 \|\| 12 \|\| RPD: 0 |
| s-TPA pH 6.5 | %w/w S | 79298-B-33 | 0.02 \|\| 0.02 \|\| RPD: 0 |
| TSA pH 6.5 | moles $H^+$/t | 79298-B-33 | <5 \|\| <5 |
| s-TSA pH 6.5 | %w/w S | 79298-B-33 | <0.01 \|\| <0.01 |
| $ANC_E$ | % $CaCO_3$ | 79298-B-33 | <0.05 \|\| <0.05 |
| a-$ANC_E$ | moles $H^+$/t | 79298-B-33 | <5 \|\| <5 |
| s-$ANC_E$ | %w/w S | 79298-B-33 | <0.05 \|\| <0.05 |
| $S_{KCl}$ | %w/w S | 79298-B-33 | <0.005 \|\| <0.005 |
| $S_P$ | %w/w | 79298-B-33 | <0.005 \|\| 0.007 |
| $S_{POS}$ | %w/w | 79298-B-33 | <0.005 \|\| 0.007 |
| a-$S_{POS}$ | moles $H^+$/t | 79298-B-33 | <5 \|\| <5 |
| $Ca_{KCl}$ | %w/w | 79298-B-33 | 0.01 \|\| 0.01 \|\| RPD: 0 |
| $Ca_P$ | %w/w | 79298-B-33 | 0.01 \|\| 0.01 \|\| RPD: 0 |
| $Ca_A$ | %w/w | 79298-B-33 | <0.005 \|\| <0.005 |
| $Mg_{KCl}$ | %w/w | 79298-B-33 | 0.006 \|\| 0.006 \|\| RPD: 0 |
| $Mg_P$ | %w/w | 79298-B-33 | 0.006 \|\| 0.008 \|\| RPD: 29 |
| $Mg_A$ | %w/w | 79298-B-33 | <0.005 \|\| <0.005 |
| $S_{HCl}$ | %w/w S | 79298-B-33 | <0.005 \|\| <0.005 |
| $S_{NAS}$ | %w/w S | 79298-B-33 | <0.005 \|\| <0.005 |
| a-$S_{NAS}$ | moles $H^+$/t | 79298-B-33 | <5 \|\| <5 |
| s-$S_{NAS}$ | %w/w S | 79298-B-33 | <0.01 \|\| <0.01 |
| Fineness Factor | - | 79298-B-33 | 1.5 \|\| 1.5 \|\| RPD: 0 |
| a-Net Acidity | moles $H^+$/t | 79298-B-33 | 27 \|\| 32 \|\| RPD: 17 |

| QUALITY CONTROL<br>sPOCAS | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD |
|---|---|---|---|
| Liming rate | kg $CaCO_3$ /t | 79298-B-33 | 2.0 \|\| 2.4 \|\| RPD: 18 |
| a-Net Acidity without ANCE | moles $H^+$/t | 79298-B-33 | NA \|\| NA |
| Liming rate without ANCE | kg $CaCO_3$ /t | 79298-B-33 | NA \|\| NA |

**Report Comments:**

| | |
|---|---|
| Asbestos ID was analysed by Approved Identifier: | Not applicable for this job |
| Asbestos ID was authorised by Approved Signatory: | Not applicable for this job |

| | | |
|---|---|---|
| INS: Insufficient sample for this test | PQL: Practical Quantitation Limit | NT: Not tested |
| NA: Test not required | RPD: Relative Percent Difference | NA: Test not required |
| <: Less than | >: Greater than | LCS: Laboratory Control Sample |

**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 batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the 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.

