coffey geotechnics
SPECIALISTS MANAGING THE EARTH

CABOOLTURE RIVER DREDGING

GEO-ENVIRONMENTAL INVESTIGATIONS

Northeast Business Park
Spring Hill

GEOTKPAR01150AA/A
3 May 2007

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SPECIALISTS MANAGING THE EARTH

3 May 2007

Northeast Business Park
PO Box 1001
Spring Hill
QLD 4000

Attention: Mr Jeff Smith

Dear Sir,

RE: Caboolture River Dredging

Geo-environmental Investigations

Coffey Geotechnics Pty Ltd (Coffey) was commissioned by Mr Jeff Smith of Northeast Business Park to undertake acid sulphate soil, dredging soil property and contamination investigations within the reaches of the Caboolture River proposed to be dredged. This report presents the factual data and assessments from the investigations.

For and on behalf of Coffey Geotechnics Pty Ltd

Ron McMahon

Principal Engineer

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1 INTRODUCTION

Coffey Geotechnics Pty Ltd (Coffey) was commissioned by Mr Jeff Smith of Northeast Business Park to undertake geo-environmental investigations within the reaches of the Caboolture River proposed to be dredged. The investigations included:-

- acid sulphate soil investigations
- assessment of dredging properties of the soils
- likely contamination of the soils

These three aspects of the investigations are reported individually herein. For each aspect of the investigations, the methodology, factual data and laboratory results are presented together with an analysis and assessment of the investigations findings.

2 SURFACE AND WORKS PROFILE

The lower reaches of the Caboolture River discharge into the shallow marine waters of Deception Bay. The river system has seen the development of soil and vegetation types typical of an estuarine ecosystem. Alluvial sediments and mangroves dominate the surface profile within the investigation area. The cleared areas along the banks of the river were associated with boat ramp access facilities and private farm land uses.

The proposed dredge area begins approximately one kilometre east of the mouth of the Caboolture River and terminates 6.5 kilometres up river. Drawing number 7900/33/01-102 by Cardno (QLD) is attached as Appendix A. It illustrates the proposed dredge area, length and cut. The dredge cut is shown to be 50 metres in width to a depth of RL – 4.25 metres AHD. It has been designed with a 1:3 cut batter slope.

3 DRILLING WORKS AND SUBSURFACE PROFILE

Boreholes were undertaken within the proposed dredged area at 300 metre centres. A photographic map (from Google Earth) showing bore locations is attached as Figure 1. GPS coordinates were taken at each borehole location using a Garmin hand held GPS unit with the accuracy ranging from +/- 3-5 metres. Table 1 below lists the GPS coordinates of the 20 boreholes. The bed level at each borehole location was obtained by interpolation between bathometric survey points. Bed levels and borehole termination depths are shown in Table 1 and on the borehole log for each borehole location.

Table 1 GPS Coordinates of Borehole Locations.

Borehole Number	Surface RL Termination RL	GPS Coordinates	Borehole Number	Surface RL Termination RL	GPS Coordinates
BH 1	- 3.5 m AHD - 6.0 m AHD	S2709.108 E15303.605	BH 11	- 2.5 m AHD - 4.3 m AHD	S2708.654 E15302.076
BH 2	- 2.5 m AHD - 5.1 m AHD	S2709.066 E15303.425	BH 12	- 3.0 m AHD - 5.25 m AHD	S2708.483 E15302.092
BH 3	- 2.5 m AHD - 5.2 m AHD	S2709.008 E15303.257	BH 13	- 3.5 m AHD - 5.8 m AHD	S2708.323 E15302.118
BH 4	- 3.5 m AHD - 6.0 m AHD	S2709.074 E15303.104	BH 14	- 3.0 m AHD - 5.4 m AHD	S2708.193 E15302.182
BH 5	- 3.5 m AHD - 5.2 m AHD	S2709.134 E15302.947	BH 15	- 2.5 m AHD - 4.55 m AHD	S2708.008 E15302.271
BH 6	- 3.5 m AHD - 5.75 m AHD	S2709.178 E15302.791	BH 16	- 2.5 m AHD - 4.6 m AHD	S2707.910 E15302.184
BH 7	- 4.0 m AHD - 6.3 m AHD	S2709.190 E15302.621	BH 17	- 2.5 m AHD - 4.5 m AHD	S2707.751 E15302.083
BH 8	- 3.0 m AHD - 5.0 m AHD	S2709.072 E15302.079	BH 18	- 2.5 m AHD - 5.1 m AHD	S2707.620 E15301.984
BH 9	- 3.5 m AHD - 5.75 m AHD	S2708.957 E15302.009	BH 19	- 2.5 m AHD - 5.05 m AHD	S2707.645 E15301.799
BH 10	- 3.5 m AHD - 5.8 m AHD	S2708.811 E15302.075	BH 20	- 3.5 m AHD - 6.0 m AHD	S2707.599 E15301.633

Boreholes were drilled using the Vibrocore drilling technique. Water depth was measured at each site using a Garmin fishfinder. Borehole logs together with explanation sheets defining the terms and symbols used are attached in Appendix B.

The subsurface profile on the site was inferred from Coffey borehole logs. Three distinct subsurface profiles are distinguished by the borehole logs along the investigation area. These are:-

- River Mouth Sediments
- Pre Holocene Sediments
- Holocene Estuarine Sediments

These profiles are described below. They are used in the report to group results, assessments and trends related to the three profiles.

River Mouth Sediments

The river mouth sediment profile is present in boreholes BH 1 to BH 10. Boreholes BH 1, BH 2, BH 3, BH 4, BH 7 and BH 10 show alluvial sediments consisting of grey to dark grey sands and clayey sands underlain by dark grey marine clays. The upper sediments are 0.5 to 1.3 metres in depth overlying the marine clays which persist to the limit of the investigation. These sediments contain some shell fragments throughout the profile. Boreholes BH 5, BH 6, and BH 8 also show alluvial fine to coarse grained sands and clayey sands (with shell fragments) to the limit of the investigation but no marine clays were encountered. In borehole BH 9, the sediments are again present but there is a band of marine clay from 0.7 to 1.3 metres interbedded with the sediments.

Pre Holocene Sediments

The pre Holocene sediment profile is present in boreholes BH 11 to BH 17. These boreholes, with the exception of boreholes BH 13 and BH 14, show alluvial sediments consisting of fine to coarse sands to depths between 0.8 and 1.1 metres underlain by pre Holocene clays. The alluvial sediments contain shell fragments. The pre Holocene clays are stiff pale grey to green sandy/silty clays with mottling. In BH 17, the mottled grey clays showed traces of fine to medium gravels.

Estuarine Sediments

The estuarine sediments profile is present in boreholes BH 18 to BH 20. Borehole BH 18 shows dark grey alluvial sediments consisting of fine to coarse grained sands with silt and clay fines to the limit of the investigation. Boreholes BH 19 and BH 20 show dark grey alluvial sediments consisting of fine to coarse sands, clayey sand and sandy silty clays underlain by dark grey marine clays at depths between 1.5 and 1.7 metres.

4 ACID SULPHATE SOIL INVESTIGATION

The acid sulphate soil (ASS) investigation aims to:-

- Determine the extent and severity of any acid sulphate hazard within the proposed dredge area
- Identify any potential disturbance of AASS and/or PASS by the proposed dredging operations
- Recommend management options to ensure that the dredge works cause no significant harm to the environment due to any ASS hazard.

4.1 Field Work

Field work on site was carried out under the direction of a principal engineer from Coffey's Maroochydore office on the 16th to 19th April 2007. Twenty boreholes were drilled using the Vibrocore drilling technique. This technique provides a continuous uncontaminated sample. The depth of investigation varied from a minimum of RL – 4.3 AHD to a maximum depth of – 6.0 metres AHD. Investigation depths are shown in Table 1. Borehole locations are shown in Figure 1. Borehole logs together with explanations sheets defining the terms and symbols used are attached in Appendix B.

Soil samples were collected at 0.25 metre depth intervals in all boreholes. Samples were chilled in field and sealed in oxygen impermeable plastic before being transported to the analytical laboratories of Bio Track Pty Ltd at Samford. A total of 181samples were collected.

4.2 ASS Hazards

Acid sulphate soils (ASS) are soils that contain iron pyrites. The pyrite is formed under specific conditions. These conditions require the presence of iron, sulphur and organic matter. The pyrites oxidise in aerobic conditions and, when combined with water, form sulphuric acid. This normally occurs when soils are excavated and placed above the water table or the water table is lowered and conditions change from anaerobic to aerobic.

The sulphuric acid will leach out of the soil and may lower the pH of receiving waters, increase the levels of dissolved metals in the receiving waters (particularly iron and aluminium) and strip the natural neutralising capacity from the receiving waters. These consequences can have a serious impact on the receiving waters and its biosystem.

There are two basic types of ASS. These are actual acid sulphate soils (AASS) which are soils in which the pyrite has already been oxidised and sulphuric acid is present in the soil and potential acid sulphate soils (PASS) where the pyrite is present but has not been oxidised. Both AASS and PASS have the potential to do environmental harm. The proposed works may impact on ASS in a number of ways. These are:-

- During dredging some of the pyritic material will be hydraulically separated and may settle to the river bed. Possible oxidation of these fines may occur due to the high dissolved oxygen in the river water.
- Dredged PASS may be placed in aerobic conditions above the water table and directly exposed to oxygen.

The investigations undertaken were designed to evaluate the nature and extent of any ASS hazards posed by these mechanisms.

4.3 Laboratory Analysis

An analysis of the soils was undertaken at the analytical laboratories of BioTrack Pty Ltd at Samford. All 181 samples were tested by the peroxide screen test method. Eighty selected samples were also tested for acid generating potential using the SPOCAS method as set out in the QASSIT Guidelines. Test certificates are attached in Appendix C.

4.4 Results

4.4.1 Screen Testing

Screen testing was undertaken using the peroxide oxidation method as set out in the QASSIT Guidelines. All 181 samples were screen tested. The results are presented in Appendix C. They are discussed for each of the three identified profiles below.

River Mouth Sediments

The field screen tests of the river mouth sediments (BH 1 – BH 10) indicated zero total actual acidity in all samples with field pH values predominantly above 7. The oxidised pH values ranged between 2.9 and 7.2. These results indicate that some of the soils tested are potential acid sulphate soils.

Pre Holocene Sediments

The field screen tests of the pre Holocene (BH 11 – BH 17) sediments indicated zero to low total actual acidity in all samples with field pH values predominantly above 7. The oxidised pH values ranged between 2.1 and 7.8. These results indicate that some of the soils tested are potential acid sulphate soils.

Estuarine Sediments

The field screen tests within the estuarine (BH 18 to BH 20) sediments indicated zero total actual acidity in all samples with field pH values predominantly above 7. The oxidised pH values ranged between 2.4 and 4.8. These results indicate that most of the soils tested are potential acid sulphate soils.

4.4.2 Quantitative Testing

Quantitative laboratory analyses were undertaken on samples selected based on the screen test results. The test method was the SPOCAS method as defined in the QASSIT guidelines. This method follows both the acid and the sulphur trails to determine the acid sulphate characteristics of the soil. A total of 80 samples were tested. Test results are presented in Appendix C. They are discussed for each of the three identified profiles below.

River Mouth Sediment Profile

Actual Acidity

The actual acidity was assessed by the measurement of titratable actual acidity (TAA) plus pre-oxidation sulphur (Skcl). All samples tested measured zero TAA. However Skcl values above the threshold defining ASS were measured in some samples. Results indicate that acid has been produced in these soils from the oxidation of pyrites during a previous exposure to an oxidising environment. The acid formed has been neutralised by the calcium present in the soils, predominantly as shell fragments, and the measured sulphur is present as calcium sulphate, the product of the neutralisation process. As all the acid in these soils has been neutralised, the soils sampled in the river mouth sediments are nonAASS.

Potential Acidity

The potential acidity is obtained by measuring the total potential acidity (TPA) and the increase in sulphur levels post oxidation (Spos). Seventy five percent of the measured Spos values within the river mouth sediment profile were greater than 0.03% sulphur content, the QASSIT level defining PASS. Sulphur content within the samples defined as PASS ranged from a relatively low 0.03% sulphur content to a very high 3.77% sulphur content. Laboratory results also show that although 75% of the samples recorded significant sulphur content, only 17.5% recorded TPA measurements above QASSIT levels defining PASS (18 mole per tonne). This is almost certainly due to the high natural neutralising capacity in these soils associated with their shell content. The pyrites are oxidised and the acid is formed but it is neutralised by the calcium carbonate (shell) present. This is confirmed by the increase in soluble calcium present post oxidation (refer Ca KCL and Ca P values).

Laboratory results thus indicate that most soils of the river mouth profile are PASS but that most have a high neutralising capacity. These soils must be managed in accordance with an acid sulphate soils management plan (ASSMP).

Pre Holocene Sediment Profile

Titratable Actual Acidity

The actual acidity was assessed by the measurement of TAA plus Skcl. All samples measured zero quantities of TAA except for two samples in BH 17 these both measured 3 moles per tonne of TAA. These measurements are well below the TAA indicator level defining AASS in the QASSIT Guidelines. Preoxidation sulphur levels were also at or below the QASSIT threshold. All soils sampled in the pre Holocene sediments are thus nonAASS.

Potential Acidity

Results indicate that PASS is present in all boreholes. Sixty eight percent of the measured Spos values within the pre Holocene sediments were greater than 0.03%, the QASSIT level defining PASS. Borehole BH 11 had only one sample registering sulphur content above QASSIT guidelines. However, all samples in Boreholes BH 15, BH 16 and BH 17 registered Spos values above 0.03% sulphur. The Spos levels were predominantly moderate at levels between 0.03% and 0.35% but one sample in Bh 17 showed 1.48% sulphur. All TPA values recorded were below the QASSIT level defining PASS soils. This is attributed again to the acid reactive calcium, present as shell fragments, within the soil samples tested.

Laboratory results indicate that many soils of the pre Holocene profile are PASS but that all have a high acid neutralising capacity in excess of the acid generating capacity. These soils must be managed in accordance with an ASSMP.

Estuarine Sediment Profile

Titratable Actual Acidity

The actual acidity was assessed by the measurement of TAA plus Skcl. All samples measured zero quantities of TAA. Again some samples showed Skcl values above the QASSIT threshold indicating previous acidification and neutralisation. As all the acid in these soils has been neutralised, the soils estuarine sediment profile are thus nonAASS.

Potential Acidity

Results indicate that PASS is present in all boreholes with all samples measuring Spos values above 0.03%. Many of the samples had very high values greater than 2% sulphur. In borehole BH 18, the acid neutralising capacity is in excess of the acid generating capacity and the measured TPA was zero. High TPA values were recorded in boreholes BH19 and BH 20 indicating insufficient neutralising capacity to treat the acid generated.

The results demonstrate that these sediments are PASS. They must be managed in accordance with an ASSMP.

4.5 ASS Assessment

From the results of the laboratory testing the following assessment can be made:-

- All soils within the proposed dredge area nonAASS
- All soils within the proposed dredge area should be considered PASS
- A high proportion of acid reactive calcium is present in the river mouth and pre Holocene sediments, which may neutralise some or all TPA generated. However the estuarine sediments show an acid generating capacity greater than the acid neutralising capacity of the soils.

