

Appendix E

Phase 2 ESA and Remediation Action Plan

STAGE 2 – PROPOSED RESIDENTIAL SUBDIVISION

Environmental Site Assessment and Preliminary Geotechnical & Acid Sulfate Soils Assessment

Sandy Beach Mill Pty Ltd

GEOTCOFH01296AA-AO

5 March 2007

Graham Drive, Sandy Beach, NSW

5 March 2007

Sandy Beach Mill Pty Ltd
PO Box 9000
MOONEE BEACH NSW 2450

Attention: Anthony Cogle

Dear Sir

**RE: ENVIRONMENTAL SITE ASSESSMENT & PRELIMINARY GEOTECHNICAL & ACID
SULFATE SOILS ASSESSMENT AT GRAHAM DRIVE, SANDY BEACH NSW**

Coffey Geotechnics Pty Ltd is pleased to present our report on the environmental site assessment, preliminary geotechnical and acid sulfate soils assessments for the above site.

We draw your attention to the attached sheets entitled "Important Information About Your Coffey Environmental Site Assessment" and "Important Information About Your Coffey Report" which should be read in conjunction with this report.

We trust that this report meets with your requirements. If you require further information please contact the undersigned in our Coffs Harbour office.

For and on behalf of Coffey Geotechnics Pty Ltd



Greg Hackney

Associate Geotechnical Engineer
Coffs Harbour Office Manager



Alicia Zillman

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Important Information About Your Coffey Environmental Site Assessment

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1 INTRODUCTION

Coffey Geotechnics Pty Ltd (Coffey) has conducted a Phase 2 Environmental Site Assessment (ESA), preliminary geotechnical and preliminary acid sulfate soils assessment for the Stage 2 area of a proposed residential subdivision to be located at Lot 260 DP752853 (Lot 260), Lot 1 DP726077 (Lot 1), Lot 1 DP726078 (Lot 1A) and Lot 2 DP354878 (Lot 2), Graham Drive, Sandy Beach, NSW. The work was commissioned by Anthony Cogle of Sandy Beach Mill Pty Ltd (SBM).

For the purpose of this report the Stage 2 area is referred to as the 'site'. The Stage 2 area is approximately 7.9ha in area. The location and extent of this area is shown on Figure 1.

The objectives of the ESA were to:

- Assess the site with respect to soil contamination;
- Assess groundwater with respect to potential contamination entering the creek from Lot 260 and Lot 1;
- Provide recommendations on the need for further investigation and to provide options for site management and/or remediation in order to render the site suitable for the proposed residential development.

The objectives of the preliminary geotechnical and preliminary acid sulfate soils assessment were to:

- Assess the suitability of the site for residential development from a geotechnical perspective;
- Provide recommendations for site preparation;
- Assess the suitability of site soils for use as fill and fill construction procedures;
- Provide pavement design parameters, and;
- Provide a preliminary acid sulfate soils assessment.

Coffey conducted the work in accordance with the relevant sections of proposal no. CH1296/1-AJ, dated 28 June 2006. This report presents the results of the site investigation.

Coffey have previously carried out environmental assessment work on the site. A summary of the previous work is provided in the section below.

2 PREVIOUS WORK

Coffey has carried out two assessments on the site previously, one of these was a Phase 1 ESA which covered both the Stage 1 and Stage 2 areas, which was carried out in 2005 and was reported in GEOTCOFH01296AA-AM dated 5 March 2007. The other was a Phase 2 ESA and preliminary geotechnical and acid sulfate soil assessments for the Stage 1 area, carried out in 2006 and reported in GEOTCOFH01296AA-AK dated 11 August 2007.

GEOTCOFH01296AA-AM, dated 5 March 2007 - The Phase 1 ESA included a site history, assessment of potential Areas of Environmental Concern (AECs) and Chemicals of Concern (COCs) and limited sampling and analysis of site soils on both the Stage 1 and Stage 2 areas of the subdivision.

The site history assessment indicated that a sawmill had previously been located on Lot 1 DP726077 and the northern portion of Lot 260 and a concrete batching plant had been located on Lot 1 DP726077. The other two lots, Lot 1 DP726078 and Lot 2 DP354878, appeared to have been used for residential use only.

The Stage 1 area of the subdivision had previously been used as a horse exercise area (the north-western portion), residential (the south-western portion), and vacant land. Fill had been placed on the north-eastern portion of the site, which included fill materials comprising soil and sawdust which were placed prior to SBM's involvement with the site, and more recently some fill from nearby roads. The lateral and vertical extent of the fill was not assessed in the Phase 1 ESA. The area that was considered to potentially contain fill, was estimated to be approximately 1.6ha in area.

Fill materials comprising soil and sawdust were placed on the south-eastern part of the site prior to SBM's involvement with the site. More recently some fill from nearby roads had been placed in a stockpile on the site.

The Stage 2 area of the subdivision had previously been used as a sawmill (Lot 1 and northern portion of Lot 260), a concrete batching plant (Lot 1) and residential (eastern side of Lot 1, Lot 2 and Lot 1A).

The Phase 1 ESA identified sixteen main AECs on the subdivision area and the test results showed soil contamination, particularly for total petroleum hydrocarbons and zinc, above threshold concentrations for residential land use. The report recommended further sampling and analysis in the identified AECs to confirm the presence or absence of contamination and to characterise the site in accordance with the NSW EPA guidelines.

The sixteen main AECs identified in the Phase 1 ESA, which were located on both the Stage 1 and Stage 2 areas and included:

- **AEC 1: Shed 1** – located on Lot 260, generally comprised mechanical and sawmill operation areas, areas where oil/chemical drums were observed on the ground and in pits, and areas where fill was observed.
- **AEC 2: Shed 2** - located on Lot 260, generally comprised a plant storage/workshop area with a tractor leaking oil/petrol, workshop areas where chemicals/oils/paints were stored. The shed was observed to have a concrete floor.
- **AEC 3: Shed 3** - located on Lot 260, generally comprised two long mechanical pits filled with rubbish/waste etc likely generated during historical use of the site. Near the south eastern corner, an elevated storage shed covered in what appeared to be oily soil/sawdust was observed. Stained soils with a hydrocarbon odour were observed below this shed. What appeared to be an old mechanical working area with obvious oil staining was also observed. The majority of the shed floor and pits were concrete paved. Parts of the shed may have been constructed of materials which may contain asbestos.
- **AEC 4: Shed 4** – located on Lot 260, generally comprised a wooden floor elevated over a relatively large pit used for what appeared to be sawmilling purposes.
- **AEC 5: Remnant Shed** – located on Lot 260, generally comprised supporting poles of the shed with deep sawdust on floor. The shed was likely to have been used for sawmilling purposes.
- **AEC 6: Underground Storage Tank** – located on Lot 260, understood to be located near the office on Lot 206, under a concrete slab. A nearby test pit encountered soils with olfactory (smell) evidence of contamination. Capacity of tank is unknown.
- **AEC 7: Filled areas** - located on Lot 260, much of the northern and eastern areas of Lot 260 appeared to contain historical fill materials comprising both timber shavings and soils. The lateral extent of fill and the depth was not known.

- **AEC 8: Filled areas** - located on Lot 1, much of the southern area of the concrete site appeared to contain fill. The fill is likely to be from historical site activities, such as sawmilling and the concrete batching plant. The lateral extent of fill and the depth was not known.
- **AEC 9: Stockpiles of rubbish** - located on Lot 260, multiple stockpiles of rubbish/waste were observed at the site, comprising plastic bottles, oil/chemical drums, car parts, ovens, toilets, plastic, concrete etc.
- **AEC 10: Stockpiles of rubbish** – located on Lot 1, one main stockpile was observed on the eastern area of Lot 1, comprising plastic bottles, oil/chemical drums, plastic, concrete etc.
- **AEC 11: Above ground storage tank (AST) and bowser and oil pit** - located on Lot 1, Bowser and AST appeared relatively old and were surrounded by a concrete apron. AST was approximately 5000 litres and probably dispensed either petrol or diesel. A bunded area, which appeared to have been used for the storage of oil/chemical drums, was observed to the south of the bowser.
- **AEC 12: Shed 5** – located on Lot 1, may have been used for storage and maintenance of plant, part soil floor part concrete floor, oil appears to have been stored in eastern end. Extension on southern end of the shed was locked at the time of the site visit.
- **AEC 13: Concrete Batching Plant** – located on Lot 1, comprised of areas within the plant area, not including AEC 8, AEC 10 to AEC 12, AEC 14 and AEC 15. This area generally comprised of wash bays and former product bins.
- **AEC 14: Shed 6** – located on Lot 1. May have been used for mechanical or sawmill purposes, as large concrete lined pits were observed on the western side of the shed.
- **AEC 15: Residences** – located on Lot 1 and Lot 2. There is a potential for former storage and use of chemicals such as paints and pesticides near the residences.
- **AEC 16: Former Residence** – located on Lot 1A. There is a potential for former storage and use of chemicals such as paints and pesticides near the residence.

It should be noted that many of these AECs have been modified (cleaned up) by SBM since the Phase 1 ESA was carried out. An updated list of the AECs that specifically refer to the Stage 2 area is included in Section 5.1.

GEOTCOFH01296AA-AK, dated 11 August 2006 – This report presented the results of the Phase 2 ESA carried out for the Stage 1 area of the subdivision. The report included sampling and analysis of the site soils within the AECs identified in the Phase 1 ESA. A preliminary geotechnical and acid sulfate soils assessment was also carried out at the same time and involved collecting bulk samples for CBR testing and acid sulfate samples from test pits.

The results of the laboratory analysis for the Stage 1 area of the subdivision indicated that the contaminants tested for, were below the adopted criteria for residential developments. Based on this, and the previous site history it was considered that the Stage 1 area was suitable for residential development. A Development Application (DA) has since been submitted to Coffs Harbour City Council for Stage 1.

The geotechnical assessment gave recommendations on the suitability of the site for residential development, suitability of site soils for use as fill, fill construction procedures and site preparation, and pavement design parameters (CBR results). The results of CBR testing indicated that site soils had

CBR values of between 4.5% and 10%, and a CBR value of 3% was recommended for the site pavements.

The results of the acid sulfate soils laboratory testing indicated the site soils were generally unlikely to be acid sulfate soils. The soils did exhibit low pH indicating a natural acidity and would be referred to as acid soils. Recommendations on treating and/or managing acidic soils were given.

3 SCOPE OF WORK

To achieve the project objectives, the following scope of work was carried out:

- Excavation of 63 test pits, and sampling from these test pits and 14 other surface sample locations;
- Sampling of the soils from the test pits and surface soils for the ESA and preliminary geotechnical and acid sulfate soil assessments;
- Installation of six groundwater monitoring wells and collection of six groundwater samples;
- Laboratory analysis of the environmental samples for a suite of potential chemicals of concern including TPH, BTEX, PAH, Heavy Metals and OCP/OPPs;
- Laboratory analysis of the geotechnical and acid sulfate soil samples; and,
- Data interpretation and reporting.

Further details of the work carried out is provided in the sections below.

4 FIELD INVESTIGATIONS

4.1 Field Work

Field work was carried out on the 18 September, 12 to 17 October and 23 October 2006 in the full-time presence of an Environmental Scientist from our Coffs Harbour office and comprised:

- Installation of six groundwater monitoring wells (BH1 to BH6) to depths of between 5.8m to 7.5m and collection of groundwater samples;
- Excavation of 63 test pits (TP101 to TP163), to depths of between 0.25m and 2.0m;
- Collection of 14 surface samples (H1 to H14) at depths of 0.0-0.15m.

The groundwater wells were installed in boreholes drilled using an MD200 4WD mounted drilling rig equipped with solid continuous flight augers. The stiff to hard clays in the subsurface precluded the use of hollow flight augers. The wells were installed to depths of 5.8m in BH1 to BH5, and 7.5m in BH6.

The test pits were excavated using a 3.5 tonne mini-excavator equipped with a 450mm bucket. Sixty of the test pits were located in an approximate 24m to 34m grid, with three additional test pits (TP117, TP162 and TP163) located outside of the grid for collection of geotechnical and acid sulfate samples.

The surface samples were collected using hand tools.

Fieldwork was carried out in the full time presence of an Environmental Scientist from Coffey, who nominated the investigation locations, logged the boreholes and pits and collected the samples. The

approximate investigation locations are shown on Figure 3. Engineering logs of the test pits are presented in Appendix A.

4.1.1 Soil Sampling

Environmental samples were collected directly from the excavator bucket or the walls of the excavation in the test pits and from soils loosened by a mattock for the surface samples. Sampling equipment was decontaminated between locations where necessary. Samples were placed into laboratory supplied glass jars, with duplicate bagged samples collected for headspace screening, and stored in a chilled insulated container during field work and transport to the laboratory. Each sample was collected using a clean pair of latex gloves. Samples were generally collected in fill materials or the top 150mm of the natural soil. Duplicate samples were collected at a rate of one per ten samples.

Bulk samples were collected from the test pits for subsequent geotechnical laboratory testing. Acid sulfate soil samples were collected at 0.5m intervals in ten test pits.

4.1.2 Installation and Sampling of Groundwater Monitoring Wells

Six groundwater monitoring wells were installed at the site in boreholes BH1 to BH6.

The lower 3.0m section of the well was screened with 50mm machine slotted, threaded PVC. Solid (unslotted) 50mm PVC was used to case the well to the ground surface. Coarse sand was placed within the well annulus to a level of about 0.5m below the ground surface, followed by an annular seal of granular bentonite pellets to the ground surface.

The wells were developed on 23 October 2006 by purging three well volumes. Samples were collected later the same day, when the wells had recharged. Samples were collected using a disposable bailer and placed into appropriate laboratory supplied containers. The samples were placed in a chilled esky during sampling and transport.

4.2 Site Conditions

4.3 Site Description and Site Observations

The Stage 2 area of the proposed development is located on the northern end of Lot 260 and the whole of Lot 1, Lot 1A, and Lot 2. The site is bounded by Graham Drive to the north and west, and rural/residential properties to the south and east. The site is located south of Woolgoolga on the western side of the Pacific Highway in an area that is generally rural with some residential properties.

This site incorporates areas that were previously used for residential use, a sawmill, and a concrete batching plant.

Regionally, the site is located in an area that has moderately sloping ground to the north and west, and alluvial floodplain to the east and south. Locally the site is generally relatively flat, with a gentle to moderate slope on the north-eastern side of about 2° to 7° sloping towards the south-west.

A creek transects the site towards the northern side oriented in an approximate east-west direction. The creek is approximately 1m to 2m deep, with relatively steep banks on the eastern end, and less steep banks on the western end.

The following site observations were made at the time of the fieldwork

- Vegetation on the site comprises of long grasses, and some thick bushy shrubs. Trees are evident along the eastern boundary, along the creek edge, with a few others scattered around the site. One small area in the north-eastern corner of Lot 1 (at TP156 location) was not vegetated, although the surrounding area was grassed.
- Five residences had previously been located on the site on Lot 1 and Lot 2 on the northern edge. Four of these had been removed, and one other residence was in the process of being removed. A sixth residence had been located on Lot 1A on the northern edge, which had been removed sometime between 1994 and 2002.
- Three sheds and an office building on Lot 260 had been removed from the site. These structures had previously been used as part of the sawmill operations. A fourth shed, located on the north-eastern corner of Lot 260 will remain on site during the subdivision works. This shed is now used to store several water tankers and scaffolding. Two sheds, office buildings, and other infrastructure associated with the concrete batching plant had been removed from Lot 1.
- Numerous stockpiles of rubbish waste had been removed from the site by SBM, and at the time of the investigation only three stockpiles of rubbish waste remained, one of tyres, one of concrete, and one of other general rubbish. Small amounts of rubbish, comprising of plastic bags, aluminium cans, wire, scrap metal, concrete and timber were observed across the site on the surface. These were mostly located in areas close to the previous residences and sheds.

4.3.1 Stratigraphy

The 1:250,000 Geological Map for Coffs Harbour / Dorrigo, which covers the Sandy Beach area, indicates that the site is underlain by both Quaternary Alluvium comprising of sand, silt, clay and gravel and the Coramba Beds comprising of siltstone and siliceous siltstone.

The general geotechnical units assessed from the materials observed in the test pits and boreholes are indicated below:

- **Unit 1: Fill** - comprising of Gravelly Clay/Clayey Gravel, clay was generally medium to high plasticity, and gravel was generally fine to medium grained;
- **Unit 2: Fill** – Clay, Gravelly Clay, and Sandy Gravel, with some rubbish materials including sawdust, concrete, bricks, timber, wire, metal sheets and pieces, asphalt pieces, plastic, and other materials were observed in some test pits;
- **Unit 3: Topsoil** - Silty Clay, low plasticity, dark brown;
- **Unit 4: Alluvial Soil** - Silty Clay, low to medium plasticity, very soft to hard in consistency, grey, dry to moist;
- **Unit 5: Alluvial Soil / Residual Soil** - Clay and Silty Clay, medium to high plasticity, very stiff to hard in consistency, orange-brown, brown and red/grey mottled, dry to moist. A Sandy Clay layer was observed in each borehole.
- **Unit 6 Residual Soil?**: Clay, medium to high plasticity, orange-brown/brown.
- **Unit 7 Extremely Weathered Siltstone**: Clayey Gravel, fine to medium grained, brown, clay is medium plasticity.

The stratigraphy observed in each test pit varied greatly over the site. However, generally Unit 1 Fill in test pits was between 0.0m to 0.1m and 0.0m to 0.7m depth, Unit 2 Fill was between 0.0m to 0.1m and 0.0m to >2.5m depth, Unit 3 Topsoil was between 0.0m to 0.1m depth, Unit 4 Alluvial Soil was between 0.0-0.4m and 0.4 to 1.3m depths, and Unit 5 Alluvial / Residual Soil was between 0.1m to >2m depths.

Table A1 in Appendix A summarises the depth of Unit 2 Fill in each test pit that Unit 2 Fill was observed in, and the general composition of the fill.

The general subsurface conditions observed in the boreholes are summarised in Table 1

Table 1: Summary of Stratigraphy observed in Boreholes BH1 to BH6

Material Description	Depth to Base of Material (m)					
	BH1	BH2	BH3	BH4	BH5	BH6
Unit 1 Fill	1.25	0.6	-	-	-	0.2
Unit 2 Fill: Sawdust	-	-	-	-	2.0	-
Unit 2 Fill: Clay, low plasticity, black, with a high percentage of charcoal and organic material	-	-	3.5	-	-	-
Unit 5	5.0	4.5	5.0	4.3	4.3	4.2
Unit 6 Residual Soil?	5.5	>5.8	>5.8	>5.8	>5.8	>7.5
Unit 7	>5.7	-	-	-	-	-

4.3.2 Groundwater

Groundwater inflows were observed in test pits TP107 at about 0.5m depth, TP147 at 2.4m, TP158 at 1.5m. Flow rates for the groundwater inflows in TP107 and TP158 were generally low, with a higher inflow occurring at about 2.4m in TP147.

Standing water levels (SWL) were measured in the groundwater wells on 23 October 2006. The SWLs (measured below ground surface) were 1.34m in BH1, 1.46m in BH2, 1.8m in BH3, 1.8m in BH4, 1.57m in BH5, and 2.15m in BH6.

It should be noted that groundwater levels may vary over time depending on a number of factors including rainfall, temperature, tidal fluctuations and other factors.

5 ENVIRONMENTAL SITE ASSESSMENT

5.1 Areas of Environmental Concern & Chemicals of Concern

The site history carried out in the Phase 1 ESA indicated there was a high risk that Lot 260 and Lot 1 on the site has been exposed to contamination from past uses, and a low risk that Lot 1A and Lot 2 have been exposed to contamination from past uses. Since the Phase 1 ESA was carried out, many of the identified 16 AECs (see Section 2.0), have been modified by site works.

Based on the condition of the site at the time of the current investigation a total of six AECs were identified and a summary of these is listed below. The general location of the AECs is shown in Figure 2.

The main AECs identified at the site include:

- **AEC A: Shed 3** - located on Lot 260, generally comprises two long mechanical pits which were previously filled with rubbish/waste etc. This waste has been removed by SBM and the shed is now used to store several water tankers and scaffolding. Near the south eastern corner, an elevated storage shed covered in what appears to be oily soil/sawdust was observed during the Phase 1 ESA, this currently has corrugated iron sheeting placed on the floor. Stained soils with a hydrocarbon odour were observed below this elevated shed. What appeared to be an old mechanical working area with obvious oil staining was also observed. The majority of the shed floor and pits were concreted. Parts of shed may be constructed of materials which may contain asbestos.
- **AEC B: Underground Storage Tank** – located immediately west of the former office on Lot 260 under a concrete slab. The capacity of the tank is unknown and it probably contained petrol or diesel.
- **AEC C: Filled areas** – This is generally areas that were filled during the sites historical use as a sawmill. The historical fill can be broken up into three general categories:
 - Fill that contains rubbish – this fill is a combination of rubbish such as timber, charcoal, concrete, metal sheets and pieces, and some minor amounts of plastic and glass. This fill in some areas also contains sawdust and soil materials. This fill is referred to as Unit 2 fill, as per the stratigraphy outlined in Section 4.3.1.
 - Fill that contains sawdust and/or timber. This fill is predominately sawdust. This fill in some areas also contains soil and timber. This fill is referred to as Unit 2 fill, as per the stratigraphy outlined in Section 4.3.1.
 - Fill that contains soil materials. This is fill that is predominately made up of imported soil materials that may have been brought in as road base. This fill is made up of both Unit 1 and Unit 2 type fill, as per the stratigraphy outlined in Section 4.3.1.