# 10 Attachment – D DCP n counts

# Dynamic Cone Penetrometer Test Log Summary

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| | | | |
|---|---|---|---|
| **Site** | Geore Evans Road | **DCP Group Reference** | **2863** |
| **Client** | Set Consulting | **Log Date** | 19-20 September 2012 |
| **Logged by** | BM/ JF | | |
| **Checked by** | AN | | |
| **Comments** | | | |

**TEST DATA**

| Depth Interval (m) | 101 | 106 | 107 | 109 | 110 | 132 | 130 | Design |
|---|---|---|---|---|---|---|---|---|
| **0.15** | 12 | 1 | 10 | 3 | 2 | 2 | 15 | **1** |
| **0.30** | 20 | 3 | | 15 | 10 | 8 | 15 | **3** |
| **0.45** | 20 | 7 | Bounce @0.3 | 22 | | 16 | 7 | **7** |
| **0.60** | 21 | 8 | | 26 | Bounce @0.4 | 17 | 28/ | **8** |
| **0.75** | | 15 | | | | 19 | 12 | **12** |
| **0.90** | Bounce @ 0.65 | 20 | | Bounce @0.5 | | 15 | 12 | **12** |
| **1.05** | | Bounce @0.85 | | | | | 10 | **10** |
| **1.20** | | | | | | Bounce @0.85 | 9 | **9** |
| **1.35** | | | | | | | 9 | **9** |
| **1.50** | | | | | | | 11 | **11** |
| **1.65** | | | | | | | 11 | **11** |
| **1.80** | | | | | | | 11 | **11** |
| **1.95** | | | | | | | 11 | **11** |
| **2.10** | | | | | | | 15 | **15** |
| **2.25** | | | | | | | 20 | **20** |
| | | | | | | | | |
| | | | | | | | Bounce @2.2 | |

# 11 Attachment E - Notes About This Report

# 11 Attachment E - Notes About This Report

# Information

## Important Information About Your Report

*Subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Martens to help you interpret and understand the limitations of your report. Not all of course, are necessarily relevant to all reports, but are included as general reference.*

### Engineering Reports - Limitations

Geotechnical reports are based on information gained from limited sub-surface site testing and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

### Engineering Reports – Project Specific Criteria

Engineering reports are prepared by qualified personnel and are based on the information obtained, on current engineering standards of interpretation and analysis, and on the basis of your unique project specific requirements as understood by Martens. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the Client.

Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relative if the design proposal is changed (eg. to a twenty storey building). Your report should not be relied upon if there are changes to the project without first asking Martens to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Martens will not accept responsibility for problems that may occur due to design changes if they are not consulted.

### Engineering Reports – Recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption often cannot be substantiated until project implementation has commenced and therefore your site investigation report recommendations should only be regarded as preliminary.

Only Martens, who prepared the report, are fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Martens cannot be held responsible for such misinterpretation.

### Engineering Reports – Use For Tendering Purposes

Where information obtained from this investigation is provided for tendering purposes, Martens recommend that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. Attention is drawn to the document 'Guidelines for the Provision of Geotechnical Information in Tender Documents', published by the Institution of Engineers, Australia.

The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

### Engineering Reports – Data

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings *etc* are customarily included in a Martens report and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

### Engineering Reports – Other Projects

To avoid misuse of the information contained in your report it is recommended that you confer with Martens before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

### Subsurface Conditions - General

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects, relevant standards and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions - the potential for will depend partly on test point (eg. excavation or borehole) spacing and sampling frequency which are often limited by project imposed budgetary constraints.

- Changes in guidelines, standards and policy or interpretation of guidelines, standards and

policy by statutory authorities.

- The actions of contractors responding to commercial pressures.

- Actual conditions differing somewhat from those inferred to exist, because no professional, no matter how qualified, can reveal precisely what is hidden by earth, rock and time.

  The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions

If these conditions occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

**Subsurface Conditions - Changes**

Natural processes and the activity of man create subsurface conditions. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Reports are based on conditions which existed at the time of the subsurface exploration.

Decisions should not be based on a report whose adequacy may have been affected by time. If an extended period of time has elapsed since the report was prepared, consult Martens to be advised how time may have impacted on the project.

**Subsurface Conditions - Site Anomalies**

In the event that conditions encountered on site during construction appear to vary from those that were expected from the information contained in the report, the Company requests that it immediately be notified. Most problems are much more readily resolved at the time when conditions are exposed, rather than at some later stage well after the event.