All potential acidity can be managed to avoid environmental harm. The State Planning Policy SPP 2/02 requires that testing, treatment and monitoring regimes should be set out under an approved acid sulphate soils management plan (ASSMP). It is recommended that the ASSMP should include:-

- Training of staff
- Testing regime (including validation testing)
- Treatment plan
- Environmental monitoring.

5 DREDGE SOIL PROPERTIES INVESTIGATION

In order to determine the likely dredge properties of the soils within the Caboolture River site, settlement, dispersion and particle size distribution test were undertaken.

5.1 Field Work

Two bulk samples per borehole were collected during field investigations. The samples were sealed in plastic bags and stored for laboratory testing.

5.2 Laboratory Analysis

5.2.1 Settlement Rate and Turbidity Testing

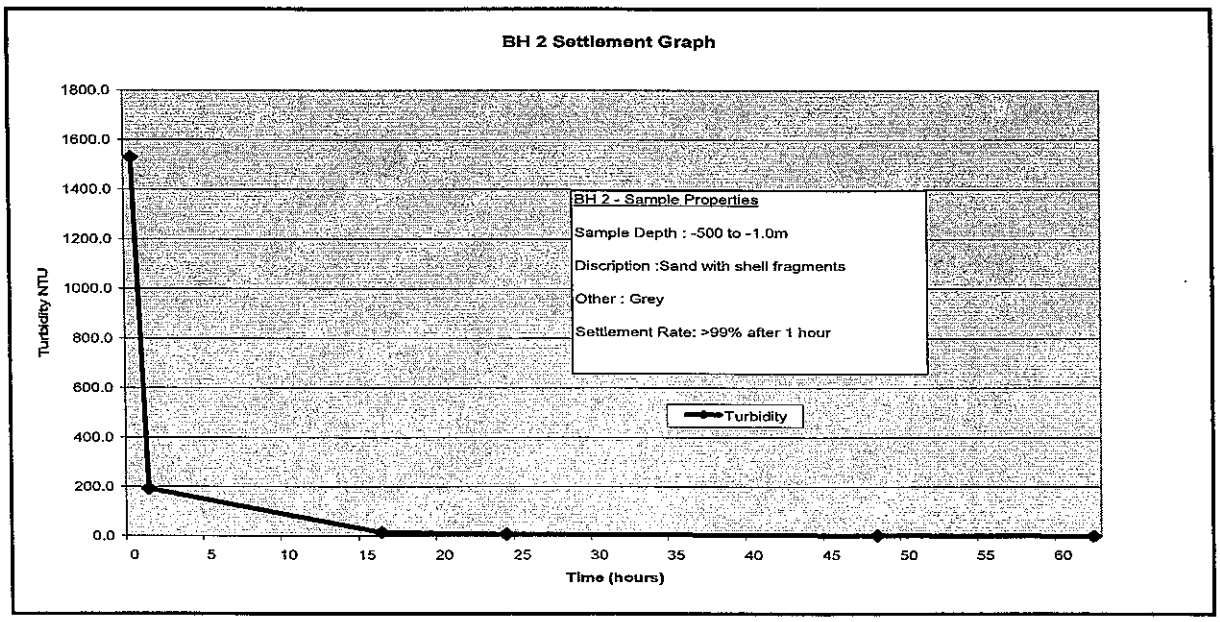
Twelve composite soil samples were selected for settlement rate and turbidity testing. Six samples were selected from areas with a sandy profile within the study area and six were selected from areas with a clayey profiles. Settlement rate was determined by the laboratory measurement of suspended solids at two time intervals. Turbidity was directly measured by a turbidity meter at a number of time intervals. All testing was undertaken under the supervision of a principal engineer at Coffey's Kunda Park office.

In order to test the soils settlement properties of the twelve samples, the following test method was undertaken:-

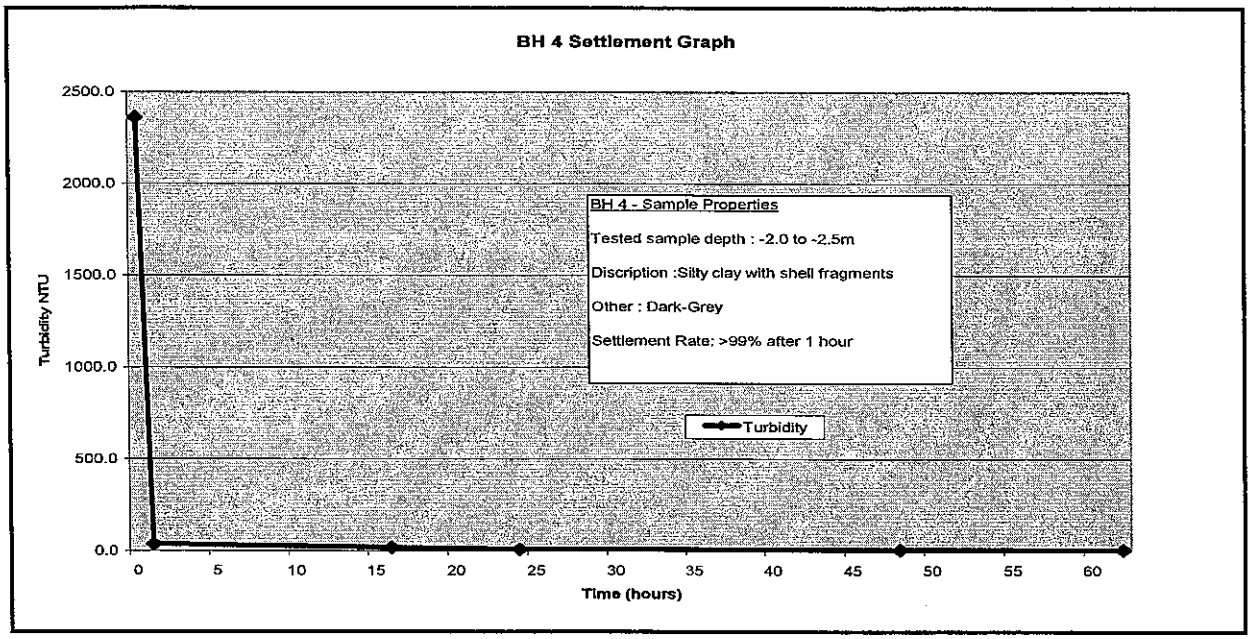
- The selected samples were oven dried in accordance AS 1289 2.1.1, and then sieved over the 2.36mm sieve.
- To achieve the 1:6.5 soils to water ratio of a typical dredging operation, 150 grams of dried sample was weighed and then saturated with 850ml of distilled water. The sample was then left undisturbed for one hour before being suspended, by stirring. The container was the sealed and left undisturbed.
- The above procedure was replicated twelve times for each sample.
- Suspended solids were measured at two selected time periods (1 and 16 hours).
- Turbidity was measured using a TPS WP88 turbidity meter after five selected time periods (1, 16, 24, 48, and 64 hours).

Test results for the twelve samples are set out graphically below.

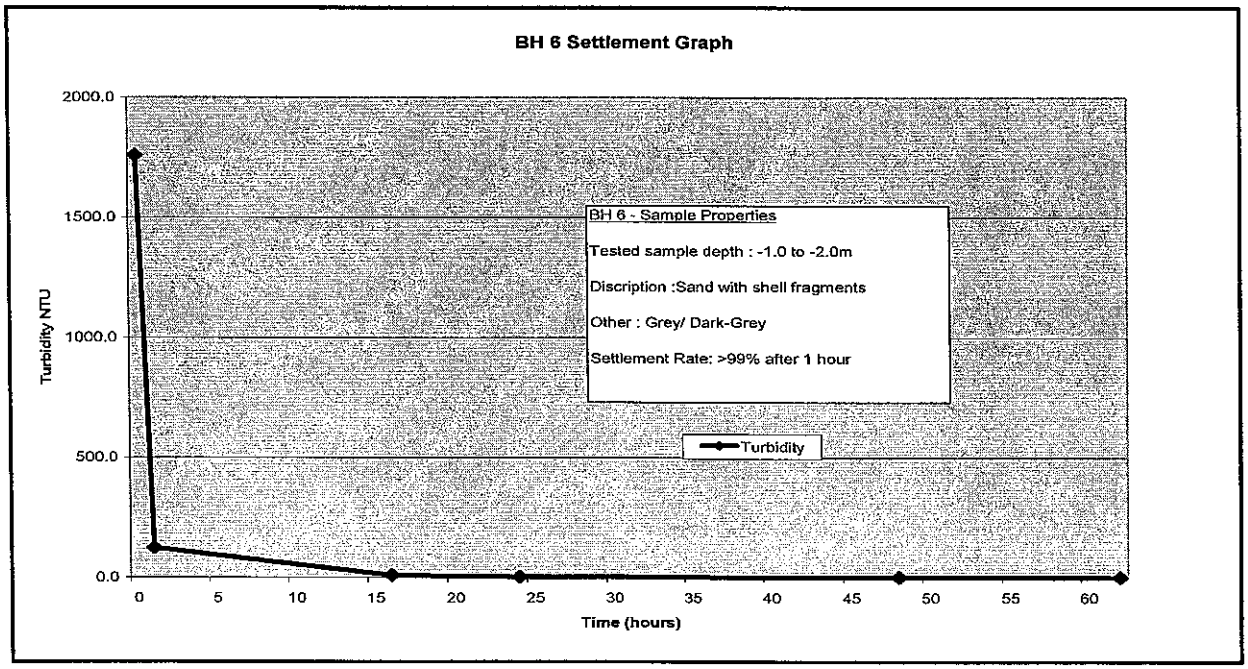
Graph 1 illustrates BH 2's turbidity measurements verses time



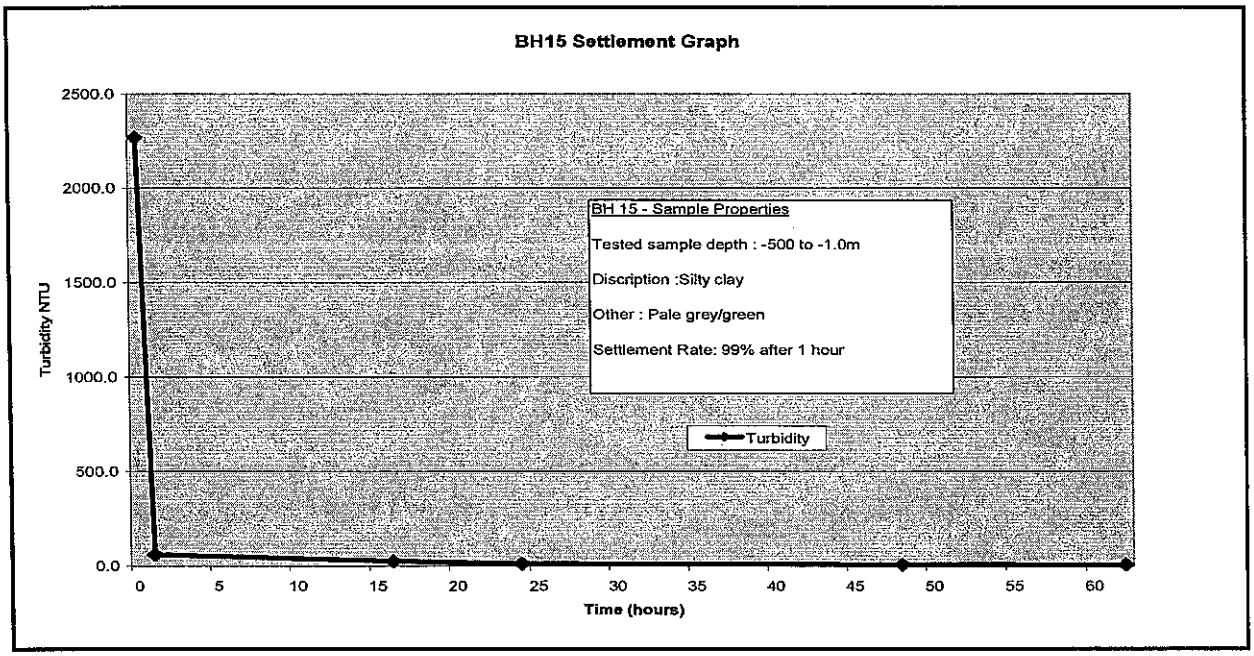
Graph 2 illustrates BH 4's turbidity measurements verses time



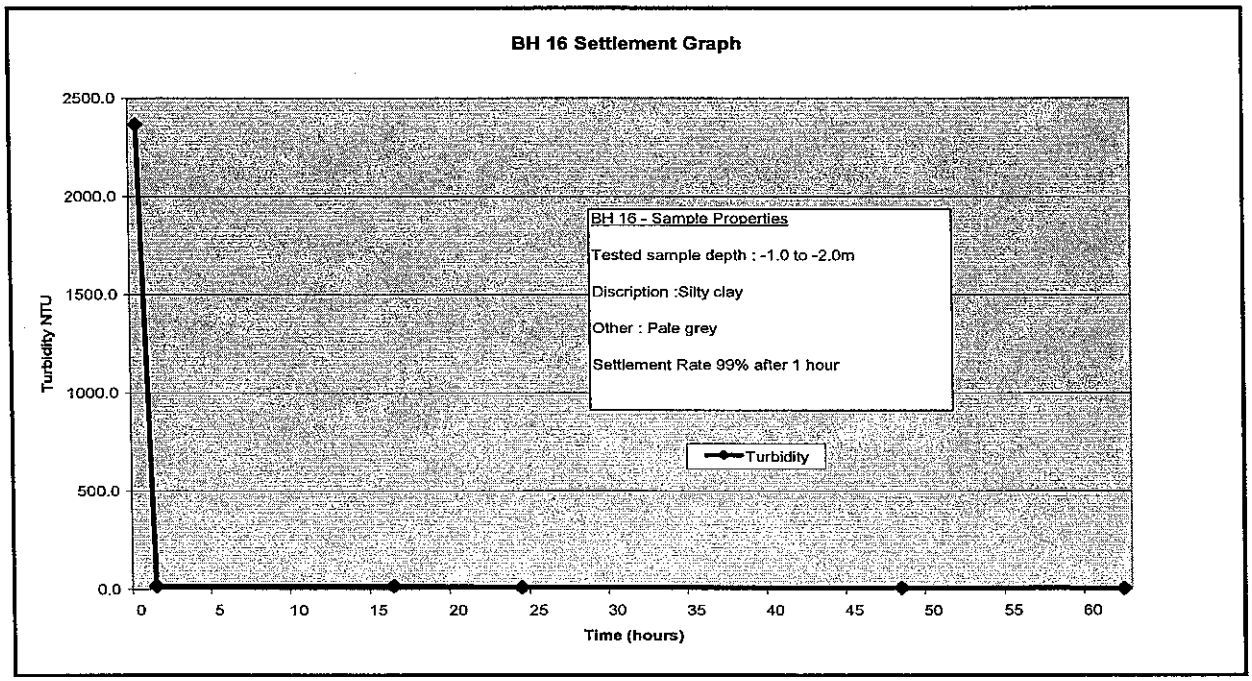
Graph 3 illustrates BH 6's turbidity measurements verses time