One area of recently placed fill is present on the south-eastern corner of Lot 260. This fill is from a Council/RTA road and comprises soils with some small amounts of bitumen. Figure 4 shows the approximate lateral extent of known Unit 2 fill areas.

- **AEC D: Stockpiles of rubbish** - located on Lot 260, three recently constructed stockpiles of rubbish/waste were observed at the site. One comprised of concrete, one of tyres, and one of general rubbish including plastic bottles, oil/chemical drums, car parts, plastic etc. Many of the

stockpiles of rubbish, and other loose rubbish that was formerly on the site has been removed off site by SBM.

- **AEC E: Residences** – located on Lot 1 (partially), and Lot 2. The residences were inspected by a licensed builder, Warren McDonald. Four were found to contain no asbestos and have since been demolished and removed. One of the residences, which has not yet been removed, apparently contains asbestos in the bathroom. The client indicated that this asbestos would be removed in accordance with WorkCover NSW guidelines. There is a potential for the storage and use of chemicals such as paints and pesticides near the former residences.
- **AEC F: Former Residence** – located on Lot 1A, potentially constructed of materials containing asbestos. There is a potential for the storage and use of chemicals such as paints and pesticides near the residence.

The NSW EPA (1995) Sampling Design Guidelines recommends that for an area of 5.0ha (Lot 260) and 1.2ha (Lot 1) a minimum of 55 and 23 sample locations respectively would be required for site characterisation. Seventeen locations were sampled on Lot 260 in the previous investigation, and three locations on Lot 1 therefore a total of 39 and 20 sample locations were selected across the 5ha and 1.2ha areas of Lot 260 and Lot 1.

Fourteen surface samples were collected in the footprints of the former residences on Lot 1A and Lot 2, as the site history assessment indicated that these two lots had been used for residential purposes in the past, and that no commercial or industrial activities had been carried out on the lots.

Soil samples were tested from a suite of common contaminants listed below:

- Heavy Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc, and mercury);
- Organochlorine and Organophosphorous Pesticides (OCP/OPP);
- Total Petroleum Hydrocarbons (TPH);
- Benzene, Toluene, Ethyl-benzene, Xylene (BTEX);
- Poly-aromatic Hydrocarbons (PAH); and,
- Poly-chlorinated biphenyls (PCBs).

5.2 Sampling & Analysis Schedule

Samples were sent to a contract NATA accredited laboratory under chain of custody conditions.

56 primary soil samples, 6 groundwater samples, and 11 quality control samples were selected for laboratory analysis. Table 2 below summarises the samples selected and the contaminants analysed for.

Table 2: Sampling & Analysis Schedule

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
<i>Primary Samples – Soil Collected 12 – 17 October 2006</i>			
AEC A and AEC C	TP106 0.0-0.1	Fill: Gravelly Clay	Heavy Metals, OCP/OPP
	TP107 0.0-0.1	Fill: Sawdust and Clayey Silt	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP107 0.3-0.4	Fill: Sand	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP107 0.5-0.6	Fill: Clayey Gravel	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP122 0.3-0.4	Fill: Clayey Gravel/Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
AEC B	TP129 0.7-0.8	Fill: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP129 1.2-1.25	Alluvial Soil: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP129 1.75-1.85	Alluvial Soil: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP131 1.1-1.2	Alluvial Soil: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP131 1.9-2.0	Alluvial Soil: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
AEC C	TP101 0.0-0.1	Fill: Clayey Gravel	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP103 0.0-0.1	Fill: Clay and Sawdust	Heavy Metals, OCP/OPP
	TP104 0.5-0.6	Fill: Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP

Table 2: Sampling & Analysis Schedule (Cont'd)

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
<i>Primary Samples – Soil Collected 12 – 17 October 2006</i>			
AEC C	TP108 0.0-0.1	Fill: Sawdust and Clay	Heavy Metals, OCP/OPP
	TP111 0.7-0.8	Fill: Clay and Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP113 0.1-0.2	Fill: Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP116 0.0-0.1	Fill: Gravelly Clay	Heavy Metals, OCP/OPP
	TP118 0.0-0.1	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	TP119 0.0-0.1	Fill: Clay and Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP121 0.0-0.1	Fill: Clay and Sawdust	Heavy Metals, OCP/OPP
	TP122 0.3-0.4	Fill: Clayey Gravel/Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP127 0.0-0.1	Fill: Clayey Gravel/Gravelly Clay	Heavy Metals, OCP/OPP
	TP132 0.0-0.1	Fill: Clayey Gravel/Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP135 1.1-1.2	Fill: Clay and Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP135 1.4-1.5	Fill: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP136 0.0-0.1	Fill: Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP

Table 2: Sampling & Analysis Schedule (Cont'd)

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
<i>Primary Samples – Soil Collected 12 – 17 October 2006</i>			
AEC C	TP139 0.0-0.1	Fill: Sawdust and Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP140 1.9-2.0	Fill: Charcoal, Sawdust, Timber, Ash, some other rubbish	Heavy Metals, OCP/OPP
	TP141 0.2-0.3	Fill: Clayey Silt, some sawdust & timber	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP142 0.0-0.1	Fill: Gravelly Clay	Heavy Metals, OCP/OPP
	TP144 0.0-0.2	Fill: Gravelly Sand	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP145 0.0-0.1	Fill: Sandy Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP146 0.8-1.0	Fill: Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP147 1.5-1.6	Fill: Clay, Ash, Charcoal, some other rubbish	Heavy Metals, OCP/OPP
	TP148 0.5-0.5	Fill: Clayey Gravel	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP149 1.7-1.8	Fill: Clay and Charcoal	Heavy Metals, OCP/OPP
	TP150 0.0-0.1	Fill: Gravelly Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP152 0.0-0.1	Fill: Sandy Gravel	Heavy Metals, OCP/OPP

Table 2: Sampling & Analysis Schedule (Cont'd)

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
<i>Primary Samples – Soil Collected 12 – 17 October 2006</i>			
AEC C	TP156 0.4-0.5	Fill: Clay, Gravel, Charcoal, Concrete, Timber, other rubbish	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP158 0.7-0.8	Fill: Clay	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
	TP159 0.5-0.6	Fill: Clay and Sand, some other rubbish	Heavy Metals, OCP/OPP
AEC E	TP161 0.0-0.1	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
<i>Primary Samples – Soil Collected 23 October 2006</i>			
AEC E	H1 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	H2 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	H3 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	H4 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	H5 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H6 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H7 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H8 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H9 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H10 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
	H11 0.0-0.15	Fill: Sandy Clay	Sample broke during transport to laboratory

Table 2: Sampling & Analysis Schedule (Cont'd)

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
Primary Samples – Soil Collected 23 October 2006			
AEC E	H12 0.0-0.15	Fill: Sandy Clay	Heavy Metals, OCP/OPP
AEC F	H13 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
	H14 0.0-0.15	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
Primary Samples – Water Collected 23 October 2006			
NA	BH1	Water – no colour, no odour	TPH, BTEX, PAH, Heavy Metals
NA	BH2	Water – no colour, no odour	TPH, BTEX, PAH, Heavy Metals
NA	BH3	Water – no colour, slight organic odour	TPH, BTEX, PAH, Heavy Metals
NA	BH4	Water – no colour, no odour	TPH, BTEX, PAH, Heavy Metals
NA	BH5	Water – brown tinge, slight organic odour	TPH, BTEX, PAH, Heavy Metals
NA	BH6	Water – no colour, no odour	TPH, BTEX, PAH, Heavy Metals
Quality Control / Quality Assurance Samples Collected in Field			
AEC C	DUP 1	Fill: Clay and Sawdust	Heavy Metals, OCP/OPP
AEC C	DUP 2	Fill: Clay and Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP

Table 2: Sampling & Analysis Schedule (Cont'd)

AEC	Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
<i>Quality Control / Quality Assurance Samples Collected in Field</i>			
AEC C	DUP 3	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
AEC C	DUP 5	Fill: Sawdust	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
AEC C	DUP 7	Fill: Gravelly Sand	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
AEC C	DUP 8	Fill: Clay, Gravel, Charcoal, Concrete, Timber, other rubbish	TPH, BTEX, PAH, PCBs, Heavy Metals, OCP/OPP
AEC E	DUP 9	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
AEC E	DUP 101	Topsoil: Clayey Silt	Heavy Metals, OCP/OPP
AEC E	DUP 102	Fill: Sandy Clay	Heavy Metals, OCP/OPP
<i>Quality Control / Quality Assurance Samples Laboratory Supplied</i>			
NA	SOIL SPIKE	Laboratory Supplied	BTEX
NA	SOIL BLANK	Laboratory Supplied	BTEX

Note: TPH = Total Petroleum Hydrocarbons; BTEX = Benzene, Toluene, Ethyl-benzene, Xylene; PAH = Polycyclic aromatic Hydrocarbons; Heavy Metals = arsenic, cadmium, chromium, copper, lead, nickel, mercury, zinc; OCP/OPP = organochlorine and organophosphorous pesticides; PCBs = Poly-Chlorinated Biphenyls.

5.3 Soil Investigation Levels (SILs)

In order to assess the degree of contamination in soils on the site, the results of soil analyses were compared with guidelines in the following references:

- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd edition);
- NSW EPA (1994) Guidelines for Assessing Service Station Sites.

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd edition) summarises the National Environmental Health Forum (NEHF) investigation levels¹ for protection of human health for different land uses and also provide guidelines for provisional phytotoxicity investigation levels for a range of contaminants in soils.

The site is intended to be redeveloped for residential use with gardens and accessible soil (home-grown produce contributing <10% fruit and vegetable intake; no poultry), including children's day-care centres, preschools, primary schools, townhouses, villas (NEHF A). The NSW EPA (1994) guidelines provide acceptable cleanup levels at service station sites which are to be redeveloped for a sensitive use such as residential. Thus, these criteria have been used to compare the results of soil testing.

The results have been compared to NEHF A criteria (Column 1) for residential with gardens and accessible soil with gardens and accessible soil (home-grown produce contributing <10% fruit and vegetable intake; no poultry), including children's day-care centres, preschools, primary schools, townhouses, villas; and to phytotoxicity criteria (Column 5) provided in the NSW DEC (2006) guidelines, and to the sensitive land use criteria in Table 3 of the NSW EPA (1994) guidelines.

The soils investigation levels (SILs) adopted for this investigation are listed in Table 4 along with the laboratory results.

5.4 Quality Assurance/Quality Control (QA/QC)

Samples were transported under chain of custody conditions and in chilled insulated containers to mgt Environmental Consulting Pty Ltd (mgt) laboratory which is NATA accredited for the analysis performed. A copy of the chain of custody is included with the laboratory test results in Appendix B.

The laboratory conducted internal quality control using laboratory duplicates, spikes and method blanks. The results are shown with laboratory report sheets in Appendix B. Analytical methods used for the laboratory testing are also indicated on the laboratory report sheets. The results of laboratory quality control testing are considered to be within acceptable limits.

Duplicate soil samples were taken during field work, and nine duplicate samples were tested for TPH, BTEX, PAH, Heavy Metals and OCP/OPPs. The results of duplicate testing are summarised in Table 3 below. The RPD for the duplicate samples and analytes tested were either within control limits or analytes were below the laboratory Limit of Reporting (LOR) making it impractical to calculate the RPD.

Based on an assessment of the field and laboratory quality control, data the results obtained are considered to reasonably represent the concentrations at the sampling points at the time of sampling. A Data Validation report is presented in Appendix C.

¹ In Imray and Langley (1994). Health Based Soil Investigation Levels. (IN: The Health Risk Assessment and Management of Contaminated Sites – Proceedings of the Third National Workshop on the Health Risk Assessment and Management of Contaminated Sites. Contaminated Sites Monograph Series No.5, 1996. South Australian Department of Health and Family Services/Commonwealth

Table 3: Comparison of Duplicate Sample Results
(All results in µg/kg)

Sample No.		Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)
TP103	DUP 1	TP111	DUP 2		TP118	DUP 3		TP136	DUP 4		TP144	DUP 5		TP156	DUP 6		TP161	DUP 7		H1	DUP 8		H8	DUP 9	
0.0-0.1		0.7-0.8			0.0-0.1			0.0-0.1			0.0-0.1			0.4-0.5			0.0-0.1			0.0-0.15			0.0-0.15		
Analyte																									
Total Petroleum Hydrocarbons																									
-	-	NA	<20	NA	-	-	NA	<20	NA	<20	<20	NA	<20	23	22	4	-	-	NA	-	-	-	-	-	NA
	-	NA	<50	<50	NA	-	NA	<50	NA	<50	<50	NA	<50	1900	1800	5	-	-	NA	-	-	-	-	-	NA
	-	NA	170	<100	Inconsistent	-	NA	<100	NA	<100	<100	NA	<100	5300	4600	14	-	-	NA	-	-	-	-	-	NA
	-	NA	460	<100	Inconsistent	-	NA	110	NA	37	<100	<100	NA	1800	2200	20	-	-	NA	-	-	-	-	-	NA
BTEX																									
-	-	NA	<0.05	<0.05	NA	-	NA	<0.05	NA	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<0.05	<0.05	NA	-	NA	<0.05	NA	<0.05	<0.05	NA	<0.05	0.17	0.16	6	-	-	NA	-	-	-	-	-	NA
-	-	NA	<0.05	<0.05	NA	-	NA	<0.05	NA	<0.05	<0.05	NA	<0.05	0.47	0.38	21	-	-	NA	-	-	-	-	-	NA
-	-	NA	<0.05	<0.05	NA	-	NA	<0.05	NA	<0.05	<0.05	NA	<0.05	4.00	2.80	35	-	-	NA	-	-	-	-	-	NA
Polycyclic Aromatic Hydrocarbons																									
-	-	NA	<1.0	<0.1	NA	-	NA	0.1	<0.1	Inconsistent	<0.1	<0.1	Inconsistent	<0.5	<1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.5	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.5	<0.2	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	0.1	Inconsistent	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.2	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.2	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA	-	-	NA	-	-	-	-	-	NA
-	-	NA	<1.0	<0.1	NA	-	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA												

Notes:
100 RPD exceeds control limit of 50%
Inconsistent RPD shows an inconsistency
NA Both samples have concentrations below the LOR, or no test was performed

Comparison of Laboratory Results to Soil Investigation Levels

The laboratory test results for soil samples are summarised in Table 4 below.

Comparison of soil concentrations to the SILs discussed in Section 5.3 is as follows:

- AEC A (Shed 3)
 - Concentrations of TPH C₁₀ to C₃₆, exceeded adopted criteria in samples TP107 0.0-0.1m (10,225mg/kg) and TP107 0.5-0.6m (10825mg/kg). Elevated levels of TPH were also noted in TP122 in AEC 1;
 - Concentrations of BTEX were below adopted criteria;
 - Concentrations of PAH were below adopted criteria;
 - Concentrations of heavy metals were below adopted criteria;
 - Concentrations of OCP/OPP were below adopted criteria;
 - Concentrations of PCBs were below adopted criteria.
- AEC B (UST)
 - Concentrations of TPH C₁₀ to C₃₆, exceeded adopted criteria in sample TP129 1.2-1.25m (1310mg/kg). Elevated levels of TPH (412mg/kg to 780mg/kg) were noted in other samples collected from TP129 and TP131;
 - Concentrations of BTEX were below adopted criteria;
 - Concentrations of PAH were below adopted criteria;
 - Concentrations of zinc in samples TP129 0.7-0.8m (3000mg/kg) exceeded the adopted criteria (for Provisional Phytotoxicity). Concentrations of heavy metals were below adopted criteria in the other samples tested;
 - Concentrations of OCP/OPP were below adopted criteria;
 - Concentrations of PCBs were below adopted criteria
- AEC C (Filled Areas)
 - Concentrations of TPH C₁₀ to C₃₆, exceeded adopted criteria in samples TP135 1.1-1.2m (5425mg/kg) and TP156 0.4-0.5m (9000mg/kg). Elevated levels of TPH were noted in samples collected from TP104, TP111, TP113, TP119, TP136, TP136, TP139, TP141 and TP158, but these concentrations were below the adopted criteria;
 - Concentrations of BTEX were below the adopted criteria in each sample tested;
 - Concentrations of PAH and benzo(a)pyrene exceeded the adopted criteria in TP101 0.0-0.1m (benzo(a)pyrene 2.9mg/kg and total PAH 35mg/kg)). Each other sample tested had concentrations below the adopted criteria;
 - Concentrations of zinc exceeded adopted criteria for phytotoxicity in samples TP101 0.0-0.1m (1800mg/kg), and TP156 0.7-0.8m (780mg/kg). Concentrations of heavy metals were below adopted criteria in the other samples tested;
 - Concentrations of OCP and OPP were below the LOR in each sample tested;

- Concentrations of PCBs were below the LOR in each sample tested.
- AEC E (Former Residences Lot 1 and Lot 2)
 - Concentrations of Heavy metals exceeded adopted criteria for phytotoxicity in samples TP161 0.0-0.1m (zinc 250mg/kg), H3 0.0-0.1 (zinc 230mg/kg, and copper 670mg/kg), H5 0.0-0.1 (zinc 230mg/kg), H6 0.0-0.1 (zinc 220mg/kg) and H10 (zinc 510mg/kg). Concentrations of cadmium and lead exceeded adopted criteria for human health in TP161 0.0-0.1m (cadmium 32mg/kg, lead 1100mg/kg), and H5 0.0-0.1 (copper 1300mg/kg, and lead 3000mg/kg). Heavy Metals in each other sample tested were below adopted criteria;
 - Concentrations of OCP/OPP were below adopted criteria for each sample tested.
- AEC F (Former Residence Lot 1A)
 - Concentrations of arsenic in sample H14 exceeded adopted criteria for human health (200mg/kg). Heavy metals in each other sample tested were below adopted criteria;
 - Concentrations of OCP/OPP were below adopted criteria for each sample tested.