**Report Use By Other Design Professionals**

To avoid potentially costly misinterpretations when other design professionals develop their plans based on a report, retain Martens to work with other project professionals who are affected by the report. This may involve Martens explaining the report design implications and then reviewing plans and specifications produced to see how they have incorporated the report findings.

**Subsurface Conditions - Geoenvironmental Issues**

Your report generally does not relate to any findings, conclusions, or recommendations about the potential for hazardous or contaminated materials existing at the site unless specifically required to do so as part of the Company's proposal for works.

Specific sampling guidelines and specialist equipment, techniques and personnel are typically used to perform geoenvironmental or site contamination assessments. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Martens for information relating to such matters.

**Responsibility**

Geotechnical reporting relies on interpretation of factual information based on professional judgment and opinion and has an inherent level of uncertainty attached to it and is typically far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded.

To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Martens to other parties but are included to identify where Martens' responsibilities begin and end. Their use is intended to help all parties involved to recognize their individual responsibilities. Read all documents from Martens closely and do not hesitate to ask any questions you may have.

**Site Inspections**

*Martens will always be pleased to provide engineering inspection services for aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site. Martens is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction.*

# Soil Data

## Explanation of Terms (1 of 3)

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### Definitions

In engineering terms, soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material does not exhibit any visible rock properties and can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726 and the S.A.A Site Investigation Code. In general, descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions.

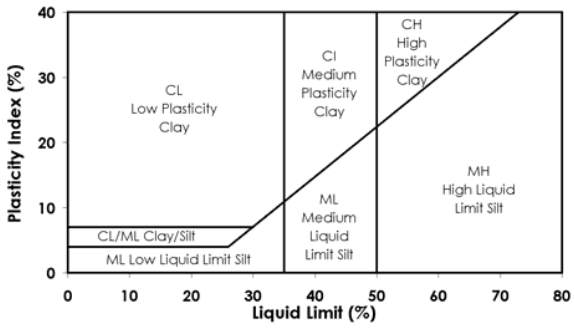
### Particle Size

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay). Unless otherwise stated, particle size is described in accordance with the following table.

| Division | Subdivision | Size |
|---|---|---|
| BOULDERS | | >200 mm |
| COBBLES | | 60 to 200 mm |
| GRAVEL | Coarse | 20 to 60 mm |
| | Medium | 6 to 20 mm |
| | Fine | 2 to 6 mm |
| SAND | Coarse | 0.6 to 2.0 mm |
| | Medium | 0.2 to 0.6 mm |
| | Fine | 0.075 to 0.2 mm |
| SILT | | 0.002 to 0.075 mm |
| CLAY | | < 0.002 mm |

### Plasticity Properties

Plasticity properties can be assessed either in the field by tactile properties, or by laboratory procedures.




### Moisture Condition

Dry — Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist — Soil feels cool and damp and is darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet — As for moist but with free water forming on hands when handled.

### Consistency of Cohesive Soils

Cohesive soils refer to predominantly clay materials.

| Term | $C_u$ (kPa) | Approx SPT "N" | Field Guide |
|---|---|---|---|
| Very Soft | <12 | 2 | A finger can be pushed well into the soil with little effort. |
| Soft | 12 - 25 | 2 to 4 | A finger can be pushed into the soil to about 25mm depth. |
| Firm | 25 - 50 | 4 – 8 | The soil can be indented about 5mm with the thumb, but not penetrated. |
| Stiff | 50 - 100 | 8 – 15 | The surface of the soil can be indented with the thumb, but not penetrated. |
| Very Stiff | 100 - 200 | 15 – 30 | The surface of the soil can be marked, but not indented with thumb pressure. |
| Hard | > 200 | > 30 | The surface of the soil can be marked only with the thumbnail. |
| Friable | - | | Crumbles or powders when scraped by thumbnail |