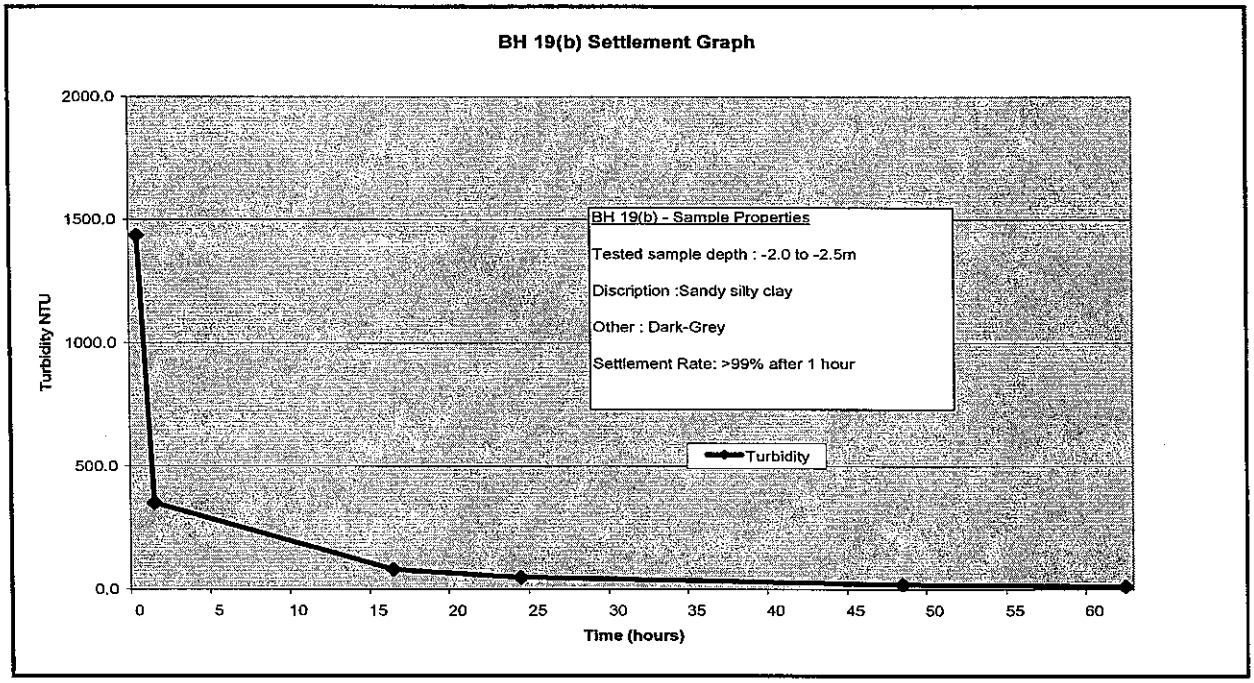
Graph 6 illustrates BH 15's turbidity measurements verses time



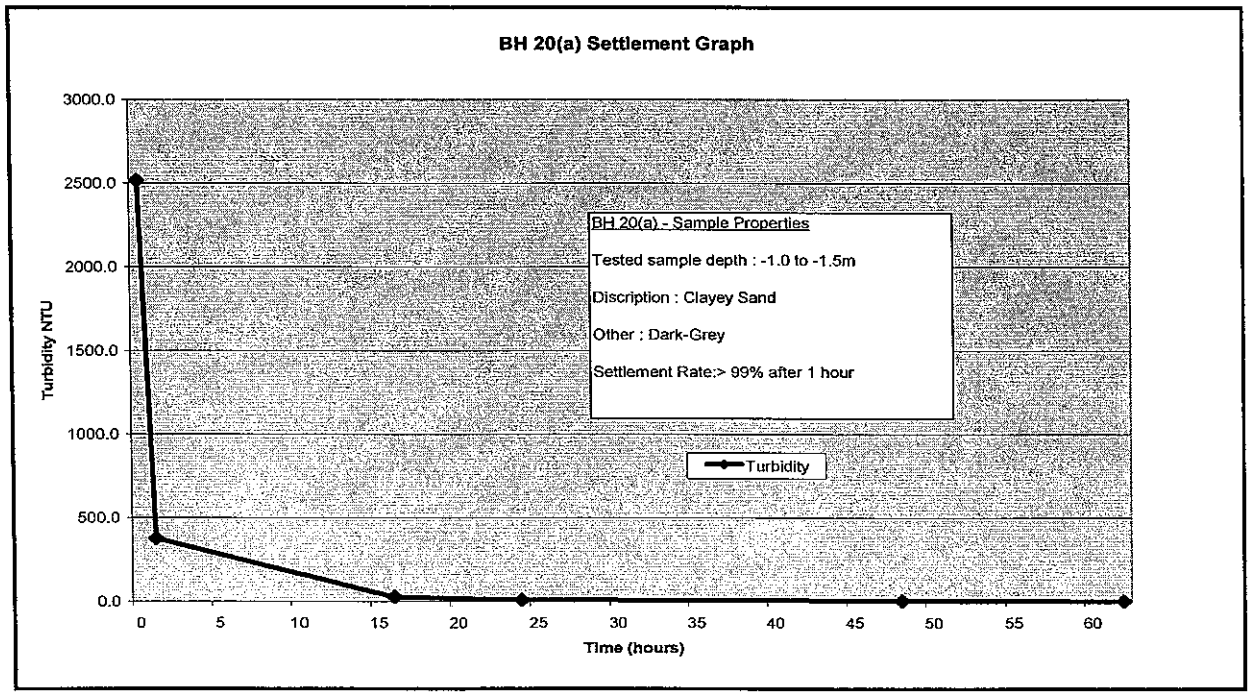
Graph 7 illustrates BH 16's turbidity measurements verses time



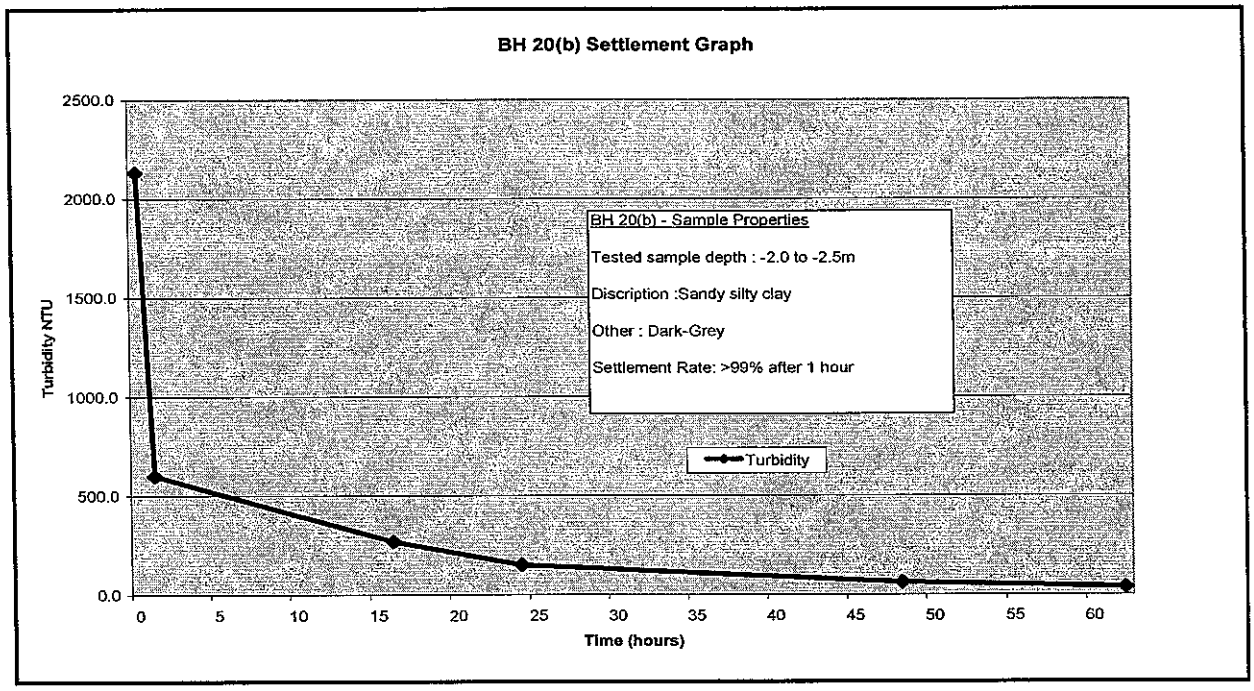
Graph 10 illustrates BH 19(b)'s turbidity measurements verses time



Graph 11 illustrates BH 20(a)'s turbidity measurements verses time



Graph 12 illustrates BH 20(b)'s turbidity measurements verses time



The graphs indicate that all samples (with the exception of sample BH 20(b)) required less than 16 hours to attain turbidity measurements of less than 100 NTU. After 24 hours, most (75%) samples had turbidity values less than 20 NTU. All the samples which were slow to clear were from boreholes BH 18, BH 19 and BH 20 in the estuarine sediment profile at the upstream extent of the proposed dredging. Holding periods in excess of 60 hours may be required to achieve turbidity levels suitable for discharge of return flows back to the river. Allowance for these prolonged holding periods should be made in planning the dredging operations.

Settlement rate testing showed that over 99% of all sediment fell out of suspension within one hour. There should thus be no problems in meeting the suspended solids criteria for release waters during dredging. It was observed however that although the clay and silt fines settled out of suspension, they formed sludge at the bottom of the container. This sludge showed little to no consolidation under saturated conditions. Draining this material and mixing it with sand fill may be required to provide engineered fill for reclamation works.

5.2.2 Dispersion

The six samples were collected from the clay profiles of boreholes BH 1, BH 2, BH 3, BH 15, BH 16 and BH 20 for dispersion testing using the Emersion crumb dispersion test. All testing was undertaken in under the supervision of a principal engineer at Coffey's Kunda Park office.

Test observations indicated that all samples tested are non dispersive soils, however, some slaking was observed in the pre Holocene clays in boreholes BH 15 and BH 16.

5.2.3 Particle size distribution

Twelve samples were selected for coarse particle size distribution analyses (down to 75 microns). The test method was by sieve analyses. Results for the selected samples are tabulated below in Table 2 with test certificates attached in Appendix C.

Table 2 Tabulated Results from the Coarse Particle Size Distribution Analyses

	Depth	Material	Dominant Particle Size
BH 1	-0.5 to -2.0m	Sandy clay	Refer Table 3
BH 2	-1.0 to -1.3m	Clayey sand	150 – 424 microns
BH 6	-2.0 to -2.4m	Sand	Even 0.15 – 9.5 mm
BH 8	-0.2 to -0.5m	Sand	150 – 600 microns
BH 10	-0.6 to -0.8m	Sand	Even 150 – 1180 microns
BH 12	-0.6 to -0.8m	Sand	0.3 – 1.18 mm
BH 13	-1.5 to -1.8m	Sand	Even 150 – 1180 microns
BH 14	-0.5 to -1.5m	Clayey sand	Refer Table 3
BH 15	-0.7 to -0.9m	Sand	150 – 600 microns
BH 18	-0.5 to -2.0m	Sand	Refer Table 3
BH 19	-1.0 to -1.4m	Clayey sand	0.3 – 2.36 mm
BH 20	-1.3 to -1.6m	Clayey sand	Even 75 – 1180 microns

Six samples were selected for fine particle size distribution analyses down to 2 microns. Testing was by the hydrometer method. The results are tabulated below in Table 3 with test certificates attached in Appendix C.

Table 2 Tabulated Results from the Fine Particle Size Distribution Analyses

	Depth	Material	Dominant Coarse Particle Size	Dominant Fines Size
BH 1	-0.25 to -2.25m	Sandy clay	Even 0.75 – 4.75 mm	30 – 60 microns 20% less than 2 microns
BH 4	-1.0 to -1.3m	Silty clay	150 – 600 microns	Even 2 – 40 microns 30% less than 2 microns
BH 11	-2.0 to -2.4m	Clayey sand	150 – 600 microns	12% less than 2 microns
BH 14	-0.2 to -0.5m	Clayey Sand	Even 0.15 – 2.36 mm	Even 1- 75 microns
BH 18	-0.6 to – 2.0 m	Sand with trace silt and clay fines	150 – 600 microns	Even 3 – 75 microns
BH 20	-.25 to -2.25m	Silty sandy clay	75 – 425 microns	Even 2 – 75 microns

5.3 Soil Type Assessment

The soils to be dredged consist of fine to medium grained sands, clays and silts. These soils are mostly present as loose sediments and unconsolidated clays. The clays present below the sediments in the pre Holocene profiles (BH11 to BH17) are firm to stiff with undrained shear strength values assessed to be 40 to 80 kPa.

Dredgability

Soils on the site can be readily cut with a medium sized cutter suction dredge. Production rates for smaller dredges may be lower at depth in the stiff clays in the vicinity of BH 11 to BH 17.

Testing has indicated that all soils will settle rapidly but higher turbidity may persist for soils in the upper reaches of the stream (BH18 to BH 20). Settling periods in excess of 60 hours may be required in these areas.

Suitability as Fill

The soils to be dredged are generally suitable for use as engineered fill. Due to the high fines content, it is unlikely that hydraulically placed fill will meet acceptable compaction standards. It is thus likely that the dredged spoil will have to be spread in layers not more than 300 mm thick, dried back to near optimum moisture content and mechanically compacted.

Differential settlement of sands and fines can be expected in the dredging process. It is important that the fines are not accumulated in one section of the reclamation area. Fines should be mixed back into the coarser fractions of the fill. This may be achieved by management of the dredging operations or may require mechanical removal.

6 CONTAMINATION INVESTIGATION

The most likely form of contamination of the river sediments was considered to be by heavy metals from industry or farming operations or tributyl tin from defouling water craft. In order to determine the risk of contaminated soils within the proposed dredge area, four sediment samples were collected during borehole drilling and laboratory tested for heavy metals and tributyl tin.

6.1 Field Work

The four samples were collected from the upper sediments in boreholes BH 1, BH 7, BH 14 and BH 20. The locations of sample sites are shown in Figure 1. Samples were collected at depths of approximately 100mm to 150mm, placed in sterile jars and chilled in the field before being frozen overnight for despatch to the analytical laboratories of Australian Laboratory Services (ALS).

6.2 Laboratory Analysis

All samples were analysed for a suite of heavy metals and tributyl tin. All testing was undertaken at ALS under the terms of their NATA accreditation. The test certificates are attached in Appendix C.

6.3 Results

The results for tributyl were all below the limit of registration. Low levels of heavy metals were recorded. These were all below the indicator limits for further investigation set by EPA.

6.4 Contamination Assessment

Based on the results of the analyses of the samples, there are no indications of contamination of the soils on the site.

7 CONCLUSIONS

Based on the investigations, dredging of the Caboolture River is feasible. The soils can be readily cut and pumped and will settle quickly. Longer holding periods will be required to reach normally acceptable turbidity levels.

Acid sulphate soils are present in the river. Many of these soils have a high natural neutralising capacity due to the presence of shell fragments. The excavation and handling of these soils will have to be undertaken in accordance with an ASSMP to avoid environmental harm.

The dredged spoil will have to be dried back and compacted to provide engineered fill for future building platforms. Some mechanical mixing of the fines through the coarser fractions may be necessary of the fines accumulate in one area due to the hydraulic placement of the fill.

There was no indication of contamination by heavy metals or tributyl tin in the river sediments.

For and on behalf of Coffey Geotechnics Pty Ltd

Ron McMahon

Principal Engineer

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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.