Table 4: Summary of Laboratory Results for Soil Samples
(All results in mg/kg)

AEC		AEG A and AEG C				AEG B and AEG C				AEG C						
Sample ID	Material	THRESHOLD CONCENTRATIONS	TP106	TP107	TP107	TP107	TP122	TP129	TP129	TP129	TP131	TP131	TP101	TP103	TP104	TP108
Date of Sampling	Depth (m)		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			0.0-0.1	0.0-0.1	0.3-0.4	0.3-0.4	0.3-0.4	0.7-0.8	1.2-1.25	1.75-1.85	1.1-1.2	16-Oct-2006	12-Oct-2006	12-Oct-2006	12-Oct-2006	12-Oct-2006
Heavy Metals	Arsenic	100 ¹	4.7	2.8	3.3	6.7	4.5	6.5	<2	<2	4.4	<2	7.7	3.1	3.7	2.2
	Cadmium	20 ¹	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Chromium	120,000 ¹	8.3	15	<5	5.4	17	10	7.5	6.3	10	9.1	33	7.9	<5	<5
	Copper	1000 ¹	9	83	<5	19	20	<5	<5	<5	<5	<5	<5	12	9.8	5.3
	Lead	300 ¹	18	50	<5	19	28	26	10	11	9	12	61	14	11	9.2
	Nickel	600 ¹	6.1	7.4	<5	<5	11	<5	<5	<5	<5	<5	12	<5	<5	<5
	Zinc	7000 ¹	84	83	<5	48	50	3000	14	8.8	12	12	1800	130	44	22
	Mercury	15 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Petroleum Hydrocarbons																
C10 - C14 Fraction		65 ³	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-
			-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-
			-	1500	120	1900	120	140	910	280	520	<100	<100	<100	<100	-
			-	8700	120	8900	400	<100	<100	<100	<100	<100	<100	<100	<100	-
		1000 ³	-	10225	265	10825	545	215	1310	412	780	<250	<250	<250	<250	-
BTEX																
Benzene		1 ³	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Toluene		130 ³	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Ethylbenzene		50 ³	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Xylene		25 ³	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Polycyclic Aromatic Hydrocarbons																
Acenaphthene			-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
		1 ¹	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Chrysene			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Dibenz(a,h)anthracene			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Fluorene			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Indeno(1,2,3-cd)pyrene			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Naphthalene			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
			-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0						

Table 4: Summary of Laboratory Results for Soil Samples (Cont'd)
(All results in mg/kg)

AEC			AEC													
Sample ID	Material	THRESHOLD CONCENTRATIONS	TP111	TP113	TP116	TP118	TP119	TP121	TP127	TP132	TP135	TP136	TP139	TP140	TP141	
Date of Sampling	Depth (m)		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
			12-Oct-2006	12-Oct-2006	12-Oct-2006	13-Oct-2006	13-Oct-2006	13-Oct-2006	13-Oct-2006	16-Oct-2006	16-Oct-2006	16-Oct-2006	16-Oct-2006	16-Oct-2006	16-Oct-2006	
			0.7-0.8	0.1-0.2	0.0-0.1	0.0-0.1	0.0-0.1	0.0-0.1	0.0-0.1	0.0-0.1	1.1-1.2	0.0-0.1	0.0-0.1	1.9-2.0	0.2-0.3	
Heavy Metals																
		100 ¹	4.6	6.4	5.8	4.6	4.5	5.5	5.5	6.4	2.6	4	2.2	2.1	7.1	
	Arsenic	20 ²	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
	Cadmium	20 ¹	8.5	7.1	8.5	8	17	11	11	8.3	7.9	6.5	6.1	6.7	8	
	Chromium	120,000 ¹	<5	9.5	5.9	<5	20	38	38	14	<5	<5	17	29	9.3	
	Copper	1000 ¹	10	16	19	19	28	23	23	48	12	11	6	10	13	
	Lead	300 ¹	<5	<5	<5	<5	11	11	11	5.3	<5	<5	<5	<5	5.1	
	Nickel	600 ¹	18	44	41	27	50	58	58	47	100	14	48	76	100	
	Zinc	7000 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	Mercury	15 ¹														
Total Petroleum Hydrocarbons																
		65 ³	<20	<20	-	-	<20	-	-	<20	<20	<20	<20	-	<20	
	C6 - C9 Fraction		<50	<50	-	-	<50	-	-	<50	<50	<50	150	-	<50	
	C10 - C14 Fraction		170	<100	-	-	140	-	-	<100	200	<100	110	-	<100	
	C15 - C28 Fraction		460	230	-	-	200	-	-	<100	3200	110	300	-	170	
	C29 - C36 Fraction		655	305	-	-	365	-	-	<250	375	185	560	-	245	
	Total C10-C36	1000 ³														
BTEX																
	Benzene	1 ³	<0.05	<0.05	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	
	Toluene	130 ³	<0.05	<0.05	-	-	<0.05	-	-	<0.05	0.70	<0.05	<0.05	-	<0.05	
	Ethylbenzene	50 ³	<0.05	<0.05	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	
	Xylene	25 ³	<0.05	<0.05	-	-	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	
Polycyclic Aromatic Hydrocarbons																
	Acenaphthene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Acenaphthylene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Anthracene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Benz(a)anthracene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Benz(a)pyrene	1 ¹	<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Benz(b)fluoranthene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Benz(g,h,i)pyrene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Benz(k)fluoranthene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Chrysene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Dibenz(a,h)anthracene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Fluoranthene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Fluorene		<1	<0.1	-	-	<0.1	-	-	<0.5	<0.1	<0.1	<0.2	-	<0.1	
	Indeno(1,2,3-cd)pyrene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Naphthalene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Phenanthrene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Pyrene		<1	<0.1	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.2	-	<0.1	
	Total PAH	20 ¹	<16	1.6	-	-	<1.6	-	-	<2	<1.6	<1.6	<3.2	-	<1.6	
Organochlorine Pesticides																
	Aldrin/Dieldrin	10 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	Chlordane	50 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	Heptachlor	10 ¹	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	DDT	200 ¹	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	
Organophosphorus Pesticides																
	Total	NA	<42	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<11	<4.2	<4.2	
Poly-Chlorinated Biphenyls																
	Total	10 ¹	<1	<1	-	-	<1	-	-	<1	<1	<1	<1	-	<1	

NOTES:

Concentration exceeds the respective threshold concentration

¹ Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Residential - NEHF-A)

² Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Provisional Phytotoxicity - NEHF-G)

³ Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

See original laboratory reports for detection limits

Table 4: Summary of Laboratory Results for Soil Samples (Cont'd)
(All results in mg/kg)

AEC		AEC											
Sample ID	Material	THRESHOLD CONCENTRATIONS											
Date of Sampling	Depth (m)	TP142 Soil	TP144 Soil	TP145 Soil	TP146 Soil	TP147 Soil	TP148 Soil	TP149 Soil	TP150 Soil	TP152 Soil	TP156 Soil	TP158 Soil	TP159 Soil
		16-Oct-2006 0.0-0.1	16-Oct-2006 0.0-0.1	16-Oct-2006 0.0-0.1	16-Oct-2006 0.8-1.0	16-Oct-2006 1.5-1.6	16-Oct-2006 0.5-0.6	16-Oct-2006 1.7-1.8	17-Oct-2006 0.0-0.1	17-Oct-2006 0.0-0.1	17-Oct-2006 0.4-0.5	17-Oct-2006 0.7-0.8	17-Oct-2006 0.5-0.6
Heavy Metals													
Arsenic	100 ¹	<2	5.8	6.4	9.6	5	7.7	3.3	<2	9.8	7.7	6.8	7.9
Cadmium	20 ¹	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5
Chromium	120,000 ¹	<5	<5	7.7	5.6	7.3	7	8.5	<5	5.6	27	6.6	12
Copper	1000 ¹	<5	12	21	14	18	14	16	7.6	9.6	58	22	17
Lead	300 ¹	<5	13	27	22	14	23	19	6.6	23	150	28	29
Nickel	600 ¹	<5	<5	<5	<5	<5	<5	5.7	<5	<5	18	<5	<5
Zinc	7000 ¹	5.4	160	120	51	65	58	52	30	69	780	100	120
Mercury	15 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Petroleum Hydrocarbons													
C6 - C9 Fraction	65 ³	-	<20	<20	<20	-	<20	-	<20	-	23	<20	-
C10 - C14 Fraction		-	<50	<50	<50	-	<50	-	<50	-	1900	<50	-
C15 - C28 Fraction		-	<100	<100	<100	-	<100	-	<100	-	5300	130	-
C29 - C36 Fraction		-	<100	<100	<100	-	<100	-	<100	-	1800	320	-
Total C10-C36	1000 ³	-	<250	<250	<250	-	<250	-	<250	-	9000	475	-
BTEX													
Benzene	1 ³	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-
Toluene	130 ³	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	0.17	<0.05	-
Ethylbenzene	50 ³	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	0.47	<0.05	-
Xylene	25 ³	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	-	4.00	<0.05	-
Polycyclic Aromatic Hydrocarbons													
Acenaphthene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.5	<0.1	-
Acenaphthylene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.5	<0.1	-
Anthracene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.2	<0.1	-
Benzo(a)anthracene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Benzo(a)pyrene	1 ¹	-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Benzo(b)fluoranthene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Benzo(g,h,i)pyrene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Benzo(k)fluoranthene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Chrysene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Dibenz(a,h)anthracene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Fluoranthene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Fluorene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	1.7	<0.1	-
Indeno(1,2,3-cd)pyrene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Naphthalene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	2.2	<0.1	-
Phenanthrene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	2.1	<0.1	-
Pyrene		-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	0.1	<0.1	-
Total PAH	20 ¹	-	<1.6	<1.6	<1.6	-	<1.6	-	<1.6	-	8.2	<1.6	-
Organochlorine Pesticides													
Aldrin/Dieldrin	10 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlordane	50 ¹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	10 ¹	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DDT	200 ¹	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Organophosphorous Pesticides													
Total	NA	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2
Poly-Chlorinated Biphenyls													
Total	10 ¹	-	<1	<1	<1	-	<1	-	<1	-	<1	<1	-

NOTES:

Bold Concentration exceeds the respective threshold concentration

¹ Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Residential - NEHF-A)

² Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Provisional Phytotoxicity - NEHF-G)

³ Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

See original laboratory reports for detection limits

Table 4: Summary of Laboratory Results for Soil Samples (Cont'd)
(All results in mg/kg)

AEC		THRESHOLD CONCENTRATIONS	AEC E										AEC F			
Sample ID	Material		H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H12	H13	H14	
Date of Sampling	Depth (m)		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
17-Oct-2006	0.0-0.1	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	23-Oct-2006	
		0.0-0.1	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	
Heavy Metals																
Arsenic	100 ¹	20 ²	7.7	5.8	7.3	6.5	6.8	5.8	5.9	<2	<2	11	6.4	17	200	
Cadmium	20 ¹	3 ²	1.7	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Chromium	120,000 ¹	400 ²	27	8.8	9.6	12	12	9.2	9.3	<5	<5	14	8.8	<5	9.9	
Copper	1000 ¹	100 ²	58	<5	<5	<5	1300	<5	<5	<5	<5	<5	<5	<5	<5	
Lead	300 ¹	600 ²	150	43	22	160	45	3000	240	<5	14	110	96	18	75	
Nickel	600 ¹	60 ²	18	<5	<5	<5	23	<5	5.8	<5	<5	<5	<5	<5	<5	
Zinc	7000 ¹	200 ²	780	160	35	230	140	230	150	12	82	510	170	18	98	
Mercury	15 ¹	1 ²	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Organochlorine Pesticides																
Aldrin/Dieldrin	10 ¹		<0.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chlordane	50 ¹		<0.1	<0.1	0.4	<0.1	<0.1	<0.55	1.8	<0.1	<0.1	<0.55	<0.1	<0.1	<0.55	
Hepachlor	10 ¹		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
DDT, DDE, DDD	200 ¹		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	
Organophosphorous Pesticides																
Total	NA		<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	

NOTES:

Bold Concentration exceeds the respective threshold concentration

¹ Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Residential - NEHF-A)

² Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (2nd ed) and NEPM (1999) (Provisional Phytotoxicity - Column 5)

³ Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

See original laboratory reports for detection limits

5.5 Groundwater Investigation Levels (GILs)

For assessing water quality, it is first necessary to assess the beneficial uses of water (surface water and groundwater) down-gradient of the site being assessed. Based on the results of the groundwater bore search (carried out in Coffey Report CH1296/1-AG, dated 24 November 2005), it appears that groundwater uses within the area comprise domestic use, which are likely used for irrigation purposes. None of the bores were inferred to be located down gradient of the site. Based on the location of the site, it is likely that groundwater will be brackish / marine water. The closest water body would be the Double Crossing Creek which runs through the site between Lot 260 and the other lots. Coffey consider that the principal beneficial use of the groundwater is for the maintenance of the integrity of aquatic ecosystems when it discharges into Double Crossing Creek.

The threshold concentrations presented in the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* are considered applicable for the protection of aquatic ecosystems of the receiving waters. As these guidelines apply to receiving waters, it is generally conservative to also apply these to groundwater discharging to receiving waters.

ANZECC (2000) advocates a site-specific approach to developing guideline trigger values based on such factors as local biological affects data, the current level of disturbance of the ecosystem, etc. The guidelines present 'low risk guidelines trigger values' which are defined as concentrations of key performance parameters below which there is a low risk that adverse biological affects will occur. It is important to note that these are not threshold values at which an environmental problem is likely to occur if exceeded. Rather, if the trigger values are exceeded, then further action is required which may include either further site-specific investigations to assess whether or not there is an actual problem or management/remedial action.

Low risk trigger values are provided for the protection of 80-99% of species in marine and fresh waters (presented in Table 3.4.1 of the guidelines), with the trigger value depending on the 'health of the receiving waters'.

Background groundwater quality can be used as a basis for management decisions rather than reliance solely on the exceedance of default trigger values. This approach is consistent with the ANZECC (2000) Guidelines which place greater emphasis on the assessment of local background water quality data rather than the use of generic trigger values.

Marine water trigger values are considered applicable for protection of ecosystems in the receiving water bodies for this site. It is understood that the EPA's policy is that the trigger values for the protection of 95% of aquatic ecosystems should be used except where contaminants are potentially bioaccumulative in which case the trigger values for protection of 99% of species should be used. Therefore, we have selected trigger values for protection of 95% of fresh water species for the majority of contaminants, and 99% of fresh water species for bioaccumulative contaminants for initial comparison purposes.

For some heavy metals (such as lead) a hardness correction factor can be applied to the default trigger values, as an increase in the hardness of the water makes the metals less bio-available.

ANZECC (2000) states that there is currently insufficient data to derive high reliability trigger values for various contaminants. For these contaminants, low reliability trigger values have been adopted.

ANZECC (2000) state that there is currently insufficient data to derive a high reliability trigger value for TPH but propose a low reliability trigger value for TPH of 7µg/L. This guideline is generally considered by industry to be overly conservative and is also well below the TPH detection limit which most laboratories can achieve. Another commonly internationally used guideline for TPH is contained in Dutch (1994), which present a target, and intervention values for mineral oils. The average of the target and intervention values (325µg/L) is commonly used as an investigation level for TPH and will be adopted for this assessment.

Threshold concentrations for drinking water are provided by NHMRC/ARMCANZ in their publication Australian Drinking Water Guidelines (1996). These guidelines provide threshold levels based on assumptions of 2L of drinking water everyday for a 70 year life. Guidelines for irrigation and general water use are presented in Section 4.2 of ANZECC (2000). Guidelines for the recreational water use are presented in *Table 5.2.3 of ANZECC (2000)*.

5.6 Comparison of Results to Groundwater Investigation Levels

The laboratory test results for groundwater are summarised in Table 5.

Comparison of groundwater concentrations to the GILs discussed in Section 5.6 is as follows:

- Concentrations of TPH exceeded the adopted criteria (325µg/L) in samples BH1 (480ug/L), BH4 (540ug/L) and BH6 (510ug/L). Concentrations were below adopted criteria in BH2, BH3 and BH5;
- Concentrations of Toluene exceeded the adopted criteria in samples BH4 (210ug/L) and BH6 (350ug/L). Concentrations of Toluene were below adopted criteria in each other sample tested, Concentrations of benzene, ethyl-benzene and xylene were below the LOR in each sample tested;
- Concentrations of PAH were below the LOR in each sample tested. The LOR is above the adopted guideline level for benzo(a)pyrene, and anthracene and at this stage it is not possible to assess if benzo(a)pyrene exceeds the adopted guideline level;
- Concentrations of Chromium exceeded adopted criteria in samples BH1, BH2 and BH3. Concentrations of chromium were below adopted criteria in other samples tested. Other heavy metals were below adopted criteria in each sample tested.

Table 5: Summary of Laboratory Results for Groundwater

(All results in ug/L, unless otherwise stated)

Sample ID	THRESHOLD CONCENTRATION		BH1	BH2	BH3	BH4	BH5	BH6
Material			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Date of Sampling			23-Oct-06	23-Oct-06	23-Oct-06	23-Oct-06	23-Oct-06	23-Oct-06
Heavy Metals								
Arsenic	13 ^{1b}		1	4	6	<1	6	1
Cadmium	0.7 ¹	7 ^{1d}	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	4.4 ^{1c}		8	8	8	3	2	3
Copper	1.3 ¹	11.7 ^{1d}	1	<1	2	2	<1	<1
Lead	4.4 ¹	117.5 ^{1d}	4	<1	<1	5	7	6
Nickel	7 ¹	63	5	5	5	2	2	2
Zinc	15 ¹	135 ^{1d}	50	20	17	34	58	32
Mercury	0.1 ¹	^{1d}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Petroleum Hydrocarbons								
C6 - C9 Fraction			60	<20	<20	220	60	350
C10 - C14 Fraction			170	<50	<50	70	<50	60
C15 - C28 Fraction			200	200	100	200	<100	<100
C29 - C36 Fraction			<100	<100	<100	<100	<100	<100
Total C6-C36	325 ²		480	287	187	540	185	510
BTEX								
Benzene	500 ¹		<1	<1	<1	<1	<1	<1
Toluene	180 ^{1a}		61	4	7	210	55	350
Ethylbenzene	80 ^{1a}		<1	<1	<1	<1	<1	<1
Xylene	625 ^{1a}		<1	<1	<1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons								
Acenaphthene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthylene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Anthracene	0.01 ^{1a}		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benz(a)anthracene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1 ^{1a}		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(b)fluoranthene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i.)prylene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(k)fluoranthene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chrysene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dibenz(a,h)anthracene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluoranthene	1 ^{1a}		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluorene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3cd)pyrene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Napthalene	50 ¹		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Phenanthrene	0.6 ^{1a}		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pyrene			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH			<3.2	<3.2	<3.2	<3.2	<3.2	<3.2

Bold

Concentration exceeds the Threshold Criteria

LOR exceeds the Threshold Criteria

¹ Based on ANZECC/ARMCANZ (2000), Australian and New Zealand Guidelines For Fresh and Marine Water Quality (Marine water, South Eastern Australia, slightly to moderately disturbed system, 95%-99% of species protected)

^{1a} Low reliability trigger values

^{1b} Criteria for Arsenic V in fresh water, whereas our results are for total arsenic

^{1c} Criteria for chromium VI in fresh water, whereas our results are for total chromium

^{1d} Results corrected for hardness

² Based on Dutch Ministry of Housing, Spatial Planning and the Environment (1994) Investigation levels for mineral oils
See original laboratory reports for detection limits

5.7 Discussion & Conclusions

The previous site history assessment, reported in GEOTCOFH01296AA-AM, indicated that there was a potential for contamination to exist in soils near the infrastructure from the sawmill and concrete batching plant operations, and within the fill materials. Since the Phase 1 ESA, the infrastructure from the sawmill and concrete batching plant have largely been removed, with only one former residence on Lot 1 and one large shed on Lot 260 remaining. Much of the rubbish observed on the site during the Phase 1 ESA has been cleaned up and removed. Six AECs were therefore targeted during this current investigation.

The number of sampling locations on Lot 1 and Lot 260, both in a grid and targeting AECs, was in accordance with the NSW EPA (1995) Sampling Design Guidelines. Given the sampling distribution adopted for this investigation the circular diameter of a hotspot that could be detected with 95% confidence is 35.6m on Lot 260 and 28.9m on Lot 1. Field investigations have aided in defining the approximate location and extent of the fill materials. The estimated area of known Unit 2 Fill materials is shown on Figure 4. It should be noted that the areas indicated on Figure 4 are approximate only and that there may be other locations where historical pits were dug and Unit 2 Fill materials buried and/or burned.

For AEC A, which is the existing shed on Lot 260 (formerly called Shed 3), the laboratory testing indicated concentrations of TPH exceeding the human health criteria near a former oil storage area. Elevated concentrations of TPH were also noted in a sample on the western side of the shed.

For AEC B, the UST, the laboratory indicated concentrations of TPH exceeding the human health criteria in one sample at 0.7-0.8m depth. Concentrations of zinc exceeded the adopted criteria for phytotoxicity in the same sample. Elevated concentrations of TPH were noted in each other sample tested from test pits within the AEC. To date the capacity of the UST is not known.

For AEC C, filled areas on the site, generally the historical (Unit 2) fill materials, concentrations of TPH exceeded adopted criteria in two samples. These samples could be associated with the former Shed 1 (Lot 260) and Shed 6 (Lot 1). Elevated concentrations of TPH were noted in nine other samples, all of these were in Unit 2 Fill materials, and one could be associated with former Shed 2. One sample, on the north-east corner of Lot 260, had concentrations of benzo(a)pyrene and total PAH which exceeded adopted criteria. Concentrations of zinc exceeded adopted criteria for phytotoxicity in two samples.

For AEC E, former and existing residences in Lot 1 and Lot 2, the laboratory testing indicated concentrations of heavy metals (cadmium, lead and copper) which exceeded the adopted criteria for human health in two samples in the footprint of the former residences. Concentrations of zinc and copper exceeded the adopted criteria for phytotoxicity in four samples.

For AEC F, former residence in Lot 1A, the laboratory testing indicated concentrations of arsenic exceeding the adopted criteria for human health in a sample in the footprint of the former residence.

In the groundwater, the laboratory testing indicated concentrations of TPH (BH1, BH4, and BH6), Toluene (BH4 and BH6) and Chromium (BH1, BH2, and BH3) exceeding the adopted criteria. The concentrations of TPH and Toluene are not considered highly elevated and are likely caused by the hydrocarbons detected in the soils and the UST. As it is proposed to remove the hydrocarbon impacted soils and the UST (the likely source of the TPH and Toluene contamination in the groundwater) as part of the remedial strategy, it is considered that the remaining TPH and Toluene within the groundwater

will naturally attenuate over time and reduce the concentrations to below the adopted criteria. Should the TPH soil source be removed no formal groundwater remediation is deemed to be required.