### Density of Granular Soils

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration test (SPT) or Dutch cone penetrometer tests (CPT) as below:

| Relative Density | % | SPT 'N' Value (blows/300mm) | CPT Cone Value ($q_c$ Mpa) |
|---|---|---|---|
| Very loose | < 15 | < 5 | < 2 |
| Loose | 15 – 35 | 5 - 10 | 2 -5 |
| Medium dense | 35 – 65 | 10 - 30 | 5 - 15 |
| Dense | 65- 85 | 30 - 50 | 15 - 25 |
| Very dense | > 85 | > 50 | > 25 |

### Minor Components

Minor components in soils may be present and readily detectable, but have little bearing on general geotechnical classification. Terms include:

| Term | Assessment | Proportion of Minor component In: |
|---|---|---|
| Trace of | Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component. | Coarse grained soils: < 5 %<br>Fine grained soils: < 15 % |
| With some | Presence easily detectable by feel or eye, soil properties little different to general properties of primary component. | Coarse grained soils: 5 – 12 %<br>Fine grained soils: 15 – 30 % |

# Soil Data

## Explanation of Terms (2 of 3)

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### Soil Agricultural Classification Scheme

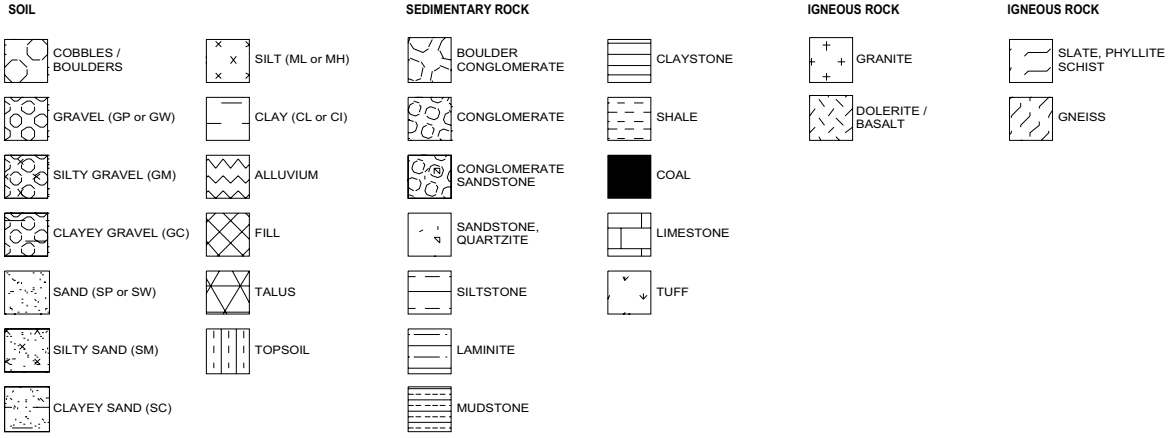
In some situations, such as where soils are to be used for effluent disposal purposes, soils are often more appropriately classified in terms of traditional agricultural classification schemes. Where a Martens report provides agricultural classifications, these are undertaken in accordance with descriptions by Northcote, K.H. (1979) *The factual key for the recognition of Australian Soils*, Rellim Technical Publications, NSW, p 26 - 28.