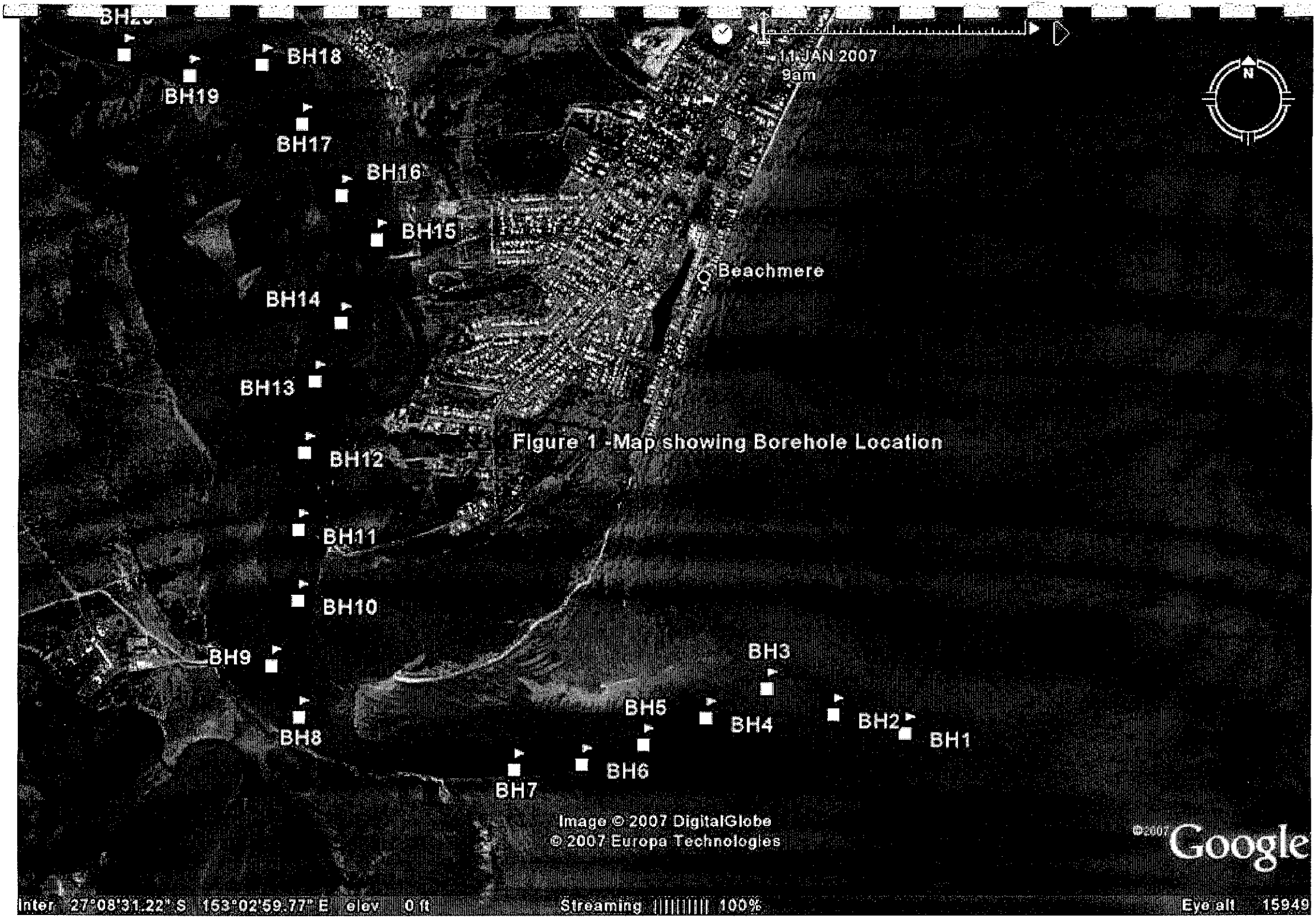
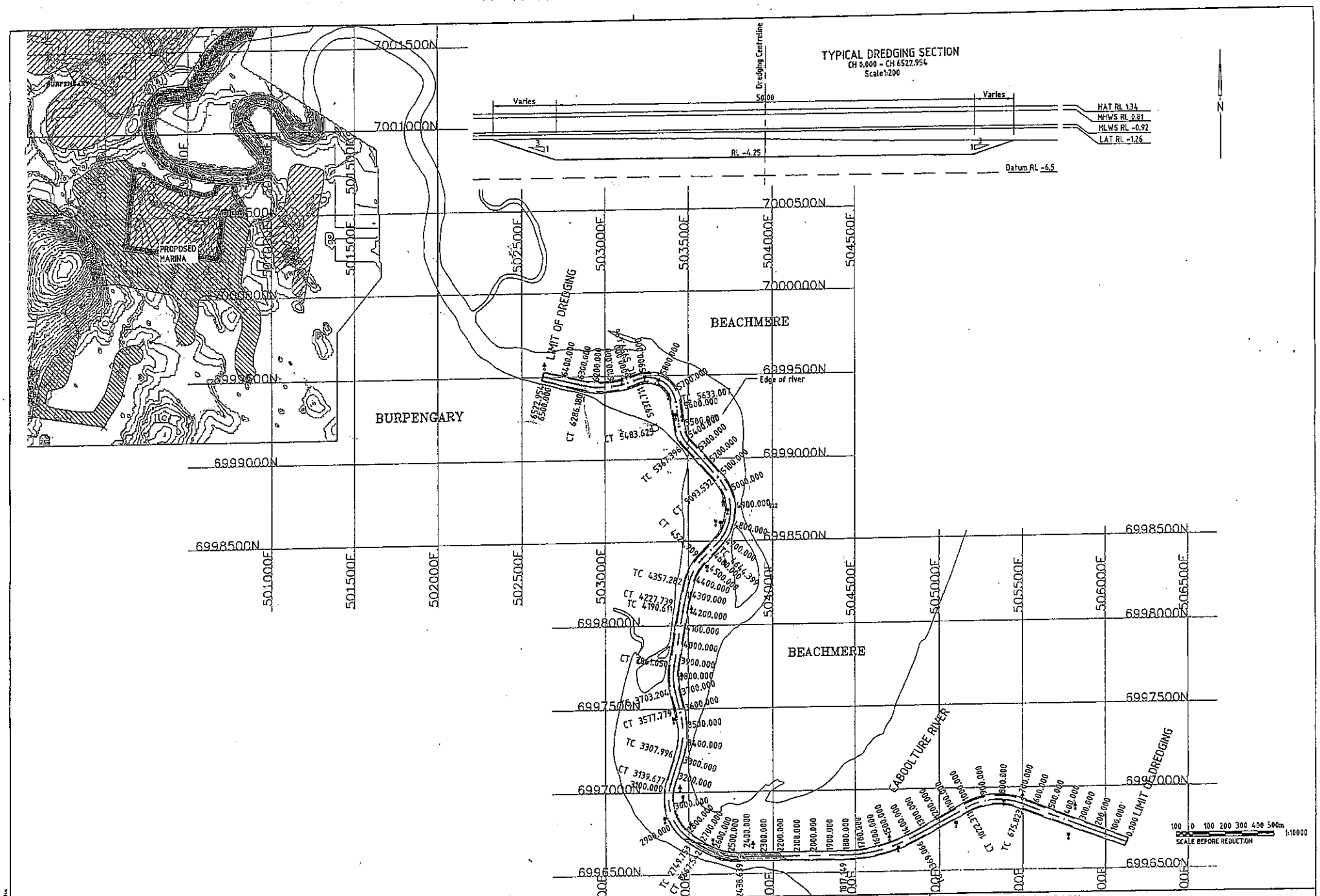


Figure 1 -Map showing Borehole Location



DESIGNED:
DRAWN:
CHECKED:
RECOMMENDED: PROJ. MGR
APPROVED: PROJ. DIR
A1
DATUM: A.H.D.

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NORTH EAST BUSINESS PARK
CABOOLTURE RIVER DREDGING
LAYOUT PLAN

DATED: 09-02-2007
DRAWING No: 7900/33/01-102
Rev.

REVISION

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH1**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	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 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to medium grained, dark grey, with shell fragments.	W	L/MD		ALLUVIAL
								SC	**CLAYEY SAND:** fine to medium grained, dark grey, with shell fragment banding.				MARINE CLAY
					-4.0	0.5							
				ASS & 2 BULK	-4.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, dark grey, with shell fragments.	M	S		
					-5.0	1.5							
					-5.5	2.0							
					-6.0	2.5			Borehole BH1 terminated at 2.5m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: COFGEOTECHVER7REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

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Engineering Log - Borehole

Borehole No.	**BH2**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information								material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
					-3.0	0.5		SP	**SAND:** fine to course grained, dark grey, with silt and clay bands, and shell fragments throughout.	W	L		ALLUVIAL
					-3.5	1.0		SC	**CLAYEY SAND:** fine to course grained, dark grey, with shell fragments throughout.				MARINE CLAY
				ASS & 2 BULK	-4.0	1.5		CH	**SANDY SILTY CLAY:** medium to high plasticity, dark grey, with shell fragments.	M	S		
					-4.5	2.0							
					-5.0	2.5							
									Borehole BH2 terminated at 2.6m				
					-5.5	3.0							
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ. LIBRARY FILE: COFGEOTECHVER7REV1.GLB. TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE. DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev 2

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Engineering Log - Borehole

Borehole No.	**BH3**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information								material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND"** fine to course grained, dark grey, with shell fragments, with clay & silt banding.	W	L		ALLUVIAL
					-3.0	0.5		SC	**CLAYEY SAND:** fine to course grained, with shell fragments.		MD		
				ASS & 2 BULK	-3.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, pale grey, with some fine to course grained sands and shell fragments.	M	S		MARINE CLAY
					-4.0	1.5							
					-4.5	2.0							
					-5.0	2.5							
					-5.5	3.0			Borehole BH3 terminated at 2.7m				
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH4**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information							material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
					-4.0	0.5		SC	**CLAYEY SAND:** fine to course grained, dark grey, with shell fragments.	W	MD		ALLUVIAL
				ASS & 2 BULK	-4.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, pale grey, with shell fragments.	M	S		MARINE CLAY
					-5.0	1.5							
					-5.5	2.0							
					-6.0	2.5							
					-6.5	3.0			Borehole BH4 terminated at 2.5m				
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH5**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**18.4.2007**
Principal:	
Date completed:	**18.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	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 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, dark grey, with shell fragments.	W	L		ALLUVIAL
								SC	**CLAYEY SAND:** fine to course grained, dark grey, with shell fragments.		MD		
					-4.0	0.5		SP	**SAND:** fine to medium grained, grey, with shell fragments.				
				ASS & 2 BULK	-4.5	1.0			...dark grey.				
					-5.0	1.5							
					-5.5	2.0		SC	CLAYEY SAND: **fine to medium grained, dark grey, with shell fragments.**				
					-6.0	2.5			Borehole BH5 terminated at 2.3m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, 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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH8**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**17.4.2007**
Principal:	
Date completed:	**17.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.0

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, pale brown/grey, with shell grit. ...dark grey.	W	L		ALLUVIAL
								SC	**CLAYEY SAND:** fine to medium grained, dark grey.				
					-3.5	0.5		SP	**SAND:** fine to medium grained, dark grey, with clay and silt fines. ...with SC lenses.				
				ASS & 2 BULK	-4.0	1.0							
					-4.5	1.5							
					-5.0	2.0			Borehole BH8 terminated at 2m				
					-5.5	2.5							
					-6.0	3.0							
					-6.5	3.5							
					-7.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH9**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**17.4.2007**
Date completed:	**17.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information							material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
				ASS & 2 BULK	-4.0	0.5		SP	**SAND:** fine to medium grained, dark grey, with silt and clay fines, with shell fragments.	W	L		ALLUVIAL
					-4.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, dark grey.		S		MARINE CLAY
					-5.0	1.5		SP	**SAND:** fine to medium grained, dark grey, with silty clay banding, with shell fragments.		MD		ALLUVIAL
					-5.5	2.0							
					-6.0	2.5			Borehole BH9 terminated at 2.25m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH10**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**17.4.2007**
Principal:	
Date completed:	**17.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, dark grey, with traces of shell.	W	L		ALLUVIAL
								SC	**CLAYEY SAND:** fine to medium frained, dark grey, with traces of shell.				
					-4.0	0.5		SP	**SAND:** fine to medium grained, dark grey, with traces of shell.				
				ASS & 2 BULK	-4.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, dark grey, with traces of shell.		F/St		MARINE CLAY
					-5.0	1.5							
					-5.5	2.0							
					-6.0	2.5			Borehole BH10 terminated at 2.3m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: C:\GEOTECH\VER7\REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH7**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -4.0

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information							material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, dark grey, with shell fragments.	W	L/MD		ALLUVIAL
					-4.5	0.5		SC	**CLAYEY SAND:** fine to course grained, dark grey, with shell fragments.				
				ASS & 2 BULK	-5.0	1.0		CH	**SANDY SILTY CLAY:** medium to high plasticity, dark grey, with shell fragments.	M	S		MARINE CLAY
					-5.5	1.5							
					-6.0	2.0							
					-6.5	2.5			Borehole BH7 terminated at 2.3m				
					-7.0	3.0							
					-7.5	3.5							
					-8.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH6**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**18.4.2007**
Principal:	
Date completed:	**18.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
				ASS & 2 BULK	-4.0	0.5		SP	**SAND:** fine to course grained, grey, with shell fragments.	W	L		ALLUVIAL
									...with shell matrix.				
					-4.5	1.0			...with shell fragments.				
					-5.0	1.5			...with silt and clay banding.				
					-5.5	2.0							
					-6.0	2.5			Borehole BH6 terminated at 2.25m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, 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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH11**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**17.4.2007**
Date completed:	**17.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information								material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
				ASS & 2 BULK	-3.0	0.5		SP	**SAND:** fine to medium grained, dark grey, with shell fragments, with traces of silts.	W	L		ALLUVIAL
					-3.5	1.0			...fine to course grained.				
					-4.0	1.5		CL	**SILTY CLAY:** low to medium plasticity, pale grey/green.	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
					-4.5	2.0			Borehole BH11 terminated at 1.8m				
					-5.0	2.5							
					-5.5	3.0							
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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 - Borehole

Borehole No.	**BH12**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**17.4.2007**
Principal:	
Date completed:	**17.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.0

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	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 100 200 300 400	structure and additional observations
					-3.5	0.5		SP	**SAND:** fine to medium grained, grey/brown, with shell fragments, with course sand traces. ...dark grey.	W	L		ALLUVIAL
				ASS & 2 BULK	-4.0	1.0		CH	**SANDY SILTY CLAY:** medium to high plasticity.	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
					-4.5	1.5							
					-5.0	2.0							
					-5.5	2.5			Borehole BH12 terminated at 2.25m				
					-6.0	3.0							
					-6.5	3.5							
					-7.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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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coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH13**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**17.4.2007**
Date completed:	**17.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, dark grey, with shell traces.	W	L		ALLUVIAL
					-4.0	0.5			...with SC bands/includes shells.				
				ASS & 2 BULK	-4.5	1.0			...grey, with shell matrix.				
					-5.0	1.5			...fine to medium grained.		MD		
					-5.5	2.0							
									Borehole BH13 terminated at 2.3m				
					-6.0	2.5							
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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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coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH14**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**17.4.2007**
Date completed:	**17.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: **NORTHEAST BUSINESS PARK**