Based on the results of the field investigations and laboratory testing, we would recommend the following:

- AEC A (Shed 3) – the southern end of this shed was used as an area to store oil and fuels, the area is relatively well defined due to the stained soil surrounding it.
 - This part of the shed should be removed, and the soils underneath be excavated and removed. Depending on the concentration and type of contaminant, the soil may be either removed to a licensed landfill; treated on site; or possibly placed under the proposed pavements on the site.
 - The resulting excavation would need to be validated, and backfilled with 'clean' soil.
 - An experienced environmental consultant be present during the removal of the soil, to help assess the extent of soil removed, and if the excavation is likely to be 'clean'.
 - Should the back fill soil come from on site, or be imported from a source other than a licensed quarry, than the backfill soil should be assessed for contaminants.
 - The excavated soil will need to be classified in accordance with the NSW DEC (1999) Assessment, Classification & Management of Liquid and Non Liquid Wastes prior to disposal to a licensed landfill, or placement under pavements.
- AEC B (UST) – The UST is located west of the former office, under a concrete slab.
 - Once the location is established, the UST should be removed and disposed of in accordance with NSW WorkCover guidelines.
 - The contaminated soils should be excavated and removed from around the tank excavation. Depending on the concentration and type of contaminant, the soil may be either removed to a licensed landfill; treated on site; or possibly placed under the proposed pavements on the site.
 - The resulting excavation would need to be validated, and backfilled with 'clean' soil.
 - An experienced environmental consultant should be present during the removal of the soil, to help assess the extent of soil removed, and collect validation samples.
 - Should the back fill soil come from on site, or be imported from a source other than a licensed quarry, than the backfill soil should be assessed for contaminants.
 - If disposed of off-site to landfill then the excavated soil will need to be classified in accordance with the NSW DEC (1999) Assessment, Classification & Management of Liquid and Non Liquid Wastes.
- AEC C (Filled Areas) – the areas of known Unit 2 Fill on the site are approximately outlined on Figure 4. Most of Lot 260 and Lot 1, and part of Lot 2 have a layer of Unit 1 Fill materials to a depth of between 0.1m and 0.5m. The Unit 1 Fill is generally fill used as road base. It should be noted that there may be other areas where Unit 2 Fill materials were buried.

- In the locations where it is known that there is contamination (from the laboratory testing), the contamination should be further delineated, excavated and removed. Depending on the concentration and type of contaminant, the soil may be either removed to a licensed landfill; treated on site; or possibly placed under the proposed pavements on the site.
- In the unknown locations (i.e. the small pits with buried Unit 2 Fill materials), these could likely be addressed during construction as they are encountered.
- The soil removed from the site should be classified according to NSW DEC (1999) Assessment, Classification & Management of Liquid and Non Liquid Wastes prior to disposal to a licensed landfill.
- AEC D (Rubbish Stockpiles) – the few remaining general rubbish stockpiles on the site should be classified according to the DEC (2004) Guidelines and then appropriately disposed off site.
- AEC E and AEC F (Former Residences Lot 1, Lot 2 and Lot 1A)
 - A number of samples with heavy metals contamination were collected from within the former residences footprints. The site history assessment (i.e. aerial photographs, interviews with former site owner) indicated that the two lots were used for residential purposes in the past.
 - The contaminated soil should be excavated and removed. Depending on the concentration and type of contaminant, the soil may be either removed to a licensed landfill; treated on site; or possibly placed under the proposed pavements on the site.
 - Soil removed from the site should be classified according to the NSW DEC (1999) Assessment, Classification & Management of Liquid and Non Liquid Wastes.

Due to size of the site, its history, and the number of AECs identified, it is recommended that a Remedial Action Plan (RAP) be prepared by a suitably qualified environmental consultant such as Coffey. An RAP will allow remediation to be completed to a specified program, in accordance with relevant guidelines and advice provided through liaison with regulatory authorities. The RAP will detail the remediation process, including setting out remedial objectives, providing procedures and plans to be implemented, providing advice on waste management issues, identifying and including proof of the necessary approvals and licenses required by regulatory authorities and detailing the validation requirements for the site following remediation.

Based on the results of the previous report, the field investigations and laboratory testing, it is considered that the proposed Stage 2 development area, bounded by Lot 1 and Lot 260, is currently **not** suitable for residential use with regards to soil contamination. Should the above recommendations be carried out, the site would likely be suitable for residential use.

Based on the results of the site history assessment which indicated that Lot 1A and Lot 2 were used for residential use in the past, a limited number of samples were collected and analysed from within the footprints of the former residences. The results of this investigation indicated that some of the soils within the footprints of the former residences are currently not suitable for residential uses. However, should the remediation recommendations outlined in this report be carried out, the footprint areas of the former residences, on Lot 1A and Lot 2, would be suitable for residential use. The suitability of the remainder of the Lot 1A and Lot 2 for residential use cannot be assessed unless further sampling and analysis is carried out.

6 PRELIMINARY GEOTECHNICAL & ACID SULFATE SOIL ASSESSMENTS

6.1 Suitability of the Site for Residential Development

Provided development is designed and carried out in accordance with the recommendations provided below, and further work is carried out to assess the reactivity and bearing pressures of the site soils, it is considered that the site would be suitable for residential use from a geotechnical perspective.

6.2 Suitability of the Site Soils for Use as Fill

The subsurface conditions encountered during the investigation are discussed in Section 4.3.1.

Materials observed during the investigation which may not be considered suitable for use as engineered fill comprise the Unit 2 Fill materials (containing sawdust, timber, ash, charcoal, or rubbish), Unit 3 Clayey Silt Topsoil and Unit 4 Silty Clay Alluvial Soil materials. These materials are likely to contain high proportions of silt and organic material which may result in construction difficulties, or in the case of high proportions of organics, the material may break down over time and possibly lead to settlement. As such, materials that are considered to contain high proportions of organic material may be stripped and stockpiled for use as landscaping materials only. The decision on the use of silty materials may be made on the site during construction, depending on the earthworks required, and the prevailing conditions at the time.

The general location and boundary of the known Unit 2 Fill materials is shown on Figure 4. It should be noted that there may be numerous locations where small pits have been dug and Unit 2 Fill materials buried.

The Unit 1 Fill materials on the site, which do not contain sawdust, organics or rubbish, would likely be suitable for re-use as engineered fill. These Unit 1 Fill materials may require some sorting before being used as general fill.

We recommend that a suitably qualified geotechnical practitioner be on site during the stripping and stockpiling of topsoil and alluvial soils to further assess their reuse.

6.3 Pavement Design Parameters

Nine CBR tests were carried out on samples collected during fieldwork. The results of the testing are summarised in Table 6 below and the laboratory results sheets are presented in Appendix D.

Table 6: Summary of CBR Test Results.

Location & Depth (m)	Material Origin & Description	Field Moisture %	Optimum Moisture %	CBR%
TP112 0.7-0.9	Alluvial Soil: Silty Clay	19.0	20.3	13.0
TP117 0.5-0.6	Alluvial/Residual Soil: Clay	21.5	21.9	7.0
TP119 0.8-1.0	Alluvial/Residual Soil: Clay	21.7	20.7	6.0
TP123 0.7-0.9	Alluvial/Residual Soil: Clay	21.3	21.1	6.0

TP128 0.4-0.6	Alluvial Soil: Silty Clay	17.0	19.8	7.0
TP151 0.3-0.5	Alluvial/Residual Soil: Clay	20.1	22.8	7.0
TP158 1.3-1.5	Alluvial/Residual Soil: Clay	15.9	19.2	8.0
TP162 0.2-0.5	Alluvial/Residual Soil: Clay	22.1	25.5	7.0
TP163 0.4-0.6	Alluvial/Residual Soil: Clay	27.7	29.3	7.0

The CBR results indicate that the CBR values are between 6.0% and 13.0%, with typical values between 6.0% and 8.0%. We consider that the 13.0% value is generally higher than would be anticipated at the site, and may be a slightly higher sand content within the sample. Based on the test results and experience with similar materials, we recommend that a design CBR of 6.0% be adopted for design of flexible pavements. The scope of work outlined in the section below is required as a minimum to enable this design CBR to be achieved.

6.4 Fill Construction Procedures & Site Preparation

The following general comments and recommendations are provided for fill construction and site preparation beneath structures and pavements:

- Following excavation to design level, or to a suitable foundation material in areas where fill is to be placed, the exposed subgrade materials should be proof rolled to identify any wet, excessively deflecting or other deleterious material. Any such areas should be over-excavated and backfilled with a clean select material. All soil materials considered unsuitable for use as engineered fill should be stripped and stockpiled for re-use as landscaping materials only.
- Approved fill beneath roads should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 95% Standard Compaction. Clay fill should be placed and maintained at 60% to 90% of Standard OMC.
- The top 300mm of natural subgrade or subgrade fill below pavements should be compacted to a minimum dry density ratio of 100% Standard Compaction.
- All pavement materials should be placed and maintained at 60% to 90% of Standard OMC.
- Approved fill beneath structures should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 95% Standard Compaction. Clay fill should be placed and maintained at $\pm 2\%$ of Standard OMC. All filling beneath structures should be carried out under Level 1 construction monitoring and testing as defined in AS3798-1996.

Earthworks should be carried out in accordance with the recommendations outlined in AS3798-1996, *'Guidelines for Earthworks for Commercial and Residential Developments'*.

6.5 Preliminary Acid Sulfate Soils Assessment

6.5.1 Formation of Acid Sulfate Soils

Acid Sulfate Soils (ASS) are soils which contain significant concentrations of pyrite which, when exposed to oxygen, in the presence of sufficient moisture, oxidises, resulting in the generation of sulfuric acid. Unoxidised pyritic soils are referred to as potential ASS (PASS). When the soils are exposed, the oxidation of pyrite occurs and sulfuric acids are generated, and the soils are said to be actual ASS (AASS).

Pyritic soils typically form in waterlogged, saline sediments rich in iron and sulfate. Typical environments for the formation of these soils include tidal flats, salt marshes and mangrove swamps below about RL 5m AHD. They can also form as bottom sediments in coastal rivers and creeks.

Pyritic soils of concern on low lying NSW and coastal lands have mostly formed in the Holocene period, (i.e. 10,000 years ago to present day) predominantly in the 7,000 years since the last rise in sea level. It is generally considered that pyritic soils which formed prior to the Holocene period would already have oxidised and leached during periods of low sea level which occurred during ice ages, exposing pyritic coastal sediments to oxygen.

Disturbance or poorly managed development and use of acid sulfate soils can generate significant amounts of sulfuric acid, which can lower soil and water pH to extreme levels (generally <4) and produce acid and salts, resulting in high salinity.

The low pH, high salinity soils can reduce or altogether preclude vegetation growth and can produce aggressive soil conditions which may be detrimental to concrete and steel components of structures, foundations, pipelines and other engineering works.

Generation of the acid conditions often releases aluminium, iron and other naturally occurring elements from the otherwise stable soil matrices. High concentrations of such elements, coupled with low pH and alterations to salinity can be detrimental to aquatic life. In severe cases, affected waters flowing off-site can have detrimental effect on aquatic ecosystems.

6.5.2 Site Location and Acid Sulfate Soils Risk Map

The site is located on the northern end of Graham Drive in Sandy Beach, NSW. The site is defined as Lot 260 DP752853 (Lot 260), Lot 1 DP726077 (Lot 1), Lot 1 DP726078 (Lot 1A) and Lot 2 DP354878 (Lot 2). The site comprises of an area of 7.9ha.

The Department of Land and Water Conservation 1:25,000 Acid Sulfate Soil Risk Map of Moonee Beach shows that about 5.2ha of the site is located in an area of low probability of acid sulfate soils occurring at greater than 1m depth (Class Ap4).

An area of 0.975ha on the south-eastern corner of the site is located in an area of high probability of acid sulfate soils at or within 1m of the ground surface (Class Ap2).

These two areas of high probability and low probability of acid sulfate soils, is shown on Figure 2.

6.5.3 Site Attributes

The topographic map for Moonee Beach (map number 9537-4S) by Department of Lands indicates that the site is at an elevation of less than 10m.

For geology and site conditions observed, see Section 4.2.

6.5.4 Proposed Excavation

At this stage, the maximum depth of excavation, or volume of soils to be disturbed is not known.

The timing of the works is not known.

6.5.5 Soil Sampling and Laboratory Testing

Three test pits were excavated in the area of high probability of ASS (TP108, TP109 and TP110), and a further seven test pits (TP101, TP113, TP117, TP119, TP123, TP128 and TP144) were excavated in the area of low probability of ASS. The test pits were excavated to 2m depth, and samples were collected at 0.5m intervals. The location of the test pits can be seen in Figure 3, and the engineering logs are presented in Appendix A.

Samples collected during fieldwork were placed in tightly sealed plastic bags and stored in chilled insulated containers during transit to cold storage at Coffey's Coffs Harbour laboratory.

Samples obtained for the acid sulfate soil assessment were sent to an external NATA registered laboratory and screened for the presence of potential ASS using laboratory methods 21Af and 21Bf of Ahern CR, Blunden B and Stone Y (eds) (1998), Acid Sulfate Soil Laboratory Methods Guidelines, ASSMAC.

The results of the acid sulfate soil screening tests are shown on the laboratory result sheets presented in Appendix D.

Generally the following points are noted from samples within the area of high probability of acid sulfate soils occurring:

- Soil in water did not produce pH<4 for each sample tested. Soil in water with a pH<4 in this test is an indication of actual acid sulfate soil;
- Oxidation with hydrogen peroxide produced pH<3 in sample TP108 2.0m. The other samples produced pH of between 3.08 and 3.34. Soil in a peroxide solution with a pH<3 in this test is an indication of potential acid sulfate soil.

Generally the following points are noted from samples within the area of low probability of acid sulfate soils occurring:

- Soil in water did not produce pH<4 for each sample tested. Soil in water with a pH<4 in this test is an indication of actual acid sulfate soil;
- Oxidation with hydrogen peroxide produced pH<3 in sample TP145 0.5m. The other samples produced pH of between 3.10 and 5.24. Soil in a peroxide solution with a pH<3 in this test is an indication of potential acid sulfate soil.

On the basis of the screening results twenty samples were selected, on the basis of location, for additional testing to assess the potential for acid generation. The results of this testing are presented in Appendix D and are summarised in Table 7.

Table 7: Summary of CRS, TAA & TPA Testing

Unit	Location & Depth (m)	Texture	Reduced Inorganic Sulfur (%Scr)	Action Criteria For %Scr	Titratible Potential Acidity (TPA) Mole H ⁺ /Tonne	Action Criteria For TPA Mole H ⁺ /Tonne
Unit 5 Alluvial / Residual	TP101 0.5	Fine	<0.005	0.03	25	18
Unit 5 Alluvial / Residual	TP101 1.0	Fine	<0.005	0.03	40	18
Unit 5 Alluvial / Residual	TP101 1.5	Fine	<0.005	0.03	70	18
Unit 5 Alluvial / Residual	TP101 2.0	Fine	<0.005	0.03	45	18
Unit 5 Alluvial / Residual	TP108 0.5	Fine	0.008	0.03	5	18
Unit 5 Alluvial / Residual	TP108 1.0	Fine	0.011	0.03	5	18
Unit 5 Alluvial / Residual	TP108 1.5	Fine	0.009	0.03	30	18
Unit 5 Alluvial / Residual	TP108 2.0	Fine	<0.005	0.03	65	18
Unit 4 Alluvial	TP110 0.5	Fine	<0.005	0.03	3	18
Unit 5 Alluvial / Residual	TP110 1.0	Fine	0.005	0.03	80	18
Unit 5 Alluvial / Residual	TP110 1.5	Fine	<0.005	0.03	90	18
Unit 5 Alluvial / Residual	TP110 2.0	Fine	<0.005	0.03	95	18
Unit 5 Alluvial / Residual	TP117 0.5	Fine	0.009	0.03	5	18

Table 7: Summary of CRS, TAA & TPA Testing (Cont'd)

Unit	Location & Depth (m)	Texture	Reduced Inorganic Sulfur (%Scr)	Action Criteria For %Scr	Titratible Potential Acidity (TPA) Mole H ⁺ /Tonne	Action Criteria For TPA Mole H ⁺ /Tonne
Unit 5 Alluvial / Residual	TP117 1.0	Fine	0.006	0.03	75	18
Unit 5 Alluvial / Residual	TP117 1.5	Fine	0.005	0.03	120	18
Unit 5 Alluvial / Residual	TP117 2.0	Fine	<0.005	0.03	95	18
Unit 4 Alluvial	TP144 1.0	Fine	0.009	0.03	0	18
Unit 4 Alluvial	TP144 1.5	Fine	0.009	0.03	5	18
Unit 4 Alluvial	TP144 2.0	Fine	0.007	0.03	5	18
Unit 4 Alluvial	TP145 0.5	Fine	0.034	0.03	0	18

Note: Values in **shaded and bold** exceed adopted action criteria;

Action criteria adopted are based on disturbance of more than 1000 tonnes of acid sulfate soils.

TPA and TAA concentrations exceeded the adopted action criteria in numerous samples. Comments on the results are provided in the Section 6.5.1.

6.5.6 Discussion and Recommendations

The results of the testing indicate that the soils at the site are unlikely to have pyritic sulfur, but contain organic sulfur. This is supported by the low TSA and Scr results and the relatively high TAA results in the testing. These results suggest that the soils are unlikely to be ASS.

Notwithstanding this, low pH values were obtained for the alluvial soil at 2.0m depth within the area of “high probability of acid sulfate soils within 1m of the ground surface” and within the alluvial/residual soils. On this basis it is recommended that:

- The alluvial soils within the area of “high probability of ASS within 1m of the ground surface” as defined by the ASS maps are unlikely to be actual or potential ASS, but treatment as a precautionary measure should be carried out.
- The alluvial soils within the area of “low probability of acid sulfate soils occurring at greater than 1m depth” as defined by the ASS maps are unlikely to be actual or potential ASS, but check testing as a precautionary measure should be carried out.
- The alluvial/residual soils are not ASS, but are high acidity soils.

For the alluvial soils within the “high probability of ASS” area as defined by the ASS maps, it is recommended that treatment in the form of mixing disturbed materials with 5kg/m^3 of lime should be carried out. This liming rate includes a factor of safety of 1.5. An Acid Sulfate Soil Management Plan (ASSMP) is attached in Appendix E.

For the alluvial soils within the area of “low probability of acid sulfate soils occurring at greater than 1m depth” as defined by the ASS maps, it is recommended that check testing of disturbed alluvial soils from elsewhere on the site, in the form of field screening and CRS, TAA and TPA testing be carried out. The need for action would be based on the results of this testing.

For the alluvial/residual soils, whilst they are not considered ASS, they are acidic. Therefore it is recommended to consult the council if a management plan for acidic soils is required. Acidic soils are unlikely to cause significant harm to the environment, as the acid is unlikely to leach from acidic soils into other soils or waterways. However, if the soil itself is washed into waterways, then it could cause acidification of the water. Acidic soils can have a negative effect on vegetation growth, especially vegetation that is not native to Australia, and concrete footings can also be corroded by acidic soils.

Generally, two options for dealing with acidic soils may be considered. These include implementation of a sediment control plan which would prevent acidic soils from entering waterways, or treatment of the acidic soils with lime. The decision as to the option to adopt would depend on the need to implement a sediment control plan for the development anyway, and/or the volumes of materials that may be excavated and treated with lime.

The acidic soils could be treated with lime to increase the pH. A bulk density of 1.6t/m^3 has been assumed for the alluvial/residual soils. Using the Total Actual Acidity (TAA) results, the liming ratio requirements were assessed to be 10kg/m^3 to 13kg/m^3 of soil for all acidic soils excavated.

Good quality fine agricultural lime should be used to treat the excavated soils. In calculating the liming ratios, a factor of safety of 1.5 has been allowed (as recommended in the ASSMAC guidelines) above the theoretical requirement to take into account the rate of lime reactivity and the possibility of inhomogeneous mixing.

In addition, it is recommended that the alluvial/residual and alluvial soils be considered as having a severe exposure classification in respect to aggressivity to buried structural elements. The recommendations indicated in AS2159-1995, with respect to concrete piles (Table 6.1 of that document) should be adopted for foundations at the site.

As stated above, it is recommended that check testing of the alluvial soils and the acidic soils be carried out during the construction phase of work, to assess the liming rate and effectiveness of the liming.

6.6 Recommendations for Further Works

Further investigation works will be required during the design and construction phase of the development. The further work would likely include an assessment of alternative footing types and bearing pressures, and data to allow assessment of expected settlements, site classification for residences, and level 1 monitoring and testing during site earthworks.

7 LIMITATIONS

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

This report does not address issues relating to potentially hazardous building materials or services which may be present on the site.

For and on behalf of Coffey Geotechnics Pty Ltd



Greg Hackney

Associate Geotechnical Engineer
Coffs Harbour Office Manager



Alicia Zillman

Associate Environmental Engineer

Important information about your **Coffey** Environmental Site Assessment

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your environmental site assessment report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is 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. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal 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. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Your report will only give preliminary 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 cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is 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 with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Important information about your **Coffey** Environmental Site Assessment

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

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

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other 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 Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. 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. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal 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. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary 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 cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is 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 Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey 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.

Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

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 our reports 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 logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

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 Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

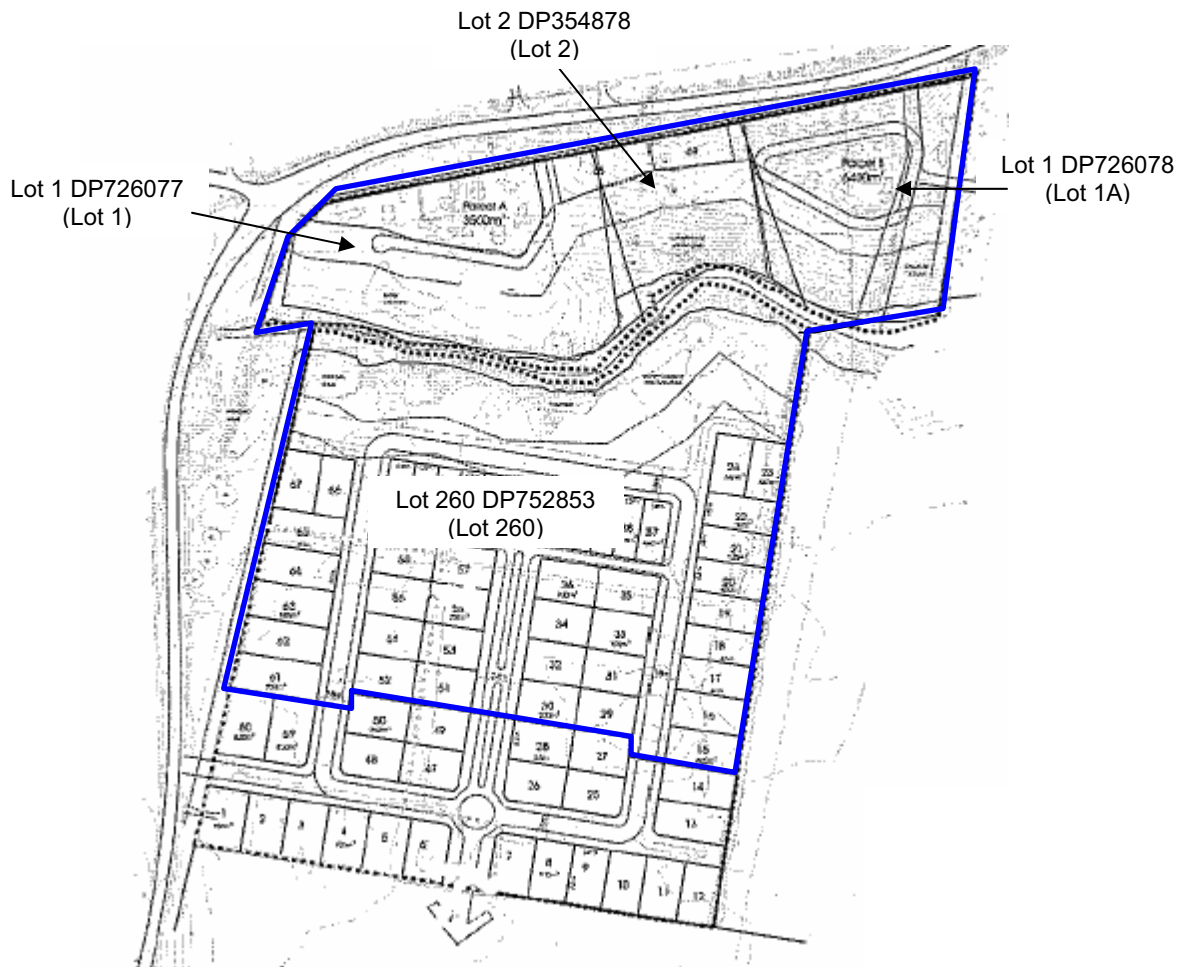
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is 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 Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.

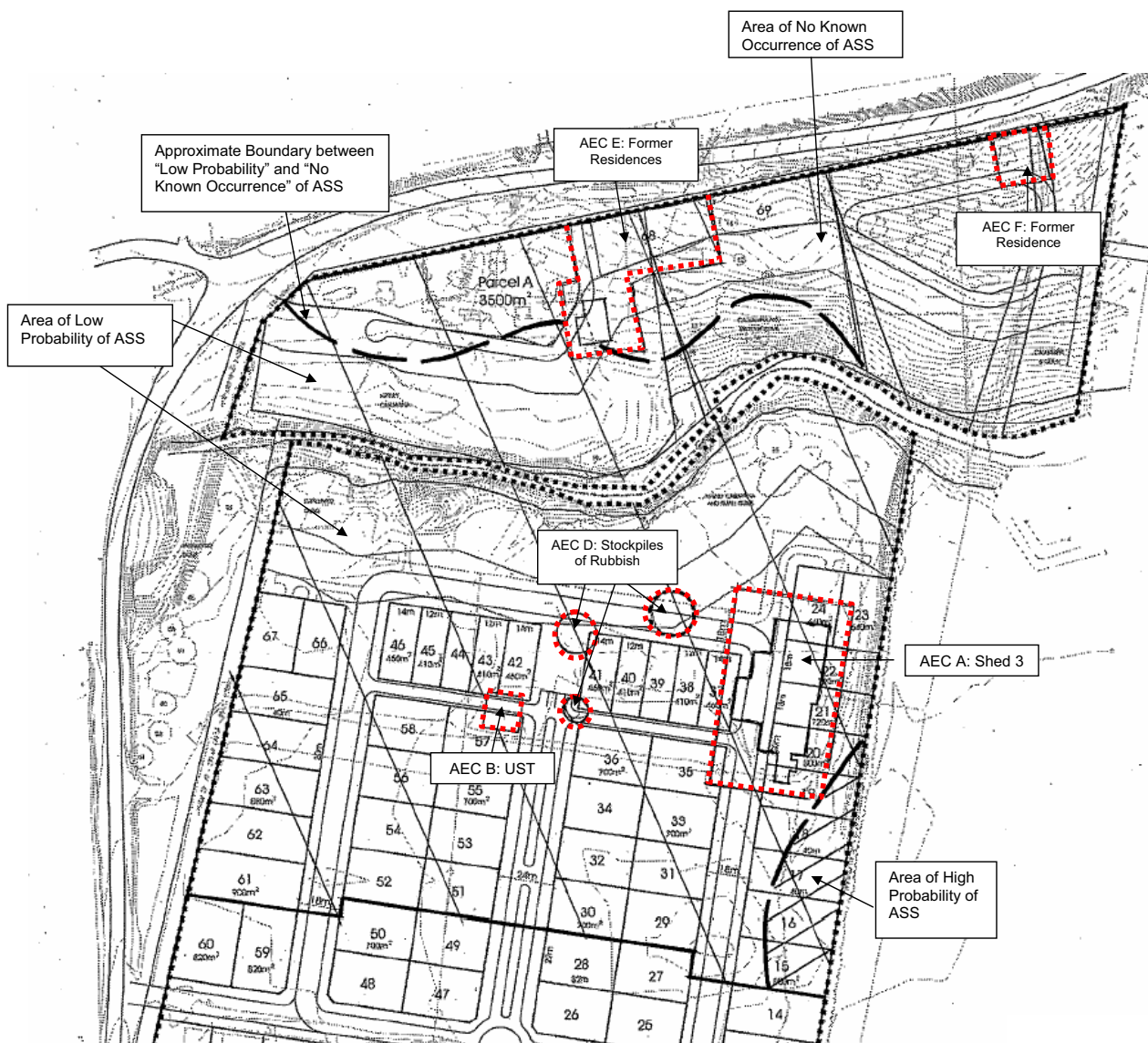
Figures



LEGEND:

 Approximate Boundary
of Stage 2 area

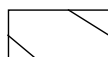
drawn	ELC	 SPECIALISTS MANAGING THE EARTH	client:	SANDY BEACH MILL PTY LTD	
approved	AZ		project:	PROPOSED SUBDIVISION GRAHAM DRIVE, SANDY BEACH NSW	
date	5/3/2007		title:	SITE PLAN SHOWING STAGE 2 AREA	
scale	~1:3000		project no:	GEOTCOFH01296AA-AO	figure no: FIGURE 1
original size	A4				



LEGEND:



Area of high probability of acid sulfate soils (ASS) within or at 1m of the ground surface



AEC C: Filled Areas



Approximate locations of AECs



Approximate Boundary between Low Probability of ASS at greater than 1 depth and No Known Occurrence of ASS

drawn	ELC
approved	AZ
date	5/3/2007
scale	~1:2000
original size	A3



client:	SANDY BEACH MILL PTY LTD
project:	PROPOSED SUBDIVISION GRAHAM DRIVE, SANDY BEACH NSW
title:	SITE PLAN SHOWING AECs AND ASS AREAS
project no:	GEOTCOFH01296AA-AO
figure no:	FIGURE 2



LEGEND:

-  Approximate location of groundwater wells
-  Approximate location of test pits
-  Approximate location of surface samples

drawn	ELC
approved	AZ
date	5/3/2007
scale	~1:1500
original size	A3



client:	SANDY BEACH MILL PTY LTD
project:	PROPOSED SUBDIVISION GRAHAM DRIVE, SANDY BEACH NSW
title:	SITE PLAN SHOWING INVESTIGATION LOCATIONS
project no:	GEOTCOFH01296AA-AO
figure no:	FIGURE 3

- — — Sawdust and timber, with and without soil.
- — — Soil materials, including Clay, Gravelly Clay and Sand.
- — — Rubbish and Soil. Rubbish includes charcoal, ash, scrap metal, plastic, concrete and sawdust. Some pits only have small amounts of rubbish.

drawn	ELC	 coffey geotechnics SPECIALISTS MANAGING THE EARTH	client: SANDY BEACH MILL PTY LTD	
approved	AZ		project: PROPOSED SUBDIVISION GRAHAM DRIVE, SANDY BEACH NSW	
date	5/3/2007		title: APPROXIMATE LOCATION AND TYPE OF UNIT 2 FILL	
scale	~1:1500		project no: GEOTCOFH01296AA-AO	
original size	A3		figure no: FIGURE 4	

Appendix A

ENGINEERING LOGS



Soil Description Explanation Sheet (1 of 2)

DEFINITION:

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 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.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

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 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

TERM	UNDRAINED STRENGTH S_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	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% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING	CEMENTING
Layers Continuous across exposure or sample.	Weakly cemented Easily broken up by hand in air or water.
Lenses Discontinuous layers of lenticular shape.	Moderately cemented Effort is required to break up the soil by hand in air or water.
Pockets Irregular inclusions of different material.	

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil Deposited by wind.

Alluvial soil Deposited by streams and rivers.

Colluvial soil Deposited on slopes (transported downslope by gravity).

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes.

Marine soil Deposited in ocean basins, bays, beaches and estuaries.

Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)				USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	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 all 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.				
	SILTS & CLAYS Liquid limit less than 50	DRY STRENGTH	DILATANCY	TOUGHNESS	
		None to Low	Quick to slow	None	ML SILT
		Medium to High	None	Medium	CL CLAY
	SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low	OL ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	MH SILT
		High	None	High	CH CLAY
		Medium to High	None	Low to medium	OH ORGANIC CLAY
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT

• Low plasticity – Liquid Limit W_L less than 35%. • Medium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM	TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.		TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.		TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.		INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.

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

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.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME Simple rock names are used rather than precise geological classification.

PARTICLE SIZE Grain size terms for sandstone are:

Coarse grained Mainly 0.6mm to 2mm

Medium grained Mainly 0.2mm to 0.6mm

Fine grained Mainly 0.06mm (just visible) to 0.2mm

FABRIC Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:

Massive No layering or penetrative fabric.

Indistinct Layering or fabric just visible. Little effect on properties.

Distinct Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	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 Material	XW	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	HW	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	MW	The whole of the rock substance is discoloured, usually by iron staining or bleaching, to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	SW	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	FR	Rock substance unaffected by weathering.

Notes on Weathering:

- AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
- Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbreviation	Point Load Index, I_{s50} (MPa)	Field Guide
Very Low	VL	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	L	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	EH	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

- In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
- The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
- The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (I_{s50}). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

COMMON DEFECTS IN ROCK MASSES		Diagram	Map Symbol	Graphic Log (Note 1)	DEFECT SHAPE	TERMS
Term	Definition				Planar	The defect does not vary in orientation
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.				Curved	The defect has a gradual change in orientation
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.				Undulating	The defect has a wavy surface
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.				Stepped	The defect has one or more well defined steps
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.				Irregular	The defect has many sharp changes of orientation
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.				Note: The assessment of defect shape is partly influenced by the scale of the observation.	
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.				ROUGHNESS TERMS	
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formed by weathering of the rock substance in place.				Slickensided	Grooved or striated surface, usually polished
					Polished	Shiny smooth surface
					Smooth	Smooth to touch. Few or no surface irregularities
					Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
					Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.
					COATING TERMS	
					Clean	No visible coating
					Stained	No visible coating but surfaces are discoloured
					Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
					Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.
					BLOCK SHAPE TERMS	
					Blocky	Approximately equidimensional
					Tabular	Thickness much less than length or width
					Columnar	Height much greater than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

Engineering Log - Piezometer

Client: **SANDY BEACH MILL**

Principal:

Project: **PROPOSED SUBDIVISION**Borehole Location: **REFER TO FIGURE 1**Borehole No. **BH1**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **18.9.2006**Date completed: **18.9.2006**Logged by: **ELC**

Checked by:

drill model & mounting: MD200 4WD				Easting:		slope: -90°		R.L. Surface: Not Measured					
hole diameter:				Northing:		bearing:		datum:					
drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT	1 2 3	N							SP CL CH	FILL: Sand, fine to medium grained, pale brown. FILL: Sandy Clay, medium plasticity, dark brown with some gravel. CLAY: medium plasticity, grey and red.	D M	VSt/St	FILL ALLUVIAL SOIL / FILL
							1						
							2						ALLUVIAL SOIL / RESIDUAL SOIL
							3		CH	Sandy CLAY: medium plasticity, grey with pale brown mottle, sand is fine to medium grained.		F	
							4					St	
							5		CH	CLAY: medium plasticity, brown with traces of fine grained gravel.			RESIDUAL SOIL
							6		GC	Clayey GRAVEL: fine to medium grained, brown, clay is medium plasticity. Borehole BH1 terminated at 5.7m due to TC-bit refusal Borehole terminated at 5.7m			EXTREMELY WEATHERED SILTSTONE
							7						
							8						
method AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool DT diatube B blank bit V V bit T TC bit TBX Tubex *bit shown by suffix e.g. ADT				support C casing N nil penetration 1 2 3 4  no resistance ranging to refusal water  10/1/98 water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test		classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			

Engineering Log - Piezometer

Client: **SANDY BEACH MILL**

Principal:

Project: **PROPOSED SUBDIVISION**Borehole Location: **REFER TO FIGURE 1**Borehole No. **BH2**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **18.9.2006**Date completed: **18.9.2006**Logged by: **ELC**

Checked by:

drill model & mounting: MD200 4WD				Easting:		slope: -90°		R.L. Surface: Not Measured				
hole diameter:				Northing:		bearing:		datum:				
drilling information				material substance								
method	penetration 1 2 3	support water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N				1		CL CH CH	FILL: Silty Clay, low plasticity, dark brown. FILL: Gravelly Clay, medium plasticity, orange-brown and pale brown, gravel is fine to medium grained. FILL: Clay, medium plasticity, yellow-brown and orange brown. CLAY: medium plasticity, grey-red.	D M	St	FILL
						2			Colour change to grey with pale brown mottle, traces of fine sand.			
						3		CH	Sandy CLAY: medium plasticity, grey, sand is fine to medium grained.		St	
						4						
						5		CH	CLAY: medium plasticity, orange-brown, some sand.			RESIDUAL SOIL?
						6			BH2 terminated due to limit of required investigation. Borehole terminated at 5.8m			
						7						
						8						
method AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool DT diatube B blank bit V V bit T TC bit TBX Tubex *bit shown by suffix e.g. ADT				support C casing N nil penetration 1 2 3 4  no resistance ranging to refusal water  10/1/98 water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test			classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	

Engineering Log - Piezometer

Client: **SANDY BEACH MILL**

Principal:

Project: **PROPOSED SUBDIVISION**Borehole Location: **REFER TO FIGURE 1**Borehole No. **BH3**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **18.9.2006**Date completed: **18.9.2006**Logged by: **ELC**

Checked by:

drill model & mounting: MD200 4WD				Easting:		slope: -90°		R.L. Surface: Not Measured											
hole diameter:				Northing:		bearing:		datum:											
drilling information				material substance															
method	penetration	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations						
ADT	1 2 3	N					1		CL	FILL: Clay, low plasticity, black, lots of ash. Organic content - buried timber	M/W	VS	FILL						
							2												
							3												
							4		CL	Sandy CLAY: low plasticity, pale grey and black, sand is fine to medium grained, some organics?	W		ALLUVIAL SOIL / RESIDUAL SOIL						
							5												
							6		CH	CLAY: medium plasticity, orange-brown.	M/D	H	RESIDUAL SOIL?						
							7												
							8			BH3 terminated due to limit of required investigation. Borehole terminated at 5.8m									
method AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool DT diatube B blank bit V V bit T TC bit TBX Tubex *bit shown by suffix e.g. ADT				support C casing N nil penetration 1 2 3 4  no resistance ranging to refusal water  10/1/98 water level on date shown  water inflow  water outflow				notes, samples, tests U ₅₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test				classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit W _L liquid limit				consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			

Engineering Log - Piezometer

Client: **SANDY BEACH MILL**

Principal:

Project: **PROPOSED SUBDIVISION**Borehole Location: **REFER TO FIGURE 1**Borehole No. **BH4**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **18.9.2006**Date completed: **18.9.2006**Logged by: **ELC**

Checked by:

drill model & mounting: MD200 4WD				Easting:		slope: -90°		R.L. Surface: Not Measured											
hole diameter:				Northing:		bearing:		datum:											
drilling information				material substance															
method	penetration	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations						
ADT	1 2 3	N					1		CH	CLAY: medium plasticity, orange-brown. Colour change to grey and orange-brown and red mottled.	M	St	ALLUVIAL SOIL / RESIDUAL SOIL						
							2					St/Vst							
							3		CL	Sandy CLAY: low to medium plasticity, grey, sand is fine to coarse grained.		St/MD							
							4		CH	CLAY: medium to high plasticity, grey-red.		Vst							
							5		CH	CLAY: medium to high plasticity, red-brown			RESIDUAL SOIL?						
							6			BH4 terminated due to limit of required investigation. Borehole terminated at 5.8m									
							7												
							8												
method AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool DT diatube B blank bit V V bit T TC bit TBX Tubex *bit shown by suffix e.g. ADT				support C casing N nil penetration 1 2 3 4  no resistance ranging to refusal water  10/1/98 water level on date shown  water inflow  water outflow				notes, samples, tests U ₅₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test				classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit				consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			

Engineering Log - Piezometer

Client: **SANDY BEACH MILL**

Principal:

Project: **PROPOSED SUBDIVISION**Borehole Location: **REFER TO FIGURE 1**Borehole No. **BH5**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **18.9.2006**Date completed: **18.9.2006**Logged by: **ELC**

Checked by:

drill model & mounting: MD200 4WD		Easting:		slope: -90°		R.L. Surface: Not Measured			
hole diameter:		Northing:		bearing:		datum:			
drilling information				material substance					
method	penetration 1 2 3	support water	notes samples, tests, etc	well details	RL	depth metres	structure and additional observations		
ADT		N							
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
method AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool DT diatube B blank bit V V bit T TC bit TBX Tubex *bit shown by suffix e.g. ADT				support C casing N nil penetration 1 2 3 4  no resistance ranging to refusal water  10/1/98 water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test		classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Borehole No. **BH6**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**

Client: **SANDY BEACH MILL**

Date started: **18.9.2006**

Principal:

Date completed: **18.9.2006**

Project: ***PROPOSED SUBDIVISION***

Logged by: **ELC**

Borehole Location: **REFER TO FIGURE 1**

Checked by:

drill model & mounting:MMD200 4WD										Easting:		slope: -90°		R.L. Surface: Not Measured			
hole diameter:										Northing:		bearing:		datum:			
drilling information										material substance							
method		penetration			support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations	
1	2	3															
ADT				N								CH	FILL: Clay, medium plasticity, orange-brown and yellow-brown, some sand and gravel.	M		FILL	
										1		CH	CLAY: medium plasticity, orange-brown. Colour change to grey-red mottle.		St/VSt	ALLUVIAL SOIL / RESIDUAL SOIL	
										2							
										3							
												CH	CLAY: medium plasticity, grey with some fine to medium grained sand.	M/W			
												CH	Sandy CLAY: medium plasticity, orange brown, sand is fine to coarse grained.				
										4		CH	CLAY: medium plasticity, grey, traces of some fine to medium grained sand.	M			
												CH	CLAY: high plasticity, grey and pale brown mottle. Colour change to pale brown.		H	RESIDUAL SOIL?	
										5							
										6							
										7							
										8			BH6 terminated due to limit of required investigation. Borehole terminated at 7.5m				
method		support				notes, samples, tests				classification symbols and soil description				consistency/density index			
AS AD RR W CT DT B V T TBX *bit shown by suffix e.g. ADT		C casing N nil				U ₃₀ undisturbed sample 50mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone P pressure meter Bs bulk sample R refusal E environmental sample PID PID measurement WS water sample PZ piezometer ALT air lift test				based on unified classification system				VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			
		penetration 1 2 3 4  no resistance ranging to refusal								moisture D dry M moist W wet Wp plastic limit W _L liquid limit							
		water  10/1/98 water level on date shown  water inflow  water outflow															

Engineering Log - Excavation

Excavation No. **TP101**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					GP	FILL: Clayey Gravel, fine to coarse grained, pale orange brown, clay is medium to high plasticity	M/D		100 200 300 400	FILL
					NONE OBSERVED		0.5		CH	CLAY: medium to high plasticity, orange brown		VSt/Fb		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0			Colour change to grey / red brown.		H/Fb		
							1.5							
							2.0							
							2.5			TP101 terminated at 2.0m due to limit of required investigation. Test pit TP101 terminated at 2m				
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP102**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED	
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:		
excavation information				material substance		
method	penetration	support	water	notes samples, tests, etc	depth RL metres	material
1 2 3						
E		N		E	0.5	CH FILL: Clay and Sawdust CH FILL: Clay, medium plasticity, grey / red brown ML Clayey SILT: low plasticity, grey CH CLAY: medium to high plasticity, orange brown
		NONE OBSERVED			1.0	TP102 terminated at 0.9m due to limit of required investigation. Test pit TP102 terminated at 0.9m
					1.5	
					2.0	
					2.5	
					3.0	
					3.5	
					4.0	

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP103**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	E		E			CH	FILL: Clay and Sawdust, brown / black CLAY: medium to high plasticity, orange brown	D	VSt	100 200 300 400	FILL ALLUVIAL SOIL / RESIDUAL SOIL
				NONE OBSERVED			0.5				M	H	600	
							1.0			TP103 terminated at 0.8m due to limit of required investigation. Test pit TP103 terminated at 0.8m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP104**

Sheet 1 of 1

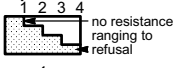
Project No: **GEOTCOFH01296AA**Date started: **12.10.2006**Date completed: **12.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: **MINI EXCAVATOR** Pit Orientation: Easting: **m** R.L. Surface: **NOT MEASURED**
 excavation dimensions: **2m long 0.45m wide** Northing: **m** datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N			RL							100 200 300 400	
				NONE OBSERVED						CH	FILL: Gravelly Clay, medium plasticity, brown / dark brown / red brown, gravel is fine to coarse grained	M			FILL
					E						FILL: Sawdust and Timber, brown / dark brown Rotting organics odour.				
										CH	CLAY: medium to high plasticity, grey		VSt		ALLUVIAL SOIL
											TP104 terminated at 1.6m due to limit of required investigation. Test pit TP104 terminated at 1.6m				

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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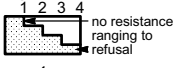
Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**
 Principal:
 Project: **PROPOSED SUBDIVISION - SANDY BEACH**
 Test pit location: **REFER TO FIGURE 1**

Excavation No. **TP105**
 Sheet 1 of 1
 Project No: **GEOTCOFH01296AA**
 Date started: **12.10.2006**
 Date completed: **12.10.2006**
 Logged by: **ELC**
 Checked by:

equipment type and model: MINI EXCAVATOR				Pit Orientation:				Easting: m				R.L. Surface: NOT MEASURED			
excavation dimensions: 2m long 0.45m wide				Northing: m				datum:							
excavation information								material substance							
method	penetration			support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations	
E	1	2	3	N		E			GC	FILL: Clayey Gravel, fine to medium grained, brown, clay is medium plasticity FILL: Sawdust, dark brown	D				FILL
							0.5		GC	FILL: Clayey Gravel, clay is medium plasticity	M	VD			
							1.0		CH	CLAY: medium to high plasticity, grey / red brown		H		X	
							1.5			TP105 terminated at 1.2m due to limit of required investigation. Test pit TP105 terminated at 1.2m					
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**
Principal:
Project: **PROPOSED SUBDIVISION - SANDY BEACH**
Test pit location: **REFER TO FIGURE 1**

Excavation No. **TP106**
Sheet 1 of 1
Project No: **GEOTCOFH01296AA**
Date started: **12.10.2006**
Date completed: **12.10.2006**
Logged by: **ELC**
Checked by:

equipment type and model: **MINI EXCAVATOR** Pit Orientation: Easting: m R.L. Surface: **NOT MEASURED**
excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CH	FILL: Gravelly Clay, medium plasticity, orange brown / brown, gravel is fine to medium grained, some sand at surface	M		100 200 300 400	FILL
							0.5		CL	Silty CLAY: low to medium plasticity, grey				ALLUVIAL SOIL
				NONE OBSERVED			1.0		CH	CLAY: medium to high plasticity, orange brown			X	ALLUVIAL SOIL / RESIDUAL SOIL
							1.5			TP106 terminated at 1.0m due to limit of required investigation. Test pit TP106 terminated at 1m				
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP107**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **12.10.2006**Date completed: **12.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N		E				FILL: Sawdust and Clayey Silt, dark brown	M			FILL
						E	0.5		SP	FILL: Sand, fine to medium grained, pale brown				
						E			GL	FILL: Clayey Gravel, fine to medium grained, grey, clay is medium plasticity	W			
						E	1.0		CH	CLAY: medium plasticity, dark brown TP107 terminated at 1.0m due to limit of required investigation. Test pit TP107 terminated at 1m	M			ALLUVIAL SOIL / RESIDUAL SOIL
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP108**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

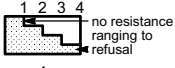
Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N						FILL: Sawdust and Clay, medium plasticity, brown	M		100 200 300 400	FILL
							0.5		CH	FILL: Gravelly Clay, medium plasticity, brown / orange brown, gravel is fine to medium grained				
									CL	Silty CLAY: low to medium plasticity, grey		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0							
										Colour change to grey / red brown mottled.		H		
							1.5							
							2.0							
							2.5			TP108 terminated at 2.0m due to limit of required investigation. Test pit TP108 terminated at 2m				
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP109**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR				Pit Orientation:				Easting: m		R.L. Surface: NOT MEASURED					
excavation dimensions: 2m long 0.45m wide								Northing: m		datum:					
excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth RL metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations
E	1	2	3	N		E				CL	FILL: Sandy Clay, low to medium plasticity, brown / orange brown, some timber	D			FILL
							0.5			CH	FILL: Gravelly Clay, medium plasticity, orange brown, gravel is fine to medium grained				
							1.0								
							1.5			CL	Silty CLAY: medium plasticity, grey / red brown mottled	M	VSt/H		ALLUVIAL SOIL / RESIDUAL SOIL
						D									
							2.0								
						D									
							2.5				TP109 terminated at 2.0m due to limit of required investigation. Test pit TP109 terminated at 2m				
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP110**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR				Pit Orientation:		Easting: m		R.L. Surface: NOT MEASURED						
excavation dimensions: 2m long 0.45m wide						Northing: m		datum:						
excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N						soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
						E			CL	FILL: Gravelly Clay, low to medium plasticity, brown, gravel is fine to coarse grained, some sawdust	D			FILL
						D	0.5		CL	Silty CLAY: low to medium plasticity, grey		H/Fb		ALLUVIAL SOIL
						D	1.0		CH	CLAY: medium to high plasticity, grey / red brown	M	H/VSt		ALLUVIAL SOIL / RESIDUAL SOIL
						D	1.5							
						D	2.0							
							2.5			TP110 terminated at 2.0m due to limit of required investigation. Test pit TP110 terminated at 2m				
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	
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Engineering Log - Excavation

Excavation No. **TP111**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N	NONE OBSERVED		0.5		CH	FILL: Gravelly Clay, medium plasticity, orange brown / brown, gravel is fine to medium grained, some bitumen fragments	D		100 200 300 400	FILL
					E		1.0		CH	FILL: Clay and Sawdust, medium plasticity, brown and grey	M			
									CL	FILL: Clay, medium plasticity, grey				
									CL	Silty CLAY: low to medium plasticity, grey				ALLUVIAL SOIL
							1.5			TP111 terminated at 1.3m due to limit of required investigation. Test pit TP111 terminated at 1.3m				
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP112**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
E	1 2 3	N	water	E			CH	FILL: Gravelly Clay, medium plasticity, brown / grey / orange brown, gravel is fine to coarse grained	D			FILL
		NONE OBSERVED			0.5		CL	Silty CLAY: low to medium plasticity, grey	M	VSt		ALLUVIAL SOIL
				Bs	1.0			TP112 terminated at 0.9m due to limit of required investigation. Test pit TP112 terminated at 0.9m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP113**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N										

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP114**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

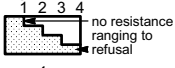
Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N	D	E			CL	FILL: Clay, low to medium plasticity, brown	D		100 200 300 400	FILL
				NONE OBSERVED			0.5		CL	Silty CLAY: medium plasticity, grey	M/D	VSt		ALLUVIAL SOIL
							1.0			TP114 terminated at 0.6m due to limit of required investigation. Test pit TP114 terminated at 0.6m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP115**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **12.10.2006**Date completed: **12.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CL	Silty CLAY: low to medium plasticity, grey, thin layer of topsoil at surface	D			ALLUVIAL SOIL
									CH	CLAY: medium to high plasticity, dark brown	D/M	H		ALLUVIAL SOIL / RESIDUAL SOIL
							0.5			TP115 terminated at 0.3m due to limit of required investigation. Test pit TP115 terminated at 0.3m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP116**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

Principal:

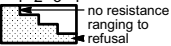
Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N		E			CH CH	FILL: Gravelly Clay, medium plasticity, brown, gravel is fine to medium grained CLAY: medium to high plasticity, orange brown TP116 terminated at 0.3m due to limit of required investigation. Test pit TP116 terminated at 0.3m	D D/M	VSt		FILL ALLUVIAL SOIL / RESIDUAL SOIL
							0.5							
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP117**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **12.10.2006**

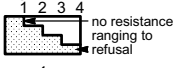
Principal:

Date completed: **12.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N		E			ML	TOPSOIL: Clayey Silt, low plasticity, dark brown	M/D			TOPSOIL / FILL?
				D	0.5		CH	CLAY: medium plasticity, grey / orange brown	M	VSt		ALLUVIAL SOIL / RESIDUAL SOIL
				Bs				Colour change to grey / orange brown / red brown.				
				D	1.0							
				D	1.5							
				D	2.0							
				D	2.5			TP117 terminated at 2.0m due to limit of required investigation. Test pit TP117 terminated at 2m				
					3.0							
					3.5							
					4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP118**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **13.10.2006**Date completed: **13.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N	E				ML CL	TOPSOIL: Clayey Silt, low plasticity, dark brown Silty CLAY: medium plasticity, orange brown				TOPSOIL ALLUVIAL SOIL / RESIDUAL SOIL
							0.5			TP118 terminated at 0.3m due to limit of required investigation. Test pit TP118 terminated at 0.3m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP119**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR				Pit Orientation:		Easting: m		R.L. Surface: NOT MEASURED						
excavation dimensions: 2m long 0.45m wide				Northing: m		datum:								
excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations
E	1	2	3	N		E				FILL: Clay and Sawdust, brown / black	M			FILL
						D	0.5		CL	Silty CLAY: low to medium plasticity, grey	M/D	St/Fb		ALLUVIAL SOIL
						Bs	1.0		CH	CLAY: medium plasticity, orange brown	M	H/Fb		ALLUVIAL SOIL / RESIDUAL SOIL
						D	1.5			Colour change to grey / red brown.				
						D	2.0							
							2.5			TP119 terminated at 2.0m due to limit of required investigation. Test pit TP119 terminated at 2m				
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	
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Engineering Log - Excavation

Excavation No. **TP120**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N	D	E	RL				soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
				NONE OBSERVED					ML CL	TOPSOIL: Clayey Silt, low plasticity, dark brown Silty CLAY: medium plasticity, grey					TOPSOIL ALLUVIAL SOIL
							0.5				TP120 terminated at 0.25m due to limit of required investigation. Test pit TP120 terminated at 0.25m				
							1.0								
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP121**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

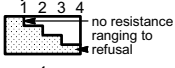
Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N					CH	FILL: Sandy Clay, medium plasticity, brown, sand is fine to medium grained	M			FILL
					E		0.5			FILL: Clay and Sawdust, dark brown				
									CH	FILL: Clay, medium plasticity, orange brown				
									CL	Silty CLAY: low to medium plasticity, grey	M/D	St/Fb		ALLUVIAL SOIL
							1.0			TP121 terminated at 0.75m due to limit of required investigation. Test pit TP121 terminated at 0.75m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration  water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP122**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

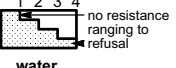
Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance												
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations		
E	1	2	3	N						GC	FILL: Clayey Gravel / Gravelly Clay, fine to medium grained, orange brown, clay is medium plasticity, some timber and metal pieces	M			FILL		
					E		0.5										
									CL	Silty CLAY: medium plasticity, grey				St			ALLUVIAL SOIL
				NONE OBSERVED			1.0				TP122 terminated at 0.7m due to limit of required investigation. Test pit TP122 terminated at 0.7m						
							1.5										
							2.0										
							2.5										
							3.0										
							3.5										
							4.0										

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP123**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations	
E	1	2	3	N										100 200 300 400		
						E				CH	FILL: Gravelly Clay, medium plasticity, orange brown	D			FILL	
							0.5			ML	TOPSOIL: Clayey Silt, low plasticity, dark brown	M			TOPSOIL	
										CL	Silty CLAY: low to medium plasticity, grey	D/M			ALLUVIAL SOIL	
						D				CH	CLAY: medium plasticity, orange brown	M	VSt/H		ALLUVIAL SOIL / RESIDUAL SOIL	
					Bs		1.0									
					D											
							1.5					Colour change to grey / red brown.				
					D											
					D		2.0									
							2.5				TP123 terminated at 2.0m due to limit of required investigation. Test pit TP123 terminated at 2m					
							3.0									
							3.5									
							4.0									

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP124**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **13.10.2006**Date completed: **13.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: **MINI EXCAVATOR** Pit Orientation: Easting: **m** R.L. Surface: **NOT MEASURED**
 excavation dimensions: **2m long 0.45m wide** Northing: **m** datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E				ML	TOPSOIL: Clayey Silt, low plasticity, dark brown, some fine to medium grained gravel	M			TOPSOIL
							0.5			CL	Silty CLAY: low to medium plasticity, grey		St		ALLUVIAL SOIL
										CH	CLAY: medium plasticity, orange brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
				NONE OBSERVED							TP124 terminated at 0.5m due to limit of required investigation. Test pit TP124 terminated at 0.5m				
							1.0								
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP125**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CL	FILL: Silty Clay and Clay, medium plasticity, dark brown / orange brown	M			FILL
									CH	CLAY: medium plasticity, orange brown				ALLUVIAL SOIL / RESIDUAL SOIL
				NONE OBSERVED			0.5			TP125 terminated at 0.4m due to limit of required investigation. Test pit TP125 terminated at 0.4m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP126**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E				GC	FILL: Gravelly Clay / Clayey Gravel	D		100 200 300 400	FILL
				NONE OBSERVED			0.5			ML CL	TOPSOIL: Clayey Silt, low plasticity, dark brown Silty CLAY: medium plasticity, grey	M			TOPSOIL ALLUVIAL SOIL
							1.0				TP126 terminated at 0.75m due to limit of required investigation. Test pit TP126 terminated at 0.75m				
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP127**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
E	1 2 3	E	water	E			GC	FILL: Clayey Gravel / Gravelly Clay, fine to medium grained, orange brown, clay is medium plasticity	D			FILL
		NONE OBSERVED			0.5		CL	Silty CLAY: low to medium plasticity, grey	M/D	St/VSt		ALLUVIAL SOIL
					1.0			TP127 terminated at 0.5m due to limit of required investigation. Test pit TP127 terminated at 0.5m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP128**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **13.10.2006**Date completed: **13.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: **MINI EXCAVATOR** Pit Orientation: Easting: m R.L. Surface: **NOT MEASURED**
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N	NONE OBSERVED	E				GC	FILL: Clayey Gravel / Gravelly Clay, fine to medium grained, brown, clay is medium plasticity	D	VD		FILL
						Bs	0.5			CL	Silty CLAY: low to medium plasticity, grey, some organics	M/D	St/VSt/Fb		ALLUVIAL SOIL
							1.0			CH	CLAY: medium plasticity, orange brown	M	H/VSt?		ALLUVIAL SOIL / RESIDUAL SOIL
						D	1.5				Colour change to grey / red brown.				
						D	2.0								
							2.5				TP128 terminated at 2.0m due to limit of required investigation. Test pit TP128 terminated at 2m				
							3.0								
							3.5								
						4.0									

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Excavation No. **TP129**

Engineering Log - Excavation

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **13.10.2006**

Principal:

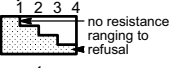
Date completed: **13.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 10m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CH	FILL: Gravelly Clay, medium plasticity, orange brown	M		100	FILL
							0.5		CH	FILL: Clay, medium plasticity, orange brown / grey			200	
										Pipe - fuel odour.			300	
							1.0		CH	CLAY: medium plasticity, grey / red brown			400	ALLUVIAL SOIL / RESIDUAL SOIL
							1.5			Slight odour - stronger where there is moisture.				
							2.0			TP129 terminated at 1.85m due to limit of required investigation. Test pit TP129 terminated at 1.85m				
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration  water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP130**

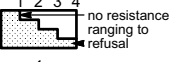
Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 15m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N	NONE OBSERVED		0.5		GC	FILL: Clayey Gravel, fine to medium grained, brown	M			FILL
							CH	FILL: Clay, medium plasticity, brown / grey, some gravel				
					1.0			Pipe at about 0.7m.				
								TP130 terminated at 0.8m due to limit of required investigation.				
								Test pit TP130 terminated at 0.8m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Excavation No. **TP131**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR				Pit Orientation:		Easting: m		R.L. Surface: NOT MEASURED						
excavation dimensions: 2m long 0.45m wide				Northing: m		datum:								
excavation information					material substance									
method	penetration 1 2 3			support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E				N					CH	FILL: Clay, medium plasticity, brown / red brown, some gravel	M			FILL
					NONE OBSERVED		0.5		CH	CLAY: medium plasticity, grey / red brown		VSt/H		ALLUVIAL SOIL / RESIDUAL SOIL
						E	1.0							
						E	1.5							
						E	2.0			TP131 terminated at 2.0m due to limit of required investigation. Test pit TP131 terminated at 2m				
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	
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Engineering Log - Excavation

Excavation No. **TP132**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			GC	FILL: Clayey Gravel / Gravelly Clay, fine to coarse grained, brown, clay is medium plasticity	M			FILL
				NONE OBSERVED			0.5		CH	CLAY: medium plasticity, orange red		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0			TP132 terminated at 0.65m due to limit of required investigation. Test pit TP132 terminated at 0.65m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP133**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E				FILL: Sawdust, Ash and Clay	M			FILL
							0.5		CL	Silty CLAY: low to medium plasticity, grey		St		ALLUVIAL SOIL
				NONE OBSERVED					CH	CLAY: medium plasticity, orange brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0			TP133 terminated at 0.5m due to limit of required investigation. Test pit TP133 terminated at 0.5m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP134**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
E	1 2 3	N	NONE OBSERVED	E	0.5		CL	FILL: Sawdust, Clay and Ash, dark brown / black				FILL
					1.0			Silty CLAY: low to medium plasticity, grey				ALLUVIAL SOIL
					1.5			TP134 terminated at 0.6m due to limit of required investigation.				
					2.0			Test pit TP134 terminated at 0.6m				
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Excavation No. **TP135**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CH	FILL: Clay, Ash and Sawdust, black / dark brown FILL: Clay, medium plasticity, red / brown	M		100 200 300 400	FILL
					NONE OBSERVED		0.5		CH	FILL: Clay, brown / grey		VS		
							1.0			Area of Sawdust / Clay from 1.1m to 1.3m.				
					E									
					E		1.5							
									CH	CLAY: medium plasticity, red / brown TP135 terminated at 1.6m due to limit of required investigation. Test pit TP135 terminated at 1.6m				ALLUVIAL SOIL / RESIDUAL SOIL
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Excavation No. **TP136**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**