| Symbol | Field Texture Grade | Behaviour of moist bolus | Ribbon length | Clay content (%) |
|---|---|---|---|---|
| S | Sand | Coherence nil to very slight; cannot be moulded; single grains adhere to fingers | 0 mm | < 5 |
| LS | Loamy sand | Slight coherence; discolours fingers with dark organic stain | 6.35 mm | 5 |
| CLS | Clayey sand | Slight coherence; sticky when wet; many sand grains stick to fingers; discolours fingers with clay stain | 6.35mm - 1.3cm | 5 - 10 |
| SL | Sandy loam | Bolus just coherent but very sandy to touch; dominant sand grains are of medium size and are readily visible | 1.3 - 2.5 | 10 - 15 |
| FSL | Fine sandy loam | Bolus coherent; fine sand can be felt and heard | 1.3 - 2.5 | 10 - 20 |
| SCL$^-$ | Light sandy clay loam | Bolus strongly coherent but sandy to touch, sand grains dominantly medium size and easily visible | 2.0 | 15 - 20 |
| L | Loam | Bolus coherent and rather spongy; smooth feel when manipulated but no obvious sandiness or silkiness; may be somewhat greasy to the touch if much organic matter present | 2.5 | 25 |
| Lfsy | Loam, fine sandy | Bolus coherent and slightly spongy; fine sand can be felt and heard when manipulated | 2.5 | 25 |
| SiL | Silt loam | Coherent bolus, very smooth to silky when manipulated | 2.5 | 25 + > 25 silt |
| SCL | Sandy clay loam | Strongly coherent bolus sandy to touch; medium size sand grains visible in a finer matrix | 2.5 - 3.8 | 20 - 30 |
| CL | Clay loam | Coherent plastic bolus; smooth to manipulate | 3.8 - 5.0 | 30 - 35 |
| SiCL | Silty clay loam | Coherent smooth bolus; plastic and silky to touch | 3.8 - 5.0 | 30- 35 + > 25 silt |
| FSCL | Fine sandy clay loam | Coherent bolus; fine sand can be felt and heard | 3.8 - 5.0 | 30 - 35 |
| SC | Sandy clay | Plastic bolus; fine to medium sized sands can be seen, felt or heard in a clayey matrix | 5.0 - 7.5 | 35 - 40 |
| SiC | Silty clay | Plastic bolus; smooth and silky | 5.0 - 7.5 | 35 - 40 + > 25 silt |
| LC | Light clay | Plastic bolus; smooth to touch; slight resistance to shearing | 5.0 - 7.5 | 35 - 40 |
| LMC | Light medium clay | Plastic bolus; smooth to touch, slightly greater resistance to shearing than LC | 7.5 | 40 - 45 |
| MC | Medium clay | Smooth plastic bolus, handles like plasticine and can be moulded into rods without fracture, some resistance to shearing | > 7.5 | 45 - 55 |
| HC | Heavy clay | Smooth plastic bolus; handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to shearing | > 7.5 | > 50 |

# Soil Data

## Explanation of Terms (3 of 3)

### Symbols for Soil and Rock




### Unified Soil Classification Scheme (USCS)

| FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass) | | | | | USCS | Primary Name |
|---|---|---|---|---|---|---|
| COARSE GRAINED SOILS More than 50 % of material less than 63 mm is larger than 0.075 mm | (A 0.075 mm particle is about the smallest particle visible to the naked eye) | GRAVELS More than half of coarse fraction is larger than 2.0 mm. | CLEAN GRAVELS (Little or no fines) | Wide range in grain size and substantial amounts of all intermediate particle sizes. | GW | Gravel |
| | | | | Predominantly one size or a range of sizes with more intermediate sizes missing | GP | Gravel |
| | | | GRAVELS WITH FINES (Appreciable amount of fines) | Non-plastic fines (for identification procedures see ML below) | GM | Silty Gravel |
| | | | | Plastic fines (for identification procedures see CL below) | GC | Clayey Gravel |
| | | SANDS More than half of coarse fraction is smaller than 2.0 mm | CLEAN SANDS (Little or no fines) | Wide range in grain sizes and substantial amounts of intermediate sizes missing. | SW | Sand |
| | | | | Predominantly one size or a range of sizes with some intermediate sizes missing | SP | Sand |
| | | | SANDS WITH FINES (Appreciable amount of fines) | Non-plastic fines (for identification procedures see ML below) | SM | Silty Sand |
| | | | | Plastic fines (for identification procedures see CL below) | SC | Clayey Sand |