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: **REFER PLAN**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.0

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
					-3.5	0.5		SP	**SAND:** fine to medium grained, dark grey, with shell fragments, with traces of course grained sands and silt.	W	L		ALLUVIAL
				ASS & 2 BULK	-4.0	1.0			...fine to medium grained, brown/grey, with shell fragments.		MD		
					-4.5	1.5			...with clayey sand banding.				
					-5.0	2.0							
					-5.5	2.5			Borehole BH14 terminated at 2.4m				
					-6.0	3.0							
					-6.5	3.5							
					-7.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, 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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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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coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH15**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**17.4.2007**
Principal:	
Date completed:	**17.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to course grained, brown, with shell fragments.	W	L		ALLUVIAL
					-3.0	0.5			...fine to medium grained, dark grey, with shell fragments, with traces of silt and clay fines.				
				ASS & 2 BULK	-3.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, pale grey, with red orange brown mottling, with traces of fine to course grained sands.	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
					-4.0	1.5							
					-4.5	2.0			Borehole BH15 terminated at 2.05m				
					-5.0	2.5							
					-5.5	3.0							
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, 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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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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coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH16**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**17.4.2007**
Date completed:	**17.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to medium grained, brown/grey, with shell fragments.	W	L		ALLUVIAL
					-3.0	0.5			...dark grey, with silt and clay fines.				
				ASS & 2 BULK	-3.5	1.0		CH	**SANDY SILTY CLAY:** medium to high plasticity, grey, with orange brown streaking.	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
					-4.0	1.5							
					-4.5	2.0			Borehole BH16 terminated at 2.1m				
					-5.0	2.5							
					-5.5	3.0							
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: COFGEOTECHVER7REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH17**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**17.4.2007**
Principal:	
Date completed:	**17.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								SP	**SAND:** fine to medium grained, brown/grey, with shell fragments.	W	L		ALLUVIAL
					-3.0	0.5			...dark grey, with shell fragments/matrix, with silts and clay fines traces.				
				ASS & 2 BULK	-3.5	1.0		CH	**SILTY CLAY:** medium to high plasticity, grey/ red orange brown, with fine to course grained sands, and fine to medium grained angular and sub-angular gravel.	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
					-4.0	1.5							
					-4.5	2.0			Borehole BH17 terminated at 2m				
					-5.0	2.5							
					-5.5	3.0							
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: COFGEOTECHVER7REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

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Engineering Log - Borehole

Borehole No.	**BH18**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
				ASS & 2 BULK	-3.0	0.5		SP	**SAND:** fine to course grained, dark grey, with CL banding throughout, with traces odf silt and clay fines, traces of shell fragments throughout.	W	L/MD		ALLUVIAL
					-3.5	1.0							
					-4.0	1.5							
					-4.5	2.0							
					-5.0	2.5							
					-5.5	3.0			Borehole BH18 terminated at 2.6m				
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: COFGEOTECHVER7REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev 2

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH19**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Date started:	**18.4.2007**
Date completed:	**18.4.2007**
Logged by:	**LC**
Checked by:	**LC**

Client: ***NORTHEAST BUSINESS PARK***

Principal:

Project: ***CABOOLTURE RIVER***

Borehole Location: ***REFER PLAN***

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -2.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
				ASS & 2 BULK	-3.0	0.5		SC	**CLAYEY SAND:** fine to course grained, dark grey, with SP banding containing silt and clay fines, with shell fragments.	W	L/MD		ALLUVIAL
					-3.5	1.0							
					-4.0	1.5							
					-4.5	2.0		CH	**SILTY CLAY:** medium to high plasticity, dark grey, with shell fragments.	M	S		MARINE CLAY
					-5.0	2.5							
					-5.5	3.0			Borehole BH19 terminated at 2.55m				
					-6.0	3.5							
					-6.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ. LIBRARY FILE: COFGEOTECHVER7REV1.GLB. TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE. DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH20**
Sheet	1 of 1
Project No:	**GEOTKPAR01150AA**
Client:	**NORTHEAST BUSINESS PARK**
Date started:	**18.4.2007**
Principal:	
Date completed:	**18.4.2007**
Project:	**CABOOLTURE RIVER**
Logged by:	**LC**
Borehole Location:	**REFER PLAN**
Checked by:	**LC**

drill model and mounting: VIBROCORE | Easting: | slope: -90° | R.L. Surface: -3.5

hole diameter: mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
								CL	**SANDY SILTY CLAY:** low to medium plasticity, dark grey.	W	VS		ALLUVIAL
								SC	**CLAYEY SAND:** fine to medium grained, dark grey.		L		
					-4.0	0.5		CL	**SANDY SILTY CLAY:** low to medium plasticity, dark grey.		S		
					-4.5	1.0		SP	**SAND:** fine to medium grained, grey, with clay and silt fines.		L/MD		
				ASS & 2 BULK				SC	**SLAYEY SAND:** fine to medium grained, dark grey.		MD		
					-5.0	1.5							
					-5.5	2.0		CH	**SILTY CLAY:** medium to high plasticityt, dark grey.	M	S/F		MARINE CLAY
					-6.0	2.5							
									Borehole BH20 terminated at 2.5m				
					-6.5	3.0							
					-7.0	3.5							
					-7.5	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, 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
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
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
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

PROJECT FILE: GK01150AA.GPJ LIBRARY FILE: COFGEOTECHVER7REV1.GLB TEMPLATE FILE: COFFEY.GDT FRAME TITLE: BOREHOLE DATE: 3.5.07

Form GEO 5.3 Issue 3 Rev.2

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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.

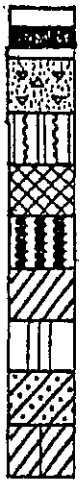
Coffey Partners International Pty Ltd
ACN 003 692 019

COFFEY

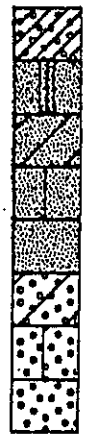
Explanation
Sheet 2

graphic symbols soil and rock

SOIL



Asphaltic Concrete or Hotmix
Concrete
Topsoil
Fill
Peat, Organic Clays and Silts (Pt, OL, OH)
Clay (CL, CH)
Silt (ML, MH)
Sandy Clay (CL, CH)
Silty Clay (CL, CH)

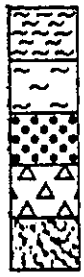


Gravelly Clay (CL, CH)
Sandy Silt (ML)
Clayey Sand (SC)
Silty Sand (SM)
Sand (SP, SW)
Clayey Gravel (GC)
Silty Gravel (GM)
Gravel (GP, GW)

ROCK

Claystone (massive)
Siltstone (massive)
Shale (laminated)
Sandstone (undifferentiated)
Sandstone, fine grained
Sandstone, coarse grained
Conglomerate

Limestone
Coal
Dolerite, Basalt
Tuff
Porphyry
Granite
Pegmatite



Schist
Gneiss
Quartzite
Talus
Alluvium

SEAMS

Seam >0.1 m thick
(on a scale 1:50)
Seam 0.01 m to 0.1 m thick
(on a scale 1:50)

INCLUSIONS (Special purposes only)

Rock Fragments
Swamp

Ironstone Gravel, Laterite
Shale Breccia in Sandstone

Water Level

Surfaces ——— Known Boundary — — — Probable Boundary ——?——? Possible Boundary

A.S.S. FIELD SCREEN ANALYSIS REPORT

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 EMAIL pe@biotrack.com.au

DATE OF REPORT 26 APRIL 2007
CLIENT NAME LUKE CRAIG
CLIENT FIRM COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
CLIENT ADDRESS PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
NUMBER OF SAMPLES 40 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
PACKAGING SAMPLES LABELLED - INTACT
SAMPLES DISPOSED ON 1/8/2007
LOG-IN DATE 23 APRIL 2007 LAB REF. LR23047.627

TEST METHODOLOGY FOR pH_f AND pH_fox AS PER QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0=none 1=slight 2=moderate 3=high 4=very high (steam evolved) visual observation at 0-5 minutes.
TEMP: Surface temperature rise ('C) oxidised sample at 5 minutes.

SAMPLE ID	Upper	Lower (m)	pH_f	pH_fox	change	RATE	TEMP	INDICATION
BH 1	0.25		7.2	7.3	0.1	4	8	no TAA & no TPA & low sulphide
BH 1	0.50		7.5	7.3	-0.2	4	8	no TAA & no TPA & low sulphide
BH 1	0.75		7.5	7.2	-0.3	4	9	no TAA & no TPA & low sulphide
BH 1	1.00		7.7	7.3	-0.4	4	7	no TAA & no TPA & low sulphide
BH 1	1.25		7.7	7.2	-0.5	4	10	no TAA & no TPA & low sulphide
BH 1	1.50		7.7	5.8	-1.9	4	7	no TAA & low TPA
BH 1	1.75		7.8	6.4	-1.4	3	14	no TAA & low TPA
BH 1	2.00		7.8	5.1	-2.7	3	8	no TAA & low TPA & sulphide possible
BH 1	2.25		8.0	4.2	-3.8	3	9	no TAA & high sulphide/low buffer
BH 1	2.50		7.7	5.5	-2.2	3	7	no TAA & low TPA & sulphide possible
BH 2	0.25		7.4	5.5	-1.9	4	11	no TAA & low TPA
BH 2	0.50		7.5	6.2	-1.3	4	13	no TAA & low TPA
BH 2	0.75		7.3	6.1	-1.2	4	7	no TAA & low TPA
BH 2	1.00		7.3	3.8	-3.5	4	8	no TAA & high sulphide/low buffer
BH 2	1.25		7.8	4.9	-2.9	4	7	no TAA & low TPA & sulphide possible
BH 2	1.50		7.8	5.1	-2.7	4	7	no TAA & low TPA & sulphide possible
BH 2	1.75		8.0	6.0	-2.0	4	14	no TAA & low TPA
BH 2	2.00		7.9	6.7	-1.2	4	15	no TAA & no TPA
BH 2	2.25		7.9	6.9	-1.0	4	7	no TAA & no TPA
BH 2	2.50		7.6	7.1	-0.5	4	8	no TAA & no TPA & low sulphide
BH 3	0.25		7.8	6.3	-1.5	3	9	no TAA & low TPA
BH 3	0.50		7.8	6.3	-1.5	3	8	no TAA & low TPA
BH 3	0.75		7.8	6.5	-1.3	3	6	no TAA & low TPA
BH 3	1.00		7.7	6.9	-0.8	3	8	no TAA & no TPA & low sulphide
BH 3	1.25		7.9	7.1	-0.8	3	8	no TAA & no TPA & low sulphide
BH 3	1.50		7.8	7.2	-0.6	3	6	no TAA & no TPA & low sulphide
BH 3	1.75		7.9	7.5	-0.4	3	6	no TAA & no TPA & low sulphide
BH 3	2.00		7.7	7.2	-0.5	3	11	no TAA & no TPA & low sulphide
BH 3	2.25		7.8	7.0	-0.8	3	8	no TAA & no TPA & low sulphide
BH 3	2.50		7.6	5.7	-1.9	3	9	no TAA & low TPA
BH 4	0.25		7.6	6.8	-0.8	4	0	no TAA & no TPA & low sulphide
BH 4	0.50		7.4	6.6	-0.8	3	9	no TAA & no TPA & low sulphide
BH 4	0.75		8.0	7.2	-0.8	3	8	no TAA & no TPA & low sulphide
BH 4	1.00		8.0	7.3	-0.7	3	8	no TAA & no TPA & low sulphide
BH 4	1.25		8.0	7.2	-0.8	3	7	no TAA & no TPA & low sulphide
BH 4	1.50		8.0	6.9	-1.1	3	8	no TAA & no TPA
BH 4	1.75		7.9	6.1	-1.8	3	5	no TAA & low TPA
BH 4	2.00		7.9	4.7	-3.2	4	8	no TAA & low TPA & high sulphide/low buffer
BH 4	2.25		7.9	4.9	-3.0	4	6	no TAA & low TPA & sulphide possible
BH 4	2.50		7.5	3.7	-3.8	4	6	no TAA & high sulphide/low buffer

P. Robertson _____ Signatory For and behalf of Bio-Track Pty Ltd

A.S.S. FIELD SCREEN ANALYSIS REPORT

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 EMAIL pe@biotrack.com.au

DATE OF REPORT 27 APRIL 2007
CLIENT NAME LUKE CRAIG
CLIENT FIRM COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
CLIENT ADDRESS PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
NUMBER OF SAMPLES 45 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
PACKAGING SAMPLES LABELLED - INTACT
SAMPLES DISPOSED ON 1/8/2007
LOG-IN DATE 23 APRIL 2007 LAB REF. LR23047.635

TEST METHODOLOGY FOR pH_f AND pH_fox AS PER QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0=none 1=slight 2=moderate 3=high 4=very high (steam evolved) visual observation at 0-5 minutes.
TEMP: Surface temperature rise ('C) oxidised sample at 5 minutes.