Client: **SANDY BEACH MILL PTY LTD**

Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**

Project: **PROPOSED SUBDIVISION - SANDY BEACH**

Logged by: **ELC**

Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model:		MINI EXCAVATOR		Pit Orientation:		Easting: m		R.L. Surface:		NOT MEASURED				
excavation dimensions:		2m long 0.45m wide		Northing:		m		datum:						
excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations
E	1	2	3	N		E				FILL: Sawdust	M			FILL
									CL	Silty CLAY: medium plasticity, grey / pale brown		St		ALLUVIAL SOIL
							0.5			TP136 terminated at 0.4m due to limit of required investigation. Test pit TP136 terminated at 0.4m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method		support	notes, samples, tests	classification symbols and soil description	consistency/density index
N	natural exposure	S shoring N nil	U ₅₀ undisturbed sample 50mm diameter	based on unified classification system	VS very soft
X	existing excavation		U ₆₃ undisturbed sample 63mm diameter		S soft
BH	backhoe bucket		D disturbed sample	F firm	
B	bulldozer blade		V vane shear (kPa)	St stiff	
R	ripper		Bs bulk sample	VSt very stiff	
E	excavator		E environmental sample	H hard	
			R refusal	M moist	Fb friable
				W wet	VL very loose
				Wp plastic limit	L loose
				WL liquid limit	MD medium dense
					D dense
					VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP137**

Sheet 1 of 1

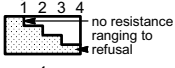
Project No: **GEOTCOFH01296AA**Date started: **16.10.2006**Date completed: **16.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N		E				FILL: Clay, Sawdust and Gravel, some timber	M			FILL
				NONE OBSERVED			0.5		CL	Silty CLAY: low to medium plasticity, grey		St		ALLUVIAL SOIL
							1.0			TP137 terminated at 0.5m due to limit of required investigation. Test pit TP137 terminated at 0.5m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP138**

Engineering Log - Excavation

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

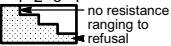
Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CH	FILL: Sawdust and Clay, brown FILL: Clay, medium plasticity, red brown / grey	M		100 200 300 400	FILL
					NONE OBSERVED		0.5							
					E		1.0			FILL: Rubbish, old fire remains - charcoal, ash and timber, wire, steel post, metal sheet, car towbar				
							1.5			TP138 terminated at 1.5m due to refusal on large concrete sheet. Test pit TP138 terminated at 1.5m				
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP139**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N	E					FILL: Sawdust and Clay, brown	M			FILL
				NONE OBSERVED			0.5		CH	CLAY: medium plasticity, orange brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0			TP139 terminated at 0.5m due to limit of required investigation. Test pit TP139 terminated at 0.5m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP140**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR					Pit Orientation:					Easting: m					R.L. Surface: NOT MEASURED				
excavation dimensions: 2m long 0.45m wide					Northing: m					datum:									
excavation information						material substance													
method	penetration			support	water	notes samples, tests, etc	depth RL metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations				
	1	2	3																
E				N							FILL: Sawdust, Clay and Timer, brown / red brown FILL: Sawdust, red brown	M			FILL				

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	
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Engineering Log - Excavation

Excavation No. **TP141**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					ML	FILL: Clayey Silt, brown, some sawdust and timber	D/M		100 200 300 400	FILL
						E	0.5							
							1.0		CL	FILL: Clay, low to medium plasticity, grey, some gravel FILL: Clay, Charcoal and Ash	M			
							1.5		CH	CLAY: medium plasticity, orange brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							2.0			TP141 terminated at 1.5m due to limit of required investigation. Test pit TP141 terminated at 1.5m				
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP142**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N	water	E			CH	FILL: Gravelly Clay, medium plasticity, pale brown	D			FILL
		NONE OBSERVED			0.5		CH	CLAY: medium plasticity, grey / red brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
					1.0			TP142 terminated at 0.75m due to limit of required investigation. Test pit TP142 terminated at 0.75m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water  water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Excavation No. **TP143**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CH	FILL: Gravelly Clay, medium plasticity, brown	M		100 200 300 400	FILL
									CH	CLAY: medium plasticity, brown				ALLUVIAL SOIL / RESIDUAL SOIL
							0.5			TP143 terminated at 0.3m due to limit of required investigation. Test pit TP143 terminated at 0.3m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP144**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED						
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:							
excavation information				material substance							
method	penetration 1 2 3	support water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations
E		N	E	0.5		SP	FILL: Gravelly Sand, one glass bottle, one old gas can	M			FILL
		NONE OBSERVED		1.0			Pieces of concrete.				
			D	1.5		CL	Silty CLAY: low plasticity, grey, one shell Colour change to grey / brown at 1.25m.				ALLUVIAL SOIL
			D	2.0							
			D	2.5			TP144 terminated at 2.0m due to limit of required investigation. Test pit TP144 terminated at 2m				
				3.0							
				3.5							
				4.0							
Sketch											
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water  water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP145**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **16.10.2006**Date completed: **16.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations	
	1	2	3												
E				N							M				FILL
							0.5								
												St			
							1.0			TP145 terminated at 0.8m due to limit of required investigation. Test pit TP145 terminated at 0.8m					
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP146**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **16.10.2006**Date completed: **16.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CH	FILL: Gravelly Clay, medium plasticity, orange brown A few glass bottles.	M		100 200 300 400	FILL
					NONE OBSERVED		0.5							
					E		1.0							
							1.5		CL	Silty CLAY: medium plasticity, grey TP146 terminated at 1.5m due to limit of required investigation. Test pit TP146 terminated at 1.5m		St		ALLUVIAL SOIL
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP147**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	notes samples, tests, etc	depth RL	metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
E	1 2 3	N			0.5			FILL: Clay, Ash and Charcoal, black	M			FILL
					1.0			Some large timber planks. A few pieces of steel/iron, one large chisel.				
					1.5							
			E		2.0							
					2.5							
					3.0			TP147 terminated due to refusal on timber? Test pit TP147 terminated at 2.5m				
					3.5							
					4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP148**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

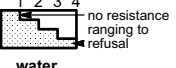
Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N						CH	FILL: Gravelly Clay, medium plasticity, brown	M	VD	100 200 300 400	FILL
					E		0.5		GC	FILL: Clayey Gravel, red brown					
							1.0		CH	FILL: Clay, medium plasticity, grey / brown					
									CL	Silty CLAY: medium plasticity, grey		St			ALLUVIAL SOIL
							1.5				TP148 terminated at 1.4m due to limit of required investigation. Test pit TP148 terminated at 1.4m				
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP149**

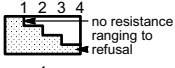
Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **16.10.2006**

Principal:

Date completed: **16.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations	
E	1 2 3	N	NONE OBSERVED	0.5		CH	FILL: Gravelly Clay, medium plasticity, brown, gravel is fine to coarse grained	M			FILL	
				1.0				FILL: Clay and Charcoal, black, large timber pieces				
			E	1.5								
				2.0		CL	Silty CLAY: medium plasticity, grey, root fibres observed		St		ALLUVIAL SOIL	
				2.5			TP149 terminated at 2.1m due to limit of required investigation. Test pit TP149 terminated at 2.1m					
				3.0								
				3.5								
				4.0								
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP150**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E				CH	FILL: Gravelly Clay, medium plasticity, orange brown / pale brown	M			FILL
										CH	CLAY: medium plasticity, grey / brown		St		ALLUVIAL SOIL
				NONE OBSERVED			0.5				TP150 terminated at 0.4m due to limit of required investigation. Test pit TP150 terminated at 0.4m				
							1.0								
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP151**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **17.10.2006**

Principal:

Date completed: **17.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
E	1 2 3	N	water	E			CH	FILL: Gravelly Clay, medium plasticity, brown, gravel is fine to coarse grained	M		100 200 300 400 kPa	FILL
		NONE OBSERVED		Bs	0.5		CH	CLAY: medium plasticity, brown / red brown		H		ALLUVIAL SOIL / RESIDUAL SOIL
					1.0			TP151 terminated at 0.5m due to limit of required investigation. Test pit TP151 terminated at 0.5m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Excavation No. **TP152**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**

Client: **SANDY BEACH MILL PTY LTD**

Date started: **17.10.2006**

Principal:

Date completed: **17.10.2006**

Project: **PROPOSED SUBDIVISION - SANDY BEACH**

Logged by: **ELC**

Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model:				MINI EXCAVATOR				Pit Orientation:				Easting: m				R.L. Surface: NOT MEASURED			
excavation dimensions:				2m long 0.45m wide				Northing: m				datum:							
excavation information							material substance												
method	penetration			support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations					
E	1	2	3	N		E			GP	FILL: Sandy Gravel, fine to coarse grained, grey	W			FILL					
									CH	CLAY: medium plasticity, orange brown	M	VSt		ALLUVIAL SOIL / RESIDUAL SOIL					
					NONE OBSERVED		0.5			TP152 terminated at 0.4m due to limit of required investigation. Test pit TP152 terminated at 0.4m									
							1.0												
							1.5												
							2.0												
							2.5												
							3.0												
							3.5												
							4.0												

Sketch

method		support	notes, samples, tests	classification symbols and soil description	consistency/density index
N	natural exposure	S shoring N nil	U ₅₀ undisturbed sample 50mm diameter	based on unified classification system	VS very soft
X	existing excavation		U ₆₃ undisturbed sample 63mm diameter		S soft
BH	backhoe bucket		D disturbed sample	F firm	
B	bulldozer blade		V vane shear (kPa)	St stiff	
R	ripper		Bs bulk sample	VS _t very stiff	
E	excavator		E environmental sample	D dry	H hard
			R refusal	M moist	Fb friable
				W wet	VL very loose
				W _p plastic limit	L loose
				W _L liquid limit	MD medium dense
					D dense
					VD very dense

Engineering Log - Excavation

Excavation No. **TP153**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **17.10.2006**

Principal:

Date completed: **17.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N	water	E			CH	FILL: Gravelly Clay, medium plasticity, dark brown Colour change to orange brown at 0.1m.	M			FILL
		N	water		0.5		CL	Silty CLAY: low to medium plasticity, grey				ALLUVIAL SOIL
		NONE	water		1.0			TP153 terminated at 0.55m due to limit of required investigation. Test pit TP153 terminated at 0.55m				
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP154**

Sheet 1 of 1

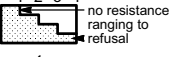
Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E				SP	FILL: Gravelly Sand, fine to coarse grained, brown, some clay	M			FILL
										CL	Silty CLAY: low to medium plasticity, grey		St		ALLUVIAL SOIL
				NONE OBSERVED			0.5				TP154 terminated at 0.4m due to limit of required investigation. Test pit TP154 terminated at 0.4m				
							1.0								
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP155**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **17.10.2006**

Principal:

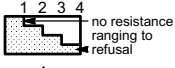
Date completed: **17.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CH	FILL: Sandy Clay, medium plasticity, brown	M			FILL
				NONE OBSERVED			0.5		CH	CLAY: medium plasticity, red / brown		St/VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.0			TP155 terminated at 0.5m due to limit of required investigation. Test pit TP155 terminated at 0.5m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP156**

Sheet 1 of 1

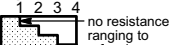
Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N						FILL: comprised of clay, gravel, charcoal, concrete, timber, metal, plastic, rope	M/W			FILL
					E		0.5		CH	CLAY: medium plasticity, orange brown	M	St		ALLUVIAL SOIL / RESIDUAL SOIL
				NONE OBSERVED			1.0			TP156 terminated at 0.75m due to limit of required investigation. Test pit TP156 terminated at 0.75m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP157**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N		E			CL	TOPSOIL: Silty Clay, low to medium plasticity, dark brown	D			TOPSOIL
									CH	CLAY: medium plasticity, orange brown		H/Fb		RESIDUAL SOIL
				NONE OBSERVED			0.5			Test pit TP157 terminated at 0.4m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Excavation No. **TP158**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Client: **SANDY BEACH MILL PTY LTD**Date started: **17.10.2006**

Principal:

Date completed: **17.10.2006**Project: **PROPOSED SUBDIVISION - SANDY BEACH**Logged by: **ELC**Test pit location: **REFER TO FIGURE 1**

Checked by:

equipment type and model: MINI EXCAVATOR		Pit Orientation:		Easting: m	R.L. Surface: NOT MEASURED							
excavation dimensions: 2m long 0.45m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N						FILL: Gravelly Clay, medium plasticity, orange brown, gravel is fine to coarse grained	M			FILL
					0.5			FILL: Silty Clay, low plasticity, grey				
								FILL: Clay, medium plasticity, orange brown				
				E				FILL: Charcoal, Sawdust and Clay				
					1.0			CLAY: medium to high plasticity	M/W	S/St		ALLUVIAL SOIL
				Bs	1.5							
			Very slow		2.0			TP158 terminated at 1.55m due to limit of required investigation. Test pit TP158 terminated at 1.55m				
					2.5							
					3.0							
					3.5							
					4.0							
Sketch												
method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense				

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP159**

Sheet 1 of 1

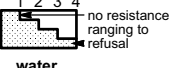
Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: **MINI EXCAVATOR** Pit Orientation: Easting: m R.L. Surface: **NOT MEASURED**
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					SC	FILL: Clay and Sand, medium plasticity, fine to medium grained, brown and pale brown Metal pieces, one plastic bottle, timber, one piece of concrete. Rotting vegetation odour.	M		100 200 300 400	FILL
					E		0.5							
							1.0							
									CH	CLAY: medium plasticity, orange brown		VSt		ALLUVIAL SOIL / RESIDUAL SOIL
							1.5			TP159 terminated at 1.4m due to limit of required investigation. Test pit TP159 terminated at 1.4m				
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP160**

Sheet 1 of 1

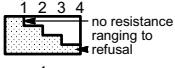
Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N		E			ML CH	TOPSOIL Clayey Silt, dark brown CLAY: medium plasticity, orange brown	D/M	Fb		TOPSOIL ALLUVIAL SOIL / RESIDUAL SOIL
					NONE OBSERVED		0.5			TP160 terminated at 0.3m due to limit of required investigation. Test pit TP160 terminated at 0.3m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP161**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N	E				CL CH	TOPSOIL: Clay, low plasticity, dark brown CLAY: medium plasticity, orange brown	M			TOPSOIL ALLUVIAL SOIL / RESIDUAL SOIL
							0.5			TP161 terminated at 0.3m due to limit of required investigation. Test pit TP161 terminated at 0.3m				
							1.0							
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	 moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP162**

Sheet 1 of 1

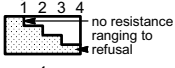
Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
	1	2	3											
E				N					CL	TOPSOIL: Silty Clay, low plasticity, dark brown	M			TOPSOIL
					Bs		0.5		CH	CLAY: medium plasticity, red brown		VSt		RESIDUAL SOIL
				NONE OBSERVED			1.0			TP162 terminated at 0.5m due to limit of required investigation. Test pit TP162 terminated at 0.5m				
							1.5							
							2.0							
							2.5							
							3.0							
							3.5							
							4.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **SANDY BEACH MILL PTY LTD**

Principal:

Project: **PROPOSED SUBDIVISION - SANDY BEACH**Test pit location: **REFER TO FIGURE 1**Excavation No. **TP163**

Sheet 1 of 1

Project No: **GEOTCOFH01296AA**Date started: **17.10.2006**Date completed: **17.10.2006**Logged by: **ELC**

Checked by:

equipment type and model: MINI EXCAVATOR Pit Orientation: Easting: m R.L. Surface: NOT MEASURED
 excavation dimensions: 2m long 0.45m wide Northing: m datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CL	TOPSOIL: Silty Clay, low plasticity, dark brown	M				TOPSOIL
					Bs		0.5		CH	CLAY: medium to high plasticity, red brown		VSt			ALLUVIAL SOIL / RESIDUAL SOIL
				NONE OBSERVED			1.0			TP163 terminated at 0.6m due to limit of required investigation. Test pit TP163 terminated at 0.6m					
							1.5								
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
---	--	---	--	---

Table C1: Summary of Unit 2 Fill Depths & Composition

Location	Depth of Fill (m)	Fill Description
TP102	0.25	Clay & Sawdust; and Clay
TP103	0.1	Clay & Sawdust
TP104	1.1	Gravelly Clay; and Sawdust & Timber
TP105	0.6	Clayey Gravel; Sawdust; and Clayey Gravel
TP107	0.9	Sawdust & Topsoil; Sand; and Clayey Gravel
TP108	0.5	Sawdust & Clay; and Gravelly Clay
TP109	1.2	Sandy Clay & Timber; and Gravelly Clay
TP111	1.05	Gravelly Clay; Clay & Sawdust; and Clay
TP114	0.4	Clay
TP119	0.4	Clay & Sawdust
TP121	0.45	Sandy Clay; and Clay & Sawdust
TP122	0.5	Gravelly Clay, some timber & metals pieces
TP129	0.85	Gravelly Clay; and Clay
TP130	0.8	Gravelly Clay; and Clay
TP131	0.5	Clay
TP133	0.2	Sawdust, ash & clay
TP134	0.4	Sawdust, ash & clay
TP135	1.5	Clay, ash & sawdust; and Clay
TP136	0.2	Sawdust
TP137	0.25	Clay, sawdust, gravel, and timber
TP138	1	Sawdust & clay; and Clay

Table C1: Summary of Unit 2 Fill Depths & Composition (Cont'd)

Location	Depth of Fill (m)	Fill Description
TP139	0.25	Sawdust & Clay
TP140	2.4	Sawdust, clay & timber; Sawdust; and Charcoal, sawdust, timber, ash & some rubbish
TP141	1.3	Silt, some sawdust & timber; Clay; and Clay, charcoal & ash
TP144	1.1	Gravelly sand, glass bottle, gas can, concrete
TP145	0.5	Sandy Gravelly Clay; and Clay
TP146	1.4	Gravelly Clay, few glass bottles
TP147	>2.5	Clay, ash charcoal, large timber planks, steel/iron, one large chisel
TP148	1.2	Gravelly Clay; Clayey Gravel; and Clay
TP149	1.8	Gravelly Clay; and Clay, charcoal, large timber pieces
TP152	0.15	Sandy Gravel
TP154	0.2	Gravelly Sand
TP155	0.25	Sandy Clay
TP156	0.5	Clay, gravel, charcoal, concrete, timber, metal, plastic and rope.
TP158	0.9	Gravelly Clay; Silty Clay; Clay; and Charcoal, sawdust, clay
TP159	1.2	Clay and Sand, with metal pieces, plastic bottle, concrete piece

Appendix B

LABORATORY TESTING RESULT SHEETS (ENVIRONMENTAL)



Environmental Consulting Pty. Ltd.

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 Telephone: (03) 9564 7055
 Fax: (03) 9564 7190
 Email: mgt@mgtenv.com.au

CERTIFICATE OF ANALYSIS

Coffey Geotechnics Pty Ltd
 Unit 1 18 Hurley Dve
 Coffs Harbour
 NSW 2450
 Site: COFH01296AA

Report Number: 199889 Page 1 of 63
 Order Number:
 Date Received: Oct 19, 2006
 Date Sampled: Oct 12, 2006
 Date Reported: Oct 31, 2006
 Contact: Emma Coleman

Methods

- USEPA 6010B Heavy Metals & USEPA7470/71 Mercury
- USEPA 8082 Polychlorinated Biphenyls
- USEPA 8141A Organophosphorus Pesticides
- USEPA 8081A Organochlorine Pesticides
- USEPA 8270C Polycyclic Aromatic Hydrocarbons
- USEPA 8260B - MGT 350A Monocyclic Aromatic Hydrocarbons
- MGT100A-GC Total Recoverable Hydrocarbons
- USEPA 6010B Heavy Metals & USEPA 7470/71 Mercury
- Method 102 - ANZECC - % Moisture

Comments

Notes

1. The results in this report supersede any previously corresponded results.
2. All Soil Results are reported on a dry basis.
3. Samples are analysed on an as received basis.

ABBREVIATIONS

mg/kg : milligrams per kilograms, mg/L : milligrams per litre, ppm : parts per million,
 LOR : Limit of Reporting
 RPD : Relative Percent Difference
 CRM : Certified Reference Material
 LCS : Laboratory Control Sample

Authorised

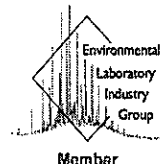
Michael Wright
 NATA Signatory
 Laboratory Manager



NATA Accredited
 Laboratory Number 1261

The tests, calibrations or measurements covered by this document have been performed in accordance with NATA requirements which include the requirements of ISO/IEC 17025 and are traceable to national standards of measurement. This document shall not be reproduced, except in full.

Report Number: 199889



Member



Environmental Consulting Pty. Ltd.