| FINE GRAINED SOILS More than 50 % of material less than 63 mm is smaller than 0.075 mm | IDENTIFICATION PROCEDURES ON FRACTIONS < 0.2 MM | | | | | |
|---|---|---|---|---|---|---|
| | DRY STRENGTH (Crushing Characteristics) | DILATANCY | TOUGHNESS | DESCRIPTION | USCS | Primary Name |
| | None to Low | Quick to Slow | None | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity | ML | Silt |
| | Medium to High | None | Medium | Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays | CL | Clay |
| | Low to Medium | Slow to Very Slow | Low | Organic slits and organic silty clays of low plasticity | OL | Organic Silt |
| | Low to Medium | Slow to Very Slow | Low to Medium | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | MH | Silt |
| | High | None | High | Inorganic clays of high plasticity, fat clays | CH | Clay |
| | Medium to High | None | Low to Medium | Organic clays of medium to high plasticity | OH | Organic Silt |
| HIGHLY ORGANIC SOILS | Readily identified by colour, odour, spongy feel and frequently by fibrous texture | | | | Pt | Peat |

Low Plasticity – Liquid Limit $W_L$ < 35 % Medium Plasticity – Liquid limit $W_L$ 35 to 60 % High Plasticity - Liquid limit $W_L$ > 60 %

# Rock Data

## Explanation of Terms (1 of 2)

### Definitions

Descriptive terms used for Rock by Martens are given below and include rock substance, rock defects and rock mass.

*Rock Substance* — In geotechnical engineering terms, rock substance is any naturally occurring aggregate of minerals and organic matter which cannot, unless extremely weathered, be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Rock substance is effectively homogeneous and may be isotropic or anisotropic.

*Rock Defect* — Discontinuity or break in the continuity of a substance or substances.

*Rock Mass* — Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

### Degree of Weathering

Rock weathering is defined as the degree in rock structure and grain property decline and can be readily determined in the field.

| Term | Symbol | Definition |
|---|---|---|
| Residual Soil | Rs | Soil derived from the weathering of rock. The mass structure and substance fabric are no longer evident. There is a large change in volume but the soil has not been significantly transported. |
| Extremely weathered | EW | Rock substance affected by weathering to the extent that the rock exhibits soil properties - ie. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident. |
| Highly weathered | HW | Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decrease compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original rock substance is no longer recognisable. |
| Moderately weathered | MW | Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable. |
| Slightly weathered | SW | Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable. |
| Fresh | Fr | Rock substance unaffected by weathering |

### Rock Strength

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance is the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics.

| Term | Is (50) MPa | Field Guide | Symbol |
|---|---|---|---|
| Extremely weak | < 0.03 | Easily remoulded by hand to a material with soil properties. | EW |
| Very weak | 0.03 - 0.1 | May be crumbled in the hand. Sandstone is 'sugary' and friable. | VW |
| Weak | 0.1 - 0.3 | A piece of core 150mm long x 50mm diameter may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling. | W |
| Medium strong | 0.3 - 1 | A piece of core 150mm long x 50mm diameter can be broken by hand with considerable difficulty. Readily scored with a knife. | MS |
| Strong | 1 - 3 | A piece of core 150mm long x 50mm diameter cannot be broken by unaided hands, can be slightly scratched or scored with a knife. | S |
| Very Strong | 3 - 10 | A piece of core 150mm long x 50mm diameter may be broken readily with hand held hammer. Cannot be scratched with pen knife. | VS |
| Extremely strong | > 10 | A piece of core 150mm long x 50mm diameter is difficult to break with hand held hammer. Rings when struck with a hammer. | ES |

# Rock Data

## Explanation of Terms (2 of 2)

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### Degree of Fracturing

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but excludes fractures such as drilling breaks.

| Term | Description |
|---|---|
| Fragmented | The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than core diameter. |
| Highly fractured | Core lengths are generally less than 20mm-40mm with occasional fragments. |
| Fractured | Core lengths are mainly 30mm-100mm with occasional shorter and longer sections. |
| Slightly fractured | Core lengths are generally 300mm-1000mm with occasional longer sections and occasional sections of 100mm-300mm. |
| Unbroken | The core does not contain any fractures. |

# Test Methods

## Explanation of Terms (1 of 2)

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### Sampling

Sampling is carried out during drilling or excavation to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples may be taken by pushing a thin-walled sample tube into the soils and withdrawing a soil sample in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Other sampling methods may be used. Details of the type and method of sampling are given in the report.