SAMPLE ID	Upper	Lower (m)	pH_f	pH_fox	change	RATE	TEMP	INDICATION
BH 5	0.25		6.7	6.9	0.2	1	0	no TAA & no TPA & low sulphide
BH 5	0.5		6.8	7.0	0.2	1	4	no TAA & no TPA & low sulphide
BH 5	0.75		7.0	7.2	0.2	1	9	no TAA & no TPA & low sulphide
BH 5	1.0		7.5	7.2	-0.3	1	3	no TAA & no TPA & low sulphide
BH 5	1.25		7.6	5.8	-1.8	3	3	no TAA & low TPA
BH 5	1.5		7.4	6.0	-1.4	4	1	no TAA & low TPA
BH 5	1.75		7.2	6.9	-0.3	3	5	no TAA & no TPA & low sulphide
BH 5	2.0		7.1	5.6	-1.5	1	0	no TAA & low TPA
BH 5	2.25		7.0	6.1	-0.9	1	3	no TAA & low TPA & low sulphide
BH 6	0.25		6.9	6.9	0.0	1	9	no TAA & no TPA & low sulphide
BH 6	0.5		7.0	7.2	0.2	1	7	no TAA & no TPA & low sulphide
BH 6	0.75		7.3	7.1	-0.2	1	3	no TAA & no TPA & low sulphide
BH 6	1.0		7.7	7.2	-0.5	4	4	no TAA & no TPA & low sulphide
BH 6	1.25		7.5	7.2	-0.3	1	4	no TAA & no TPA & low sulphide
BH 6	1.5		7.3	7.2	-0.1	1	5	no TAA & no TPA & low sulphide
BH 6	1.75		7.2	7.1	-0.1	1	7	no TAA & no TPA & low sulphide
BH 6	2.0		7.2	7.0	-0.2	1	3	no TAA & no TPA & low sulphide
BH 6	2.25		7.2	7.1	-0.1	1	6	no TAA & no TPA & low sulphide
BH 7	0.25		7.1	6.3	-0.8	2	9	no TAA & low TPA & low sulphide
BH 7	0.5		7.0	4.8	-2.2	4	4	no TAA & low TPA & sulphide possible
BH 7	0.75		7.0	5.6	-1.4	1	1	no TAA & low TPA
BH 7	1.0		7.5	6.8	-0.7	4	3	no TAA & no TPA & low sulphide
BH 7	1.25		7.4	3.8	-3.6	4	2	no TAA & high sulphide/low buffer
BH 7	1.5		7.5	4.7	-2.8	4	4	no TAA & low TPA & sulphide possible
BH 7	1.75		7.6	3.2	-4.4	4	1	no TAA & moderate TPA & high sulphide/low buffer
BH 7	2.0		7.3	4.1	-3.2	4	2	no TAA & high sulphide/low buffer
BH 7	2.25		7.6	4.8	-2.8	4	4	no TAA & low TPA & sulphide possible
BH 8	0.25		7.3	5.7	-1.6	4	5	no TAA & low TPA
BH 8	0.5		7.6	4.8	-2.8	4	1	no TAA & low TPA & sulphide possible
BH 8	0.75		7.1	4.3	-2.8	4	1	no TAA & sulphide possible
BH 8	1.0		7.4	4.4	-3.0	4	1	no TAA & sulphide possible
BH 8	1.25		7.0	2.9	-4.1	2	1	no TAA & moderate TPA & high sulphide/low buffer
BH 8	1.5		7.0	3.5	-3.5	1	1	no TAA & high sulphide/low buffer
BH 8	1.75		7.3	4.1	-3.2	4	1	no TAA & high sulphide/low buffer
BH 8	2.0		7.3	6.8	-0.5	2	0	no TAA & no TPA & low sulphide
BH 9	0.25		7.4	3.5	-3.9	4	1	no TAA & high sulphide/low buffer
BH 9	0.5		7.3	2.9	-4.4	4	2	no TAA & moderate TPA & high sulphide/low buffer
BH 9	0.75		7.6	4.7	-2.9	4	1	no TAA & low TPA & sulphide possible
BH 9	1.0		7.7	5.1	-2.6	4	0	no TAA & low TPA & sulphide possible
BH 9	1.25		7.5	5.2	-2.3	4	2	no TAA & low TPA & sulphide possible
BH 9	1.5		7.1	2.9	-4.2	4	1	no TAA & moderate TPA & high sulphide/low buffer
BH 9	1.75		7.4	3.0	-4.4	4	1	no TAA & moderate TPA & high sulphide/low buffer
BH 9	2.0		7.3	3.0	-4.3	4	0	no TAA & moderate TPA & high sulphide/low buffer
BH 9	2.25		7.1	3.1	-4.0	4	0	no TAA & moderate TPA & high sulphide/low buffer
BH 9	2.5		7.4	3.8	-3.6	4	0	no TAA & high sulphide/low buffer

Signatory For and behalf of Bio-Track Pty Ltd

A.S.S. FIELD SCREEN ANALYSIS REPORT

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 EMAIL pe@biotrack.com.au

DATE OF REPORT 27 APRIL 2007
CLIENT NAME LUKE CRAIG
CLIENT FIRM COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
CLIENT ADDRESS PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
NUMBER OF SAMPLES 42 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
PACKAGING SAMPLES LABELLED - INTACT
SAMPLES DISPOSED ON 1/8/2007
LOG-IN DATE 23 APRIL 2007 LAB REF. LR23047.639

TEST METHODOLOGY FOR pH_f AND pH_fox AS PER QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0=none 1=slight 2=moderate 3=high 4=very high (steam evolved) visual observation at 0-5 minutes.
TEMP: Surface temperature rise ('C) oxidised sample at 5 minutes.

SAMPLE ID	Upper	Lower (m)	pH_f	pH_fox	change	RATE	TEMP	INDICATION
BH 10	0.25		7.1	3.3	-3.8	4	7	no TAA & moderate TPA & high sulphide/low buffer
BH 10	0.5		7.2	3.2	-4.0	4	8	no TAA & moderate TPA & high sulphide/low buffer
BH 10	0.75		7.3	5.2	-2.1	3	13	no TAA & low TPA & sulphide possible
BH 10	1.0		8.3	8.2	-0.1	2	11	no TAA & no TPA & low sulphide
BH 10	1.25		8.1	8.0	-0.1	2	4	no TAA & no TPA & low sulphide
BH 10	1.5		8.0	8.2	0.2	2	4	no TAA & no TPA & low sulphide
BH 10	1.75		8.3	8.4	0.1	2	0	no TAA & no TPA & low sulphide
BH 10	2.0		8.0	8.1	0.1	2	4	no TAA & no TPA & low sulphide
BH 10	2.25		8.2	8.1	-0.1	1	3	no TAA & no TPA & low sulphide
BH 11	0.25		7.2	3.8	-3.4	3	5	no TAA & high sulphide/low buffer
BH 11	0.5		7.2	5.0	-2.2	3	8	no TAA & low TPA & sulphide possible
BH 11	0.75		7.4	6.3	-1.1	3	6	no TAA & low TPA
BH 11	1.0		7.4	5.2	-2.2	1	9	no TAA & low TPA & sulphide possible
BH 11	1.25		7.8	3.4	-4.4	1	11	no TAA & moderate TPA & high sulphide/low buffer
BH 11	1.5		7.9	7.4	-0.5	1	6	no TAA & no TPA & low sulphide
BH 11	1.75		8.0	7.5	-0.5	1	3	no TAA & no TPA & low sulphide
BH 12	0.25		7.4	7.1	-0.3	3	9	no TAA & no TPA & low sulphide
BH 12	0.5		7.4	6.7	-0.7	3	5	no TAA & no TPA & low sulphide
BH 12	0.75		7.8	5.9	-1.9	1	6	no TAA & low TPA
BH 12	1.0		7.3	4.2	-3.1	1	2	no TAA & high sulphide/low buffer
BH 12	1.25		7.8	6.8	-1.0	1	4	no TAA & no TPA
BH 12	1.5		7.6	7.3	-0.3	1	8	no TAA & no TPA & low sulphide
BH 12	1.75		7.7	4.7	-3.0	1	6	no TAA & low TPA & sulphide possible
BH 12	2.0		7.7	6.9	-0.8	3	14	no TAA & no TPA & low sulphide
BH 12	2.25		8.0	6.9	-1.1	2	7	no TAA & no TPA
BH 13	0.25		7.3	2.9	-4.4	2	8	no TAA & moderate TPA & high sulphide/low buffer
BH 13	0.5		7.5	4.6	-2.9	3	11	no TAA & low TPA & sulphide possible
BH 13	0.75		7.4	2.8	-4.6	3	6	no TAA & moderate TPA & high sulphide/low buffer
BH 13	1.0		7.4	5.1	-2.3	3	13	no TAA & low TPA & sulphide possible
BH 13	1.25		7.1	6.4	-0.7	2	10	no TAA & low TPA & low sulphide
BH 13	1.5		7.1	4.2	-2.9	2	5	no TAA & sulphide possible
BH 13	1.75		7.3	5.3	-2.0	1	7	no TAA & low TPA
BH 13	2.0		7.2	2.9	-4.3	1	4	no TAA & moderate TPA & high sulphide/low buffer
BH 13	2.25		7.4	3.3	-4.1	1	4	no TAA & moderate TPA & high sulphide/low buffer
BH 14	0.25		7.4	4.1	-3.3	1	5	no TAA & high sulphide/low buffer
BH 14	0.5		7.2	4.2	-3.0	1	6	no TAA & sulphide possible
BH 14	0.75		7.2	4.1	-3.1	1	7	no TAA & high sulphide/low buffer
BH 14	1.0		7.3	5.1	-2.2	1	3	no TAA & low TPA & sulphide possible
BH 14	1.25		7.3	5.1	-2.2	1	7	no TAA & low TPA & sulphide possible
BH 14	1.5		6.9	3.9	-3.0	1	6	no TAA & sulphide possible
BH 14	2.0		6.9	4.1	-2.8	1	4	no TAA & sulphide possible
BH 14	2.25		7.2	4.1	-3.1	1	2	no TAA & high sulphide/low buffer

P. Robertson _____ Signatory For and behalf of Bio-Track Pty Ltd

A.S.S. FIELD SCREEN ANALYSIS REPORT

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 EMAIL pe@biotrack.com.au

DATE OF REPORT 27 APRIL 2007
CLIENT NAME LUKE CRAIG
CLIENT FIRM COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
CLIENT ADDRESS PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
NUMBER OF SAMPLES 34 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
PACKAGING SAMPLES LABELLED - INTACT
SAMPLES DISPOSED ON 1/8/2007
LOG-IN DATE 23 APRIL 2007 LAB REF. LR23047.642

TEST METHODOLOGY FOR pH_f AND pH_fox AS PER QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0=none 1=slight 2=moderate 3=high 4=very high (steam evolved) visual observation at 0-5 minutes.
TEMP: Surface temperature rise ('C) oxidised sample at 5 minutes.

SAMPLE ID	Upper	Lower (m)	pH_f	pH_fox	change	RATE	TEMP	INDICATION
BH 15	0.25		7.3	7.1	-0.2	4	11	no TAA & no TPA & low sulphide
BH 15	0.5		7.4	3.2	-4.2	4	9	no TAA & moderate TPA & high sulphide/low buffer
BH 15	0.75		7.3	3.1	-4.2	3	7	no TAA & moderate TPA & high sulphide/low buffer
BH 15	1.0		7.2	3.8	-3.4	3	24	no TAA & high sulphide/low buffer
BH 15	1.25		8.3	7.8	-0.5	2	6	no TAA & no TPA & low sulphide
BH 15	1.5		7.9	7.0	-0.9	4	14	no TAA & no TPA & low sulphide
BH 15	1.75		8.0	7.6	-0.4	4	10	no TAA & no TPA & low sulphide
BH 15	2.0		8.3	6.8	-1.5	4	15	no TAA & no TPA
BH 16	0.25		7.3	2.9	-4.4	4	5	no TAA & moderate TPA & high sulphide/low buffer
BH 16	0.5		7.1	6.8	-0.3	4	3	no TAA & no TPA & low sulphide
BH 16	0.75		7.5	5.9	-1.6	3	8	no TAA & low TPA
BH 16	1.0		7.9	5.1	-2.8	3	14	no TAA & low TPA & sulphide possible
BH 16	1.25		8.4	6.2	-2.2	3	15	no TAA & low TPA & sulphide possible
BH 16	1.5		8.0	7.0	-1.0	3	8	no TAA & no TPA
BH 16	1.75		7.9	6.8	-1.1	3	24	no TAA & no TPA
BH 16	2.0		8.3	7.3	-1.0	3	11	no TAA & no TPA
BH 17	0.25		7.4	5.6	-1.8	3	7	no TAA & low TPA
BH 17	0.5		7.4	2.7	-4.7	3	23	no TAA & moderate TPA & high sulphide/low buffer
BH 17	0.75		7.4	4.3	-3.1	4	11	no TAA & high sulphide/low buffer
BH 17	1.0		6.1	2.1	-4.0	4	6	low TAA & high TPA & high sulphide/low buffer
BH 17	1.25		5.5	2.6	-2.9	4	6	low TAA & moderate TPA & sulphide possible
BH 17	1.5		6.9	4.9	-2.0	3	20	no TAA & low TPA
BH 17	1.75		6.8	2.2	-4.6	4	8	no TAA & high TPA & high sulphide/low buffer
BH 17	2.0		6.9	4.8	-2.1	3	10	no TAA & low TPA & sulphide possible
BH 18	0.25		7.0	4.8	-2.2	2	6	no TAA & low TPA & sulphide possible
BH 18	0.5		7.1	2.4	-4.7	3	23	no TAA & high TPA & high sulphide/low buffer
BH 18	0.75		7.2	4.2	-3.0	3	2	no TAA & sulphide possible
BH 18	1.0		7.0	2.9	-4.1	4	9	no TAA & moderate TPA & high sulphide/low buffer
BH 18	1.25		7.3	4.2	-3.1	4	0	no TAA & high sulphide/low buffer
BH 18	1.5		7.2	3.1	-4.1	4	2	no TAA & moderate TPA & high sulphide/low buffer
BH 18	1.75		7.3	3.2	-4.1	3	9	no TAA & moderate TPA & high sulphide/low buffer
BH 18	2.0		7.3	2.8	-4.5	3	0	no TAA & moderate TPA & high sulphide/low buffer
BH 18	2.25		7.5	3.1	-4.4	3	20	no TAA & moderate TPA & high sulphide/low buffer
BH 18	2.5		7.3	3.5	-3.8	4	3	no TAA & high sulphide/low buffer

P. Robertson _____ Signatory For and behalf of Bio-Track Pty Ltd

A.S.S. FIELD SCREEN ANALYSIS REPORT

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 EMAIL pe@biotrack.com.au

DATE OF REPORT 27 APRIL 2007
CLIENT NAME LUKE CRAIG
CLIENT FIRM COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
CLIENT ADDRESS PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
NUMBER OF SAMPLES 20 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
PACKAGING SAMPLES LABELLED - INTACT
SAMPLES DISPOSED ON 1/8/2007
LOG-IN DATE 23 APRIL 2007 LAB REF. LR23047.645

TEST METHODOLOGY FOR pH_f AND pH_fox AS PER QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0=none 1=slight 2=moderate 3=high 4=very high (steam evolved) visual observation at 0-5 minutes.
TEMP: Surface temperature rise ('C) oxidised sample at 5 minutes.