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 Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd		Client Sample ID	TP101 0.0-0.1	TP103 0.0-0.1	TP104 0.5-0.6	TP106 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number	06-Oc04309	06-Oc04310	06-Oc04311	06-Oc04312
Coffs Harbour		Matrix	Soil	Soil	Soil	Soil
NSW 2450		Sample Date	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type		LOR				
Total Recoverable Hydrocarbons		Units				
TRH C6-C9 Fraction by GC		mg/kg	< 20	-	< 20	-
TRH C10-C14 Fraction by GC		mg/kg	< 50	-	< 50	-
TRH C15-C28 Fraction by GC		mg/kg	< 100	-	110	-
TRH C29-C36 Fraction by GC		mg/kg	< 100	-	530	-
Monocyclic Aromatic Hydrocarbons						
Benzene		mg/kg	< 0.05	-	< 0.05	-
Toluene		mg/kg	< 0.05	-	< 0.05	-
Ethylbenzene		mg/kg	< 0.05	-	< 0.05	-
Xylenes(ortho,meta and para)		mg/kg	< 0.05	-	< 0.05	-
Fluorobenzene (surr.)		%	100	-	70	-
Polycyclic Aromatic Hydrocarbons						
Acenaphthene		mg/kg	< 0.5	-	< 0.2	-
Acenaphthylene		mg/kg	< 0.5	-	< 0.2	-
Anthracene		mg/kg	0.8	-	< 0.2	-
Benz(a)anthracene		mg/kg	3.4	-	< 0.2	-
Benzo(a)pyrene		mg/kg	2.9	-	< 0.2	-
Benzo(b)fluoranthene		mg/kg	2.0	-	< 0.2	-
Benzo(g,h,i)perylene		mg/kg	2.2	-	< 0.2	-
Benzo(k)fluoranthene		mg/kg	2.4	-	< 0.2	-
Chrysene		mg/kg	3.0	-	< 0.2	-
Dibenz(a,h)anthracene		mg/kg	< 0.5	-	< 0.2	-
Fluoranthene		mg/kg	5.3	-	< 0.2	-
Fluorene		mg/kg	< 0.5	-	< 0.2	-
Indeno(1,2,3-cd)pyrene		mg/kg	1.5	-	< 0.2	-
Naphthalene		mg/kg	< 0.5	-	< 0.2	-
Phenanthrene		mg/kg	4.0	-	< 0.2	-
Pyrene		mg/kg	4.8	-	< 0.2	-
Total PAH		mg/kg	35	-	< 3.2	-
Chrysene-d12 (surr.)		%	110	-	98	-
2-Fluorobiphenyl (surr.)		%	110	-	84	-

COMMENTS:

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mgt

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 Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd		Client Sample ID		TP101 0.0-0.1	TP103 0.0-0.1	TP104 0.5-0.6	TP106 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oc04309	06-Oc04310	06-Oc04311	06-Oc04312
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type	LOR	Units					
Organochlorine Pesticides							
4,4'-DDD	0.05	mg/kg		< 0.05	< 0.1	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchloride (surr.)	1	%		82	89	150	89
Tetrachloro-m-xylene (surr.)	1	%		97	90	82	70
Organophosphorous Pesticides							
Bolstar	0.2	mg/kg		< 0.2	< 0.5	< 0.5	< 0.2
Chlorpyrifos	0.2	mg/kg		< 0.2	< 0.5	< 0.5	< 0.2
Coumaphos	0.2	mg/kg		< 0.2	< 0.5	< 0.5	< 0.2
Demeton-O	0.2	mg/kg		< 0.2	< 0.5	< 0.5	< 0.2

COMMENTS:

 MGT Report No. 199889
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Coffey Geotechnics Pty Ltd		Client Sample ID		TP101 0.0-0.1		TP103 0.0-0.1		TP104 0.5-0.6		TP106 0.0-0.1	
Unit 1 18 Hurley Dve		Lab Number		06-Oc04309		06-Oc04310		06-Oc04311		06-Oc04312	
Coffs Harbour		Matrix		Soil		Soil		Soil		Soil	
NSW 2450		Sample Date		Oct 12, 2006		Oct 12, 2006		Oct 12, 2006		Oct 12, 2006	
Analysis Type		LOR	Units								
Diazinon		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Dichlorvos		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Disulfoton		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Ethion		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Ethoprop		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Fenitrothion		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Fensulfotihon		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Fenthion		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Merphos		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Methyl azinphos		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Methyl parathion		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Mevinphos		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Naled		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Phorate		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Ronnell		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Tokuthion		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Trichloronate		0.2	mg/kg	< 0.2		< 0.5		< 0.5		< 0.2	
Triphenylphosphate (surr.)		1	%	110		120		81		96	
Polychlorinated Biphenyls											
Aroclor-1016		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1221		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1232		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1242		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1248		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1254		0.1	mg/kg	< 0.1		-		< 0.1		-	
Aroclor-1260		0.1	mg/kg	< 0.1		-		< 0.1		-	
Total PCB		1	mg/kg	< 1		-		< 1		-	
Dibutylchlorodate (surr.)		1	%	82		-		150		-	
Tetrachloro-m-xylene (surr.)		1	%	97		-		82		-	

COMMENTS:

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Coffey Geotechnics Pty Ltd		Client Sample ID	TP101 0.0-0.1	TP103 0.0-0.1	TP104 0.5-0.6	TP106 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number	06-Oc04309	06-Oc04310	06-Oc04311	06-Oc04312
Coffs Harbour		Matrix	Soil	Soil	Soil	Soil
NSW 2450		Sample Date	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type		LOR				
% Moisture		Units				
Heavy Metals (7)		0.1	5.9	30	57	12
Arsenic		2	7.7	3.1	3.7	4.7
Cadmium		0.5	<0.5	<0.5	<0.5	<0.5
Chromium		5	33	7.9	<5	8.3
Copper		5	<5	12	9.8	9.0
Lead		5	61	14	11	18
Nickel		5	12	<5	<5	6.1
Zinc		5	1800	130	44	84
Heavy Metals						
Mercury		0.1	<0.1	<0.1	<0.1	<0.1

COMMENTS:

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Coffey Geotechnics Pty Ltd

Unit 1 18 Hurley Dve
 Coffs Harbour
 NSW 2450

Client Sample ID		TP107 0.0-0.1	TP107 0.3-0.4	TP107 0.5-0.6	TP108 0.0-0.1
Lab Number		06-Oc04313	06-Oc04314	06-Oc04315	06-Oc04316
Matrix		Soil	Soil	Soil	Soil
Sample Date		Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
LOR					
Units					
Total Recoverable Hydrocarbons					
TRH C6-C9 Fraction by GC		< 20	< 20	< 20	-
TRH C10-C14 Fraction by GC		< 50	< 50	< 50	-
TRH C15-C28 Fraction by GC		1500	120	1900	-
TRH C29-C36 Fraction by GC		8700	120	8900	-
Monocyclic Aromatic Hydrocarbons					
Benzene		< 0.05	< 0.05	< 0.05	-
Toluene		< 0.05	< 0.05	< 0.05	-
Ethylbenzene		< 0.05	< 0.05	< 0.05	-
Xylenes(ortho,mela and para)		< 0.05	< 0.05	< 0.05	-
Fluorobenzene (surr.)		76	75	79	-
Polycyclic Aromatic Hydrocarbons					
Acenaphthene		0.1	< 0.1	< 0.1	-
Acenaphthylene		0.1	< 0.1	< 0.1	-
Anthracene		0.1	< 0.1	< 0.1	-
Benz(a)anthracene		0.1	< 0.1	< 0.1	-
Benzo(a)pyrene		0.1	< 0.1	< 0.1	-
Benzo(b)fluoranthene		0.1	< 0.1	< 0.1	-
Benzo(g,h,i)perylene		0.1	< 0.1	< 0.1	-
Benzo(k)fluoranthene		0.1	< 0.1	< 0.1	-
Chrysene		0.1	< 0.1	< 0.1	-
Dibenz(a,h)anthracene		0.1	< 0.1	< 0.1	-
Fluoranthene		0.1	< 0.1	< 0.1	-
Fluorene		0.1	< 0.1	< 0.1	-
Indeno(1,2,3-cd)pyrene		0.1	< 0.1	< 0.1	-
Naphthalene		0.1	< 0.1	< 0.1	-
Phenanthrene		0.1	< 0.1	< 0.1	-
Pyrene		0.1	< 0.1	< 0.1	-
Total PAH		1.6	< 1.6	< 1.6	-
Chrysene-d12 (surr.)		1	120	120	-
2-Fluorobiphenyl (surr.)		1	110	96	110

COMMENTS:

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Coffey Geotechnics Pty Ltd		Client Sample ID		TP107 0.0-0.1	TP107 0.3-0.4	TP107 0.5-0.6	TP108 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oc04313	06-Oc04314	06-Oc04315	06-Oc04316
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type		LOR	Units				
Organochlorine Pesticides							
4,4'-DDD		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.1
4,4'-DDE		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDT		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane		0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor		0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene		0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchloride (surr.)		1	%	110	100	110	110
Tetrachloro-m-xylene (surr.)		1	%	69	90	100	63
Organophosphorous Pesticides							
Bolstar		0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.5
Chlorpyrifos		0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.5
Coumaphos		0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.5
Demeton-O		0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.5

COMMENTS:

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Coffey Geotechnics Pty Ltd		Client Sample ID		TP107 0.0-0.1	TP107 0.3-0.4	TP107 0.5-0.6	TP108 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oct04313	06-Oct04314	06-Oct04315	06-Oct04316
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type	LOR	Units					
Diazinon	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Dichlorvos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Disulfoton	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Ethion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Ethoprop	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Fenitrothion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Fensulfothion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Fenthion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Merphos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Methyl azinphos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Methyl parathion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Mevinphos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Naled	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Phorate	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Ronnel	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Tokuthion	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Trichloronate	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.5
Triphenylphosphate (surr.)	1	%		77	84	91	86
Polychlorinated Biphenyls							
Aroclor-1016	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1221	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1232	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1242	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1248	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1254	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Aroclor-1260	0.1	mg/kg		< 0.1	< 0.1	< 0.1	-
Total PCB	1	mg/kg		< 1	< 1	< 1	-
Dibutylchlorendate (surr.)	1	%		110	100	110	-
Tetrachloro-m-xylene (surr.)	1	%		69	90	100	-

COMMENTS:

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Coffey Geotechnics Pty Ltd		Client Sample ID	TP107 0.0-0.1	TP107 0.3-0.4	TP107 0.5-0.6	TP108 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number	06-Oc04313	06-Oc04314	06-Oc04315	06-Oc04316
Coffs Harbour		Matrix	Soil	Soil	Soil	Soil
NSW 2450		Sample Date	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006
Analysis Type		LOR				
		Units				
% Moisture		0.1	54	21	21	27
Heavy Metals (7)						
Arsenic		2	2.8	3.3	6.7	2.2
Cadmium		0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium		5	15	< 5	5.4	< 5
Copper		5	83	< 5	19	5.3
Lead		5	50	< 5	19	9.2
Nickel		5	7.4	< 5	< 5	< 5
Zinc		5	83	< 5	48	22
Heavy Metals						
Mercury		0.1	< 0.1	< 0.1	< 0.1	< 0.1

COMMENTS:

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Coffey Geotechnics Pty Ltd

Unit 1 18 Hurley Dve
 Coffs Harbour
 NSW 2450

Client Sample ID	TP111 0.7-0.9	TP113 0.0-0.1	TP116 0.0-0.1	TP118 0.0-0.1
Lab Number	06-0c04317	06-0c04318	06-0c04319	06-0c04320
Matrix	Soil	Soil	Soil	Soil
Sample Date	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 13, 2006
LOR				
Analysis Type	Units			
Total Recoverable Hydrocarbons				
TRH C6-C9 Fraction by GC	mg/kg	< 20	< 20	-
TRH C10-C14 Fraction by GC	mg/kg	< 50	< 50	-
TRH C15-C28 Fraction by GC	mg/kg	170	< 100	-
TRH C29-C36 Fraction by GC	mg/kg	460	230	-
Monocyclic Aromatic Hydrocarbons				
Benzene	mg/kg	< 0.05	< 0.05	-
Toluene	mg/kg	< 0.05	< 0.05	-
Ethylbenzene	mg/kg	< 0.05	< 0.05	-
Xylenes(ortho,meta and para)	mg/kg	< 0.05	< 0.05	-
Fluorobenzene (surr.)	%	91	73	-
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	mg/kg	< 1.0	< 0.1	-
Acenaphthylene	mg/kg	< 1.0	< 0.1	-
Anthracene	mg/kg	< 1.0	< 0.1	-
Benz(a)anthracene	mg/kg	< 1.0	< 0.1	-
Benzo(a)pyrene	mg/kg	< 1.0	< 0.1	-
Benzo(b)fluoranthene	mg/kg	< 1.0	< 0.1	-
Benzo(g,h,i)perylene	mg/kg	< 1.0	< 0.1	-
Benzo(k)fluoranthene	mg/kg	< 1.0	< 0.1	-
Chrysene	mg/kg	< 1.0	< 0.1	-
Dibenz(a,h)anthracene	mg/kg	< 1.0	< 0.1	-
Fluoranthene	mg/kg	< 1.0	< 0.1	-
Fluorene	mg/kg	< 1.0	< 0.1	-
Indeno(1,2,3-cd)pyrene	mg/kg	< 1.0	< 0.1	-
Naphthalene	mg/kg	< 1.0	< 0.1	-
Phenanthrene	mg/kg	< 1.0	< 0.1	-
Pyrene	mg/kg	< 1.0	< 0.1	-
Total PAH	mg/kg	< 16	1.6	-
Chrysene-d12 (surr.)	%	130	120	-
2-Fluorobiphenyl (surr.)	%	110	90	-

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Coffey Geotechnics Pty Ltd		Client Sample ID		TP111 0.7-0.9	TP113 0.0-0.1	TP116 0.0-0.1	TP118 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oct04317	06-Oct04318	06-Oct04319	06-Oct04320
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 13, 2006
Analysis Type	LOR	Units					
Organochlorine Pesticides							
4,4'-DDD	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchloride (surr.)	1	%		110	99	100	110
Tetrachloro-m-xylene (surr.)	1	%		88	69	81	90
Organophosphorous Pesticides							
Bolstar	0.2	mg/kg		< 2.0	< 2.0	< 2.0	< 2.0
Chlorpyrifos	0.2	mg/kg		< 2.0	< 2.0	< 2.0	< 2.0
Coumaphos	0.2	mg/kg		< 2.0	< 2.0	< 2.0	< 2.0
Demeton-O	0.2	mg/kg		< 2.0	< 2.0	< 2.0	< 2.0

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Unit 1 18 Hurley Dve		Lab Number		06-Oct04317		06-Oct04318		06-Oct04319		06-Oct04320	
Coffs Harbour		Matrix		Soil		Soil		Soil		Soil	
NSW 2450		Sample Date		Oct 12, 2006		Oct 12, 2006		Oct 12, 2006		Oct 13, 2006	
Analysis Type		LOR		Units							
Diazinon		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Dichlorvos		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Disulfoton		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Ethion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Ethoprop		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Fenitrothion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Fensulfotlion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Fenthion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Merphos		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Methyl azinphos		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Methyl parathion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Mevinphos		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Naled		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Phorate		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Ronnol		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Tokuthion		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Trichloronate		0.2		mg/kg		< 2.0		< 0.2		< 0.2	
Triphenylphosphate (surr.)		1		%		76		87		94	
Polychlorinated Biphenyls										92	
Aroclor-1016		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1221		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1232		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1242		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1248		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1254		0.1		mg/kg		< 0.1		< 0.1		-	
Aroclor-1260		0.1		mg/kg		< 0.1		< 0.1		-	
Total PCB		1		mg/kg		< 1		< 1		-	
Dibutylchlorendate (surr.)		1		%		110		99		-	
Tetrachloro-m-xylene (surr.)		1		%		88		69		-	

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Coffey Geotechnics Pty Ltd		Client Sample ID	TP111 0.7-0.9	TP113 0.0-0.1	TP116 0.0-0.1	TP118 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number	06-0c04317	06-0c04318	06-0c04319	06-0c04320
Coffs Harbour		Matrix	Soil	Soil	Soil	Soil
NSW 2450		Sample Date	Oct 12, 2006	Oct 12, 2006	Oct 12, 2006	Oct 13, 2006
Analysis Type		LOR	Units			
% Moisture		0.1	%	29	14	20
Heavy Metals (7)						17
Arsenic		2	mg/kg	4.6	6.4	5.8
Cadmium		0.5	mg/kg	< 0.5	< 0.5	< 0.5
Chromium		5	mg/kg	5.8	7.1	8.5
Copper		5	mg/kg	< 5	9.5	5.9
Lead		5	mg/kg	10	16	19
Nickel		5	mg/kg	< 5	< 5	< 5
Zinc		5	mg/kg	18	44	41
Heavy Metals						27
Mercury		0.1	mg/kg	< 0.1	< 0.1	< 0.1

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Coffey Geotechnics Pty Ltd

Unit 1 18 Hurley Dve

Coffs Harbour

NSW 2450

Coffey Geotechnics Pty Ltd		Client Sample ID		TP119 0.0-0.1	TP121 0.15-0.3	TP122 0.3-0.4	TP127 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oc04321	06-Oc04322	06-Oc04323	06-Oc04324
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 13, 2006	Oct 13, 2006	Oct 13, 2006	Oct 13, 2006
Analysis Type		LOR	Units				
Total Recoverable Hydrocarbons							
TRH C6-C9 Fraction by GC		20	mg/kg	< 20	-	< 20	-
TRH C10-C14 Fraction by GC		50	mg/kg	< 50	-	< 50	-
TRH C15-C28 Fraction by GC		100	mg/kg	140	-	120	-
TRH C29-C36 Fraction by GC		100	mg/kg	200	-	400	-
Monocyclic Aromatic Hydrocarbons							
Benzene		0.05	mg/kg	< 0.05	-	< 0.05	-
Toluene		0.05	mg/kg	< 0.05	-	< 0.05	-
Ethylbenzene		0.05	mg/kg	< 0.05	-	< 0.05	-
Xylenes(ortho,meta and para)		0.05	mg/kg	< 0.05	-	< 0.05	-
Fluorobenzene (surr.)		1	%	76	-	87	-
Polycyclic Aromatic Hydrocarbons							
Acenaphthene		0.1	mg/kg	< 0.1	-	< 0.1	-
Acenaphthylene		0.1	mg/kg	< 0.1	-	< 0.1	-
Anthracene		0.1	mg/kg	< 0.1	-	< 0.1	-
Benz(a)anthracene		0.1	mg/kg	< 0.1	-	< 0.1	-
Benzo(a)pyrene		0.1	mg/kg	< 0.1	-	< 0.1	-
Benzo(b)fluoranthene		0.1	mg/kg	< 0.1	-	< 0.1	-
Benzo(g,h,i)perylene		0.1	mg/kg	< 0.1	-	< 0.1	-
Benzo(k)fluoranthene		0.1	mg/kg	< 0.1	-	< 0.1	-
Chrysene		0.1	mg/kg	< 0.1	-	< 0.1	-
Dibenz(a,h)anthracene		0.1	mg/kg	< 0.1	-	< 0.1	-
Fluoranthene		0.1	mg/kg	< 0.1	-	< 0.1	-
Fluorene		0.1	mg/kg	< 0.1	-	< 0.1	-
Indeno(1,2,3-cd)pyrene		0.1	mg/kg	< 0.1	-	< 0.1	-
Naphthalene		0.1	mg/kg	< 0.1	-	< 0.1	-
Phenanthrene		0.1	mg/kg	< 0.1	-	< 0.1	-
Pyrene		0.1	mg/kg	< 0.1	-	< 0.1	-
Total PAH		1.6	mg/kg	< 1.6	-	< 1.6	-
Chrysene-d12 (surr.)		1	%	130	-	130	-
2-Fluorobiphenyl (surr.)		1	%	100	-	90	-

COMMENTS:

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Coffey Geotechnics Pty Ltd		Client Sample ID		TP119 0.0-0.1	TP121 0.15-0.3	TP122 0.3-0.4	TP127 0.0-0.1
Unit 1 18 Hurley Dve		Lab Number		06-Oc04321	06-Oc04322	06-Oc04323	06-Oc04324
Coffs Harbour		Matrix		Soil	Soil	Soil	Soil
NSW 2450		Sample Date		Oct 13, 2006	Oct 13, 2006	Oct 13, 2006	Oct 13, 2006
Analysis Type	LOR	Units					
Organochlorine Pesticides							
4,4'-DDD	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorodate (surr.)	1	%		130	150	110	120
Tetrachloro-m-xylene (surr.)	1	%		80	73	83	94
Organophosphorous Pesticides							
Bolstar	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg		< 0.2	< 0.2	< 0.2	< 0.2

COMMENTS:

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