### Drilling Methods

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Hand Excavation – in some situations, excavation using hand tools such as mattock and spade may be required due to limited site access or shallow soil profiles.

Hand Auger - the hole is advanced by pushing and rotating either a sand or clay auger generally 75-100mm in diameter into the ground. The depth of penetration is usually limited to the length of the auger pole, however extender pieces can be added to lengthen this.

Test Pits - these are excavated with a backhoe or a tracked excavator, allowing close examination of the *in-situ* soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) - the hole is advanced by a rotating plate or short spiral auger, generally 300mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling - the hole is advanced by pushing a 100mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength *etc.* is only marginally affected.

Continuous Spiral Flight Augers - the hole is advanced using 90 - 115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or *in-situ* testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface or, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling - the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling - similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling - a continuous core sample is obtained using a diamond tipped core barrel, usually 50mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

### Standard Penetration Tests

Standard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in AS 1289 Methods of Testing Soils for Engineering Purposes - Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

(i) In the case where full penetration is obtained with successive blow counts for each 150mm of say 4, 6 and 7 blows:

as 4, 6, 7
N = 13

(ii) In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm

as 15, 30/40 mm.

The results of the tests can be related empirically to the engineering properties of the soil. Occasionally, the test method is used to obtain samples in 50mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

**CONE PENETROMETER TESTING AND INTERPRETATION**

Cone penetrometer testing (sometimes referred to as Dutch Cone - abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in AS 1289 - Test F4.1.

In the test, a 35mm diameter rod with a cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on separate 130mm long sleeve, immediately behind the cone. Tranducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output on continuous chart

# Test Methods

## Explanation of Terms (2 of 2)

recorders. The plotted results given in this report have been traced from the original records.

The information provided on the charts comprises:
Cone resistance - the actual end bearing force divided by the cross sectional area of the cone - expressed in MPA.
Sleeve friction - the frictional force of the sleeve divided by the surface area - expressed in kPa.
Friction ratio - the ratio of sleeve friction to cone resistance - expressed in percent.

There are two scales available for measurement of cone resistance. The lower (A) scale (0 - 5 Mpa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main (B) scale (0 - 50 Mpa) is less sensitive and is shown as a full line.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%-2% are commonly encountered in sands and very soft clays rising to 4%-10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:

$q_c$ (Mpa) = (0.4 to 0.6) N (blows/300mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:

$q_c$ = (12 to 18) $c_u$

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes *etc*. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.

**DYNAMIC CONE (HAND) PENETROMETERS**
Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150mm increments of penetration. Normally, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension rods. Two relatively similar tests are used.

Perth sand penetrometer - a 16 mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS 1289 - Test F 3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
Cone penetrometer (sometimes known as the Scala Penetrometer) - a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS 1289 - Test F 3.2). The test was developed initially for pavement sub-grade investigations, with correlations of the test results with California bearing ratio published by various Road Authorities.

**LABORATORY TESTING**
Laboratory testing is carried out in accordance with AS 1289 Methods of Testing Soil for Engineering Purposes. Details of the test procedure used are given on the individual report forms.

**TEST PIT / BORE LOGS**
The test pit / bore log(s) presented herein are an engineering and/or geological interpretation of the sub-surface conditions and their reliability will depend to some extent on frequency of sampling and the method of excavation / drilling. Ideally, continuous undisturbed sampling or excavation / core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify on economic grounds. In any case, the boreholes represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than 'straight line' variation between the boreholes.

**GROUND WATER**
Where ground water levels are measured in boreholes, there are several potential problems:

In low permeability soils, ground water although present, may enter the hole slowly, or perhaps not at all during the time it is left open.
A localised perched water table may lead to an erroneous indication of the true water table.
Water table levels will vary from time to time with seasons or recent prior weather changes. They may not be the same at the time of construction as are indicated in the report.
The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.