SAMPLE ID	Upper	Lower (m)	pH_f	pH_fox	change	RATE	TEMP	INDICATION
BH 19	0.25		7.1	3.8	-3.3	3	0	no TAA & high sulphide/low buffer
BH 19	0.50		7.1	4.2	-2.9	3	1	no TAA & sulphide possible
BH 19	0.75		7.2	3.6	-3.6	3	2	no TAA & high sulphide/low buffer
BH 19	1.00		6.9	3.2	-3.7	3	3	no TAA & moderate TPA & high sulphide/low buffer
BH 19	1.25		7.4	3.2	-4.2	4	21	no TAA & moderate TPA & high sulphide/low buffer
BH 19	1.50		7.3	4.2	-3.1	3	1	no TAA & high sulphide/low buffer
BH 19	1.75		7.4	2.8	-4.6	4	17	no TAA & moderate TPA & high sulphide/low buffer
BH 19	2.00		7.6	3.0	-4.6	4	41	no TAA & moderate TPA & high sulphide/low buffer
BH 19	2.25		7.5	4.1	-3.4	4	8	no TAA & high sulphide/low buffer
BH 19	2.50		7.2	2.7	-4.5	4	13	no TAA & moderate TPA & high sulphide/low buffer
BH 20	0.25		6.7	4.8	-1.9	4	8	no TAA & low TPA
BH 20	0.50		7.1	3.2	-3.9	4	11	no TAA & moderate TPA & high sulphide/low buffer
BH 20	0.75		6.9	2.7	-4.2	4	2	no TAA & moderate TPA & high sulphide/low buffer
BH 20	1.00		7.3	3.7	-3.6	3	2	no TAA & high sulphide/low buffer
BH 20	1.25		7.3	3.9	-3.4	4	23	no TAA & high sulphide/low buffer
BH 20	1.50		7.0	4.3	-2.7	4	20	no TAA & sulphide possible
BH 20	1.75		7.2	2.3	-4.9	4	7	no TAA & high TPA & high sulphide/low buffer
BH 20	2.00		7.4	2.9	-4.5	4	6	no TAA & moderate TPA & high sulphide/low buffer
BH 20	2.25		7.2	2.7	-4.5	4	18	no TAA & moderate TPA & high sulphide/low buffer
BH 20	2.50		6.9	2.5	-4.4	4	7	no TAA & moderate TPA & high sulphide/low buffer

P. Robertson _____ Signatory For and behalf of Bio-Track Pty Ltd

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275

781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 Fx. 07 3289 7155

LAB REFERENCE LR23047.615 DATE OF REPORT 29 APRIL 2007 @17:01:44
CLIENT NAME LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
SAMPLING DATE 17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
DATE RECEIVED 23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008

Sample ID as received. METHODOLOGY: As per (DNR QASSIT May 2004), oven dried (85'C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.
LIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ aS_RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TAA + aS_POS or S_Cr + aS_RAS -ANC_E/1.5
NB. Lime rates assume 97% lime neutralisation but DO NOT include any safety factors. Suggested factor=1.5-2. Rates are kg/ton. Multiply by bulk density to convert to kg/m3.
Fineness Factor=1.5 CBN POS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCl) + (Mg POS - Mg KCl) is due to carbonate solution.
Blanks represent unmeasured values, zeros & <0.x represent measured values. If pH KCl>4.5 then s-RAS (calculated from acid extract) may be zero for undisturbed soil. Ca/ar is the acid reactive calcium calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

ID.	DEPTH	pH	pH	TAA	TPA	TSA	S KCl	S P	S POS	S Cr	s-RAS	s EQ	Ca KCl	Ca P	Mg KCl	Mg P	CBN POS	LIME1	LIME2	sANC_E	Ca/ar
	m	KCL	ox	m/t	m/t	m/t	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	m/t	kg/t	kg/t	%	mg/kg
Analytical Method Codes		23A	23B	23F	23G	23H	23Ce	23De	23Ee	22B	s23Re	s	23Vh	23Wh	23Sm	23Tm	a23U&X			s19A2	
BH 1	1.0	9.06	8.60	0	0	0	0.06	0.15	0.09		0.18	0.087	1245	2182	589	598	48	1.8	4.7	0.18	124997
BH 1	1.5	8.54	5.72	0	13	13	0.11	0.23	0.12		0.58	0.704	1491	1942	1399	785	22	19.4	21.9		9857
BH 1	2.0	8.31	5.33	0	27	27	0.10	0.03	<0.01		0.76	0.765	1423	307	1387	147	0	26.0	24.6		9107
BH 1	2.5	8.43	6.59	0	0	0	0.10	0.19	0.09		0.75	0.835	1505	1605	1365	587	5	24.1	26.9	<0.01	40077
BH 2	1.0	7.97	6.87	0	0	0	0.05	0.04	<0.01		0.11	0.111	507	252	298	117	0	3.6	3.6	<0.01	3256
BH 2	1.5	8.31	8.28	0	0	0	0.05	0.81	0.76		0.11	0.740	491	8914	290	2110	570	-0.5	24.0	0.02	12232
BH 2	2.0	8.49	8.15	0	0	0	0.07	0.14	0.07		0.12	0.156	1060	1535	520	372	24	3.1	5.3	0.03	16221
BH 2	2.5	8.56	8.63	0	0	0	0.05	0.04	<0.01		0.16	0.059	1034	633	435	155	0	3.0	3.0	0.10	42567
BH 3	1.0	8.72	8.59	0	0	0	0.06	0.77	0.71		0.16	0.634	1018	9583	493	1942	547	-1.6	21.2	0.07	57491
BH 3	1.5	8.71	8.56	0	0	0	0.13	0.67	0.55		0.16	0.421	1395	8670	547	2102	491	-2.7	14.9	0.13	105711
BH 3	2.0	8.53	8.25	0	0	0	0.08	0.46	0.37		0.11	0.409	1380	5198	853	1166	216	2.0	13.9	0.07	54300
BH 3	2.5	8.50	7.76	0	0	0	0.08	0.13	0.04		0.63	0.633	1180	1356	936	375	9	19.4	20.8	0.04	47748
BH 4	1.0	8.63	8.42	0	0	0	0.07	0.02	<0.01		0.32	0.184	1143	264	645	73	0	7.4	7.4	0.13	100101
BH 4	1.5	8.58	8.57	0	0	0	0.07	1.14	1.08		0.32	0.853	1153	13880	649	2762	809	-4.8	29.8	0.22	137294
BH 4	2.0	8.35	4.13	0	103	103	0.10	3.66	3.56		0.32	3.564	1340	19653	1320	8878	1536	5.3	61.8		7859
BH 4	2.5	8.35	4.90	0	48	48	0.10	1.01	0.91		0.32	0.913	1187	5117	1019	2699	334	2.5	17.9		4541
BH 5	0.75	8.59	8.67	0	0	0	0.04	0.02	<0.01		0.08	0.052	703	325	165	34	0	2.0	2.0	0.03	39946
BH 5	1.25	8.44	7.90	0	0	0	0.06	0.22	0.16		0.09	0.230	830	1804	439	521	55	2.5	7.6	0.02	14772
BH 5	1.75	8.47	8.48	0	0	0	0.09	0.04	<0.01		0.12	0.071	953	708	533	125	0	2.8	2.8	0.05	28341
BH 5	2.25	8.41	8.04	0	0	0	0.02	0.15	0.13		0.12	0.090	551	1238	182	687	76	-0.9	3.3	0.04	1115
BH 6	0.75	8.67	8.39	0	0	0	0.05	0.27	0.22		<0.01	0.173	807	2951	287	307	109	-0.9	6.1	0.05	51433
BH 6	1.25	8.77	8.86	0	0	0	0.04	0.05	0.01		0.14	-0.034	862	684	200	10	0	0.5	0.9	0.18	98460
BH 6	1.75	8.60	8.95	0	0	0	0.02	0.23	0.21		0.14	0.131	742	3647	197	278	152	-1.8	5.1	0.08	27535
BH 6	2.25	8.58	8.85	0	0	0	0.01	0.04	0.02		0.06	0.041	617	997	183	107	19	1.1	1.7	0.04	41602
BH 7	0.75	7.95	6.49	0	<1	1	0.02	0.04	0.02		0.03	0.044	415	98	248	102	0	0.9	1.4		385

Signatory P. Edwards

For and on behalf of Bio-Track Pty Ltd

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275

781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 Fx. 07 3289 7155

LAB REFERENCE LR23047.615 DATE OF REPORT 29 APRIL 2007 @17:02:22
CLIENT NAME LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
SAMPLING DATE 17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
DATE RECEIVED 23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008

Sample ID as received. METHODOLOGY: As per (DNR QASSIT May 2004), oven dried (85'C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.
LIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ aS_RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TAA + aS_POS or S_Cr + aS_RAS -ANC_E/1.5
NB. Lime rates assume 97% lime neutralisation but DO NOT include any safety factors. Suggested factor=1.5-2. Rates are kg/ton. Multiply by bulk density to convert to kg/m3.
Fineness Factor=1.5 CBN POS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCl) + (Mg POS - Mg KCl) is due to carbonate solution.
Blanks represent unmeasured values, zeros & <0.x represent measured values. If pH KCl>4.5 then s-RAS (calculated from acid extract) may be zero for undisturbed soil. Ca/ar is the acid reactive calcium calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

ID.	DEPTH	pH	pH	TAA	TPA	TSA	S KCl	S P	S POS	S Cr	s-RAS	s EQ	Ca KCl	Ca P	Mg KCl	Mg P	CBN POS	LIME1	LIME2	sANC_E	Ca/ar
	m	KCL	ox	m/t	m/t	m/t	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	m/t	kg/t	kg/t	%	mg/kg
Analytical Method Codes		23A	23B	23F	23G	23H	23Ce	23De	23Ee	22B	s23Re	s	23Vh	23Wh	23Sm	23Tm	a23U&X			s19A2	
BH 7	1.25	8.02	2.63	0	439	439	0.10	0.64	0.54		1.05	1.586	1127	2322	1199	1066	60	56.4	48.9		6835
BH 7	1.75	8.10	2.28	0	658	658	0.10	2.57	2.47		1.05	2.474	1124	5700	1232	4139	468	33.9	63.5		3569
BH 7	2.25	7.94	2.24	0	685	685	0.07	3.84	3.77		1.05	3.771	841	6353	1081	6011	681	35.3	97.9		3066
BH 8	0.5	8.22	6.29	0	<1	1	0.04	0.11	0.07		0.23	0.301	394	408	403	330	1	7.3	9.6	-	1900
BH 8	1.0	8.32	7.09	0	0	0	0.04	0.03	<0.01		0.33	0.317	551	327	388	136	0	10.3	10.3	<0.01	16657
BH 8	1.5	7.26	6.13	0	3	3	0.02	0.07	0.06		0.03	0.089	160	216	241	325	10	1.1	2.5		282
BH 8	2.0	8.51	7.06	0	0	0	0.04	0.02	<0.01		0.11	0.099	654	206	280	88	0	3.3	3.3	<0.01	4678
BH 9	1.0	8.33	2.74	0	335	335	0.07	0.19	0.12		1.12	1.246	789	539	757	535	0	53.4	40.1		3153
BH 9	1.5	8.15	5.87	0	8	8	0.05	1.00	0.95		1.12	0.950	689	5146	440	2121	361	0.4	18.1		2843
BH 9	2.0	7.87	6.83	0	0	0	0.03	0.67	0.63		1.12	0.629	453	5018	236	1332	318	-0.1	20.3	<0.01	6168
BH 9	2.5	7.95	6.76	0	0	0	0.03	0.66	0.63		1.12	0.626	505	4723	211	1263	297	-0.0	20.2	<0.01	6123
BH 10	0.75	7.68	6.93	0	0	0	0.01	0.13	0.12		1.12	0.112	261	1124	163	834	98	-0.1	3.7	<0.01	6449
BH 10	1.25	8.11	7.57	0	0	0	0.03	0.02	<0.01		0.02	-0.003	579	296	855	534	0	0.1	0.1	0.02	1371
BH 10	1.75	8.10	7.47	0	0	0	0.03	0.11	0.08		0.02	0.055	517	1278	1093	2745	174	-0.5	2.0	0.02	239
BH 10	2.25	8.03	7.53	0	0	0	0.03	0.04	<0.01		<0.01	-0.022	504	496	1020	1114	8	-0.5	-0.4	0.03	55
BH 11	0.25	7.75	6.74	0	0	0	0.03	0.10	0.07		<0.01	0.065	488	773	336	434	22	-0.0	2.1	<0.01	917
BH 11	0.75	9.20	6.94	0	0	0	0.02	0.02	<0.01		0.02	0.029	405	260	175	204	2	0.7	0.9	<0.01	2473
BH 11	1.25	7.77	6.71	0	0	0	0.03	0.03	<0.01		<0.01	0.002	296	207	680	495	0	0.1	0.1	<0.01	<10
BH 11	1.75	7.75	6.38	0	1	1	0.03	<0.01	<0.01		0.03	0.034	298	26	695	59	0	1.2	1.1		<10
BH 12	0.75	7.73	6.78	0	0	0	0.02	0.05	0.03		0.03	0.023	186	301	419	549	16	-0.2	0.8	<0.01	14
BH 12	1.25	9.17	8.85	0	0	0	0.03	0.06	0.03		0.03	-0.021	901	1157	359	278	13	-1.1	-0.1	0.05	17128
BH 12	1.75	7.97	6.81	0	0	0	0.02	0.04	0.02		0.03	0.018	265	275	424	472	5	-0.0	0.6	<0.01	146
BH 12	2.25	7.69	6.59	0	0	0	0.02	0.03	0.02		0.03	-0.152	189	247	392	510	13	-3.6	-3.1	0.17	79
BH 13	0.75	7.82	7.20	0	0	0	0.03	0.20	0.18		0.03	0.175	202	1061	196	671	82	-0.0	5.6	<0.01	4836
BH 13	1.25	8.77	9.08	0	0	0	0.03	0.07	0.05		0.03	-0.014	826	1218	264	223	20	-0.9	0.5	0.09	50802

Signatory P. Edwards

For and on behalf of Bio-Track Pty Ltd

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275

LAB REFERENCE LR23047.615 DATE OF REPORT 29 APRIL 2007 @17:03:01
CLIENT NAME LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
SAMPLING DATE 17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
DATE RECEIVED 23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008

Sample ID as received. METHODOLOGY: As per (DNR QASSIT May 2004), oven dried (85°C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.
LIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ aS_RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TAA + aS_POS or S_Cr + aS_RAS -ANC_E/1.5
NB. Lime rates assume 97% lime neutralisation but DO NOT include any safety factors. Suggested factor=1.5-2. Rates are kg/ton. Multiply by bulk density to convert to kg/m3.
Fineness Factor=1.5 CBN POS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCl) + (Mg POS - Mg KCl) is due to carbonate solution.
Blanks represent unmeasured values, zeros & <0.x represent measured values. If pH KCl>4.5 then s-RAS (calculated from acid extract) may be zero for undisturbed soil. Ca/ar is the acid reactive calcium calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

ID.	DEPTH m	pH KCL	pH ox	TAA m/t	TPA m/t	TSA m/t	S KCl %	S P %	S POS %	s EQ %	Ca KCl mg/kg	Ca P mg/kg	Mg KCl mg/kg	Mg P mg/kg	CBN POS m/t	LIME1 kg/t	LIME2 kg/t	sANC_E %	Ca/ar mg/kg
Analytical Method Codes		23A	23B	23F	23G	23H	23Ce	23Oe	23Ee	s	23Vh	23Wh	23Sm	23Tm	a23U&X			s19A2	
BH 13	1.75	9.36	7.81	0	0		.02	0.06	0.03	0.02	0.035	542	628	242	313	10	0.3	1.3	0.02	9247
BH 13	2.25	7.74	6.56	0	0		02	0.03	0.01	0.02	-0.088	189	318	178	152	6	-2.0	-1.6	0.12	356
BH 14	0.25	7.71	7.04	0	0		.01	0.03	0.02	0.02	-0.082	167	293	117	233	16	-2.0	-1.4	0.12	707
BH 14	0.75	7.75	6.80	0	0		.01	0.12	0.10	0.02	-0.018	224	964	169	766	86	-2.6	0.7	0.12	874
BH 14	1.25	8.17	6.61	0	0		.01	0.03	0.02	<0.01	0.029	251	196	152	293	12	0.2	0.9	<0.01	185
BH 14	2.25	8.64	7.76	0	0		.03	0.02	<0.01	<0.01	-0.009	316	290	130	168	3	-0.1	-0.1	0.02	617
BH 15	0.5	8.21	7.35	0	0		.02	0.12	0.10	<0.01	0.087	215	955	148	495	66	-0.2	2.9	<0.01	5900
BH 15	1.0	8.51	8.48	0	0		.03	0.28	0.25	<0.01	0.204	442	3158	168	559	168	-1.0	7.0	0.05	4452
BH 15	1.5	8.54	8.47	0	0		.03	0.33	0.30	<0.01	0.238	309	3661	144	1053	242	-1.4	8.3	0.06	4776
BH 15	2.0	8.30	7.02	0	0		.01	0.10	0.09	<0.01	0.082	141	825	144	916	98	-0.2	2.7	<0.01	249
BH 16	0.5	8.17	6.90	0	0		01	0.11	0.10	<0.01	0.098	107	880	85	611	82	-0.1	3.2	<0.01	448
BH 16	1.0	8.68	7.94	0	0		.03	0.34	0.32	<0.01	0.292	326	3297	225	1210	229	-0.6	9.7	0.03	2599
BH 16	1.5	8.47	7.71	0	0		.01	0.11	0.09	<0.01	0.074	210	1439	230	1201	141	-0.4	2.6	0.02	1559
BH 16	2.0	8.25	7.34	0	0		.01	0.14	0.13	<0.01	0.122	132	1079	195	1317	140	-0.2	4.0	<0.01	624
BH 17	0.5	7.10	6.62	0	0		02	0.19	0.17	<0.01	0.167	145	856	218	790	83	-0.0	5.4	<0.01	646
BH 17	1.0	6.10	6.39	3	6		.02	1.48	1.46	<0.01	1.461	135	1155	227	1640	167	0.3	41.2		688
BH 17	1.5	6.26	6.19	3	3		.02	0.19	0.17	<0.01	0.176	133	631	253	1000	86	0.2	2.7		259
BH 17	2.0	7.03	6.21	0	2		.01	0.28	0.27	<0.01	0.268	161	1089	190	1231	132	0.1	4.1		418
BH 18	0.75	7.16	6.58	0	0		.01	0.09	0.08	<0.01	0.079	111	420	142	738	65	-0.0	2.6	<0.01	109
BH 18	1.25	7.36	6.56	0	0		.01	0.15	0.14	<0.01	0.001	96	814	109	856	97	-3.0	1.5	0.14	625
BH 18	1.75	7.53	6.52	0	0		.01	0.44	0.42	<0.01	0.308	222	1849	210	1373	177	-2.4	11.1	0.11	834
BH 18	2.25	7.04	7.36	0	0		.01	0.22	0.22	<0.01	0.209	82	931	127	1280	137	-0.1	6.8	<0.01	307
BH 19	1.0	7.68	6.92	0	0		02	0.32	0.31	<0.01	0.305	180	1529	165	1466	174	-0.0	9.8	<0.01	742
BH 19	1.5	9.10	8.02	0	0		02	0.38	0.37	<0.01	0.347	277	4270	88	1228	293	-0.5	11.4	0.02	6225
BH 19	2.0	8.08	2.75	0	322		.04	2.52	2.49	<0.01	2.487	332	4976	367	4905	605	16.6	59.2		1610

Signatory P. Edmiston

For and on behalf of Bio-Track Pty Ltd

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS

Analysis By: **Bio-Track Pty Ltd** ABN 91 056 237 275

781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179 Fx. 07 3289 7155

LAB REFERENCE LR23047.615 DATE OF REPORT 29 APRIL 2007 @17:03:37
CLIENT NAME LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
PROJECT NAME CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
SAMPLING DATE 17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
DATE RECEIVED 23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008

Sample ID as received. METHODOLOGY: As per (DNR QASSIT May 2004), oven dried (85'C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.
LIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ aS_RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TAA + aS_POS or S_Cr + aS_RAS -ANC_E/1.5
NB. Lime rates assume 97% lime neutralisation but DO NOT include any safety factors. Suggested factor=1.5-2. Rates are kg/ton. Multiply by bulk density to convert to kg/m3.
Fineness Factor=1.5 CBN POS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCl) + (Mg POS - Mg KCl) is due to carbonate solution.
Blanks represent unmeasured values, zeros & <0.x represent measured values. If pH KCl>4.5 then s-RAS (calculated from acid extract) may be zero for undisturbed soil. Ca/ar is the acid reactive calcium calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

ID.	DEPTH m	pH KCL	pH ox	TAA m/t	TPA m/t	TSA m/t	S KCl %	S P %	S POS %	S Cr %	s-RAS %	s EQ %	Ca KCl mg/kg	Ca P mg/kg	Mg KCl mg/kg	Mg P mg/kg	CBN POS m/t	LIME1 kg/t	LIME2 kg/t	sANC_E %	Ca/ar mg/kg
Analytical Method Codes		23A	23B	23F	23G	23H	23Ce	23De	23Ee	22B	s23Re	s	23Vh	23Wh	23Sm	23Tm	a23U&X			s19A2	
BH 19	2.5	8.21	2.54	0	624	624	0.05	2.49	2.45		<0.01	2.446	569	4504	453	3796	472	32.2	62.4		2369
BH 20	0.75	7.56	2.80	0	389	389	0.04	2.16	2.12		<0.01	2.120	273	4251	401	4177	509	20.0	50.7		1937
BH 20	1.25	7.37	4.40	0	40	40	<0.01	0.97	0.96		<0.01	0.963	80	1180	165	2363	236	2.1	22.9		438
BH 20	1.75	7.61	3.28	0	88	88	0.01	0.82	0.81		<0.01	0.809	67	1755	56	1360	192	4.5	19.4		565
BH 20	2.25	7.58	2.89	0	247	247	0.01	1.88	1.87		<0.01	1.866	97	5164	75	2035	414	12.7	45.8		1428

Signatory P. Edmonds

For and on behalf of Bio-Track Pty Ltd

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Kunda Park Laboratory
Coffey Geotechnics Pty Ltd
ABN 93 056 929 483
1/36 Kerryl Street
Kunda Park QLD 4556

Telephone: +61 7 5445 4952
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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00924
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00924'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley
(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00924
Field Sample: BH2
Date Sampled: 18/04/2007
Source: -1.0 to -1.3m
Material: Dark Grey Clayey Sand with Shell Fragments
Specification: AS Grading
Sampling Method:
Location: Refer Plan (Figure 1),,,,

Other Test Results

Description	Method	Result	Limits

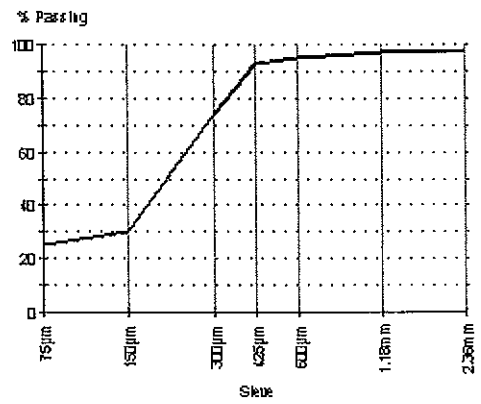
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	98	
1.18mm	97	
600µm	95	
425µm	93	
300µm	74	
150µm	30	
75µm	25	

Chart



Comments
N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Kunda Park Laboratory
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Kunda Park QLD 4556

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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00925
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00925'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley
(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00925
Field Sample: BH 6
Date Sampled: 18/04/2007
Source: -2.0 to - 2.4m
Material: Grey sand with shell fragments
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

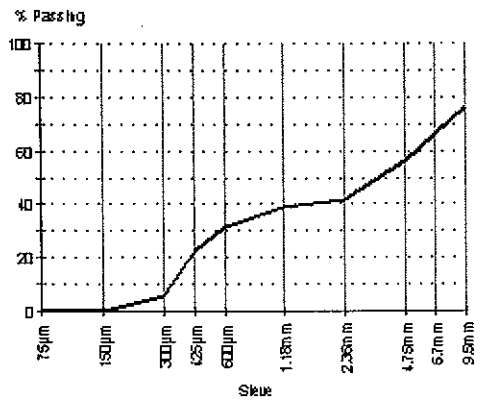
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	76	
6.7mm	66	
4.75mm	56	
2.36mm	42	
1.18mm	39	
600µm	32	
425µm	22	
300µm	6	
150µm	0	
75µm	0	

Chart



Comments
N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Kunda Park Laboratory
Coffey Geotechnics Pty Ltd
ABN 93 056 929 483
1/36 Kerryl Street
Kunda Park QLD 4556

Telephone: +61 7 5445 4952
Facsimile: +61 7 5443 3764

Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00926
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00926'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley (Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00926
Field Sample: BH 8
Date Sampled: 17/04/2007
Source: -0.2 to -0.5m
Material: Dark grey clayey sand
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

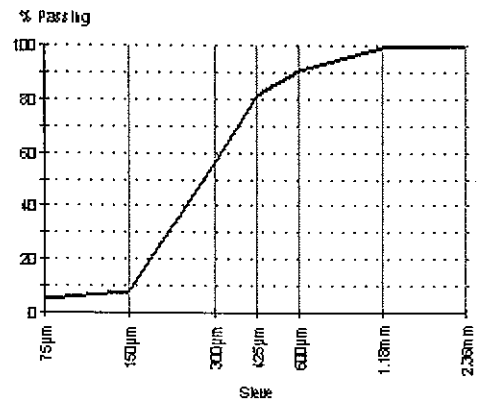
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	99	
600µm	91	
425µm	81	
300µm	56	
150µm	8	
75µm	5	

Chart



Comments
N/A

coffey geotechnics
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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00927
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00927'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558
Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley (Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00927
Field Sample: BH 10
Date Sampled: 17/04/2007
Source: -0.6 to -0.8m
Material: Dark grey sand with shell fragments
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

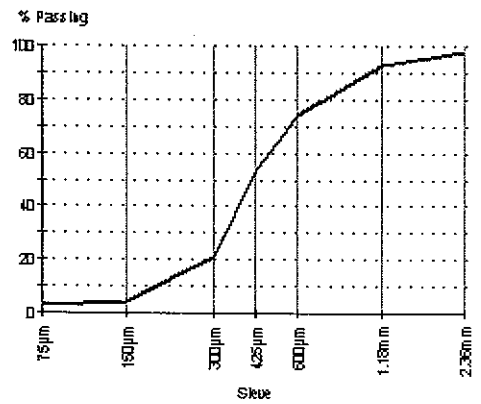
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	98	
1.18mm	93	
600µm	74	
425µm	53	
300µm	21	
150µm	4	
75µm	3	

Chart



Comments
N/A

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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00928
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00928'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley
(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00928
Field Sample: BH 12
Date Sampled: 17/04/2007
Source: -0.6 to -0.8m
Material: Grey sand with shell fragments
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

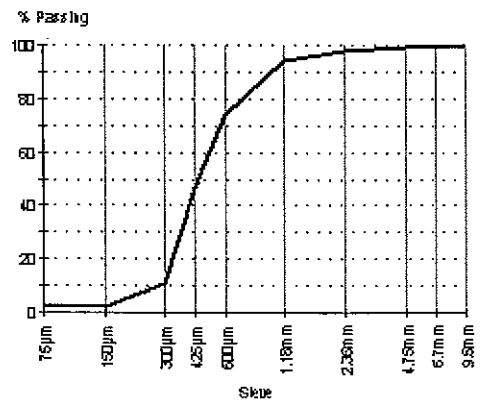
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	99	
4.75mm	99	
2.36mm	98	
1.18mm	94	
600µm	74	
425µm	47	
300µm	11	
150µm	2	
75µm	2	

Chart



Comments
N/A

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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00929
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00929'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley (Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00929
Field Sample: BH 13
Date Sampled: 17/04/2007
Source: -1.5 to - 1.8m
Material: Dark grey sand
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

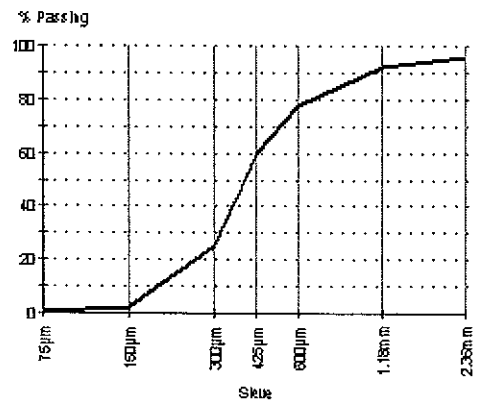
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	96	
1.18mm	92	
600µm	78	
425µm	60	
300µm	25	
150µm	2	
75µm	1	

Chart



Comments
N/A

coffey geotechnics
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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00930
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00930'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley (Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00930
Field Sample: BH 15
Date Sampled: 17/04/2007
Source: -0.7 to -0.9m
Material: Brown sand with shell fragments
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

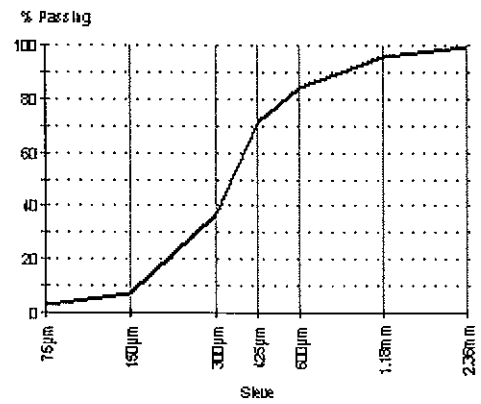
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	99	
1.18mm	96	
600µm	84	
425µm	71	
300µm	37	
150µm	7	
75µm	3	

Chart



Comments
N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Kunda Park Laboratory
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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00931
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00931'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Sample Details

Sample ID: KPAR07S-00931
Field Sample: BH 19
Date Sampled: 18/04/2007
Source: -1.0 to -1.4m
Material: Dark grey clayey sand
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

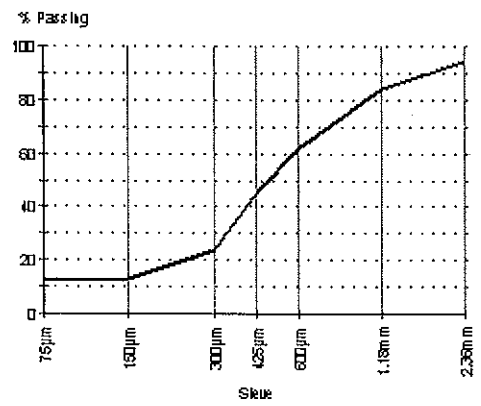
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	94	
1.18mm	84	
600µm	62	
425µm	45	
300µm	24	
150µm	13	
75µm	12	

Chart



Comments
N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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Aggregate/Soil Test Report

Report No: MAT:KPAR07S-00932
Issue No: 1
This report replaces all previous issues of report no 'MAT:KPAR07S-00932'.

Client: Coffey Geotechnics Pty Ltd
1/36 Kerryl Street
Kunda Park QLD 4558

Principal:
Job No: LABTKPAR00021AA
Project: GEOTKPAR01150AA Northeast Business Park
Lot No: **TRN:**

Approved Signatory: Matthew Morley (Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 1/05/2007

Sample Details

Sample ID: KPAR07S-00932
Field Sample: BH 20
Date Sampled: 18/04/2007
Source: -1.3 to -1.6m
Material: Dark grey clayey sand
Specification: AS Grading
Sampling Method:
Location: ,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits

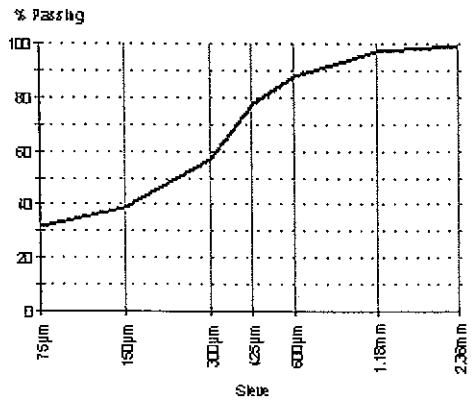
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Not Washed

Sieve Size	% Passing	Limits
2.36mm	99	
1.18mm	97	
600µm	88	
425µm	77	
300µm	57	
150µm	39	
75µm	32	

Chart



Comments
N/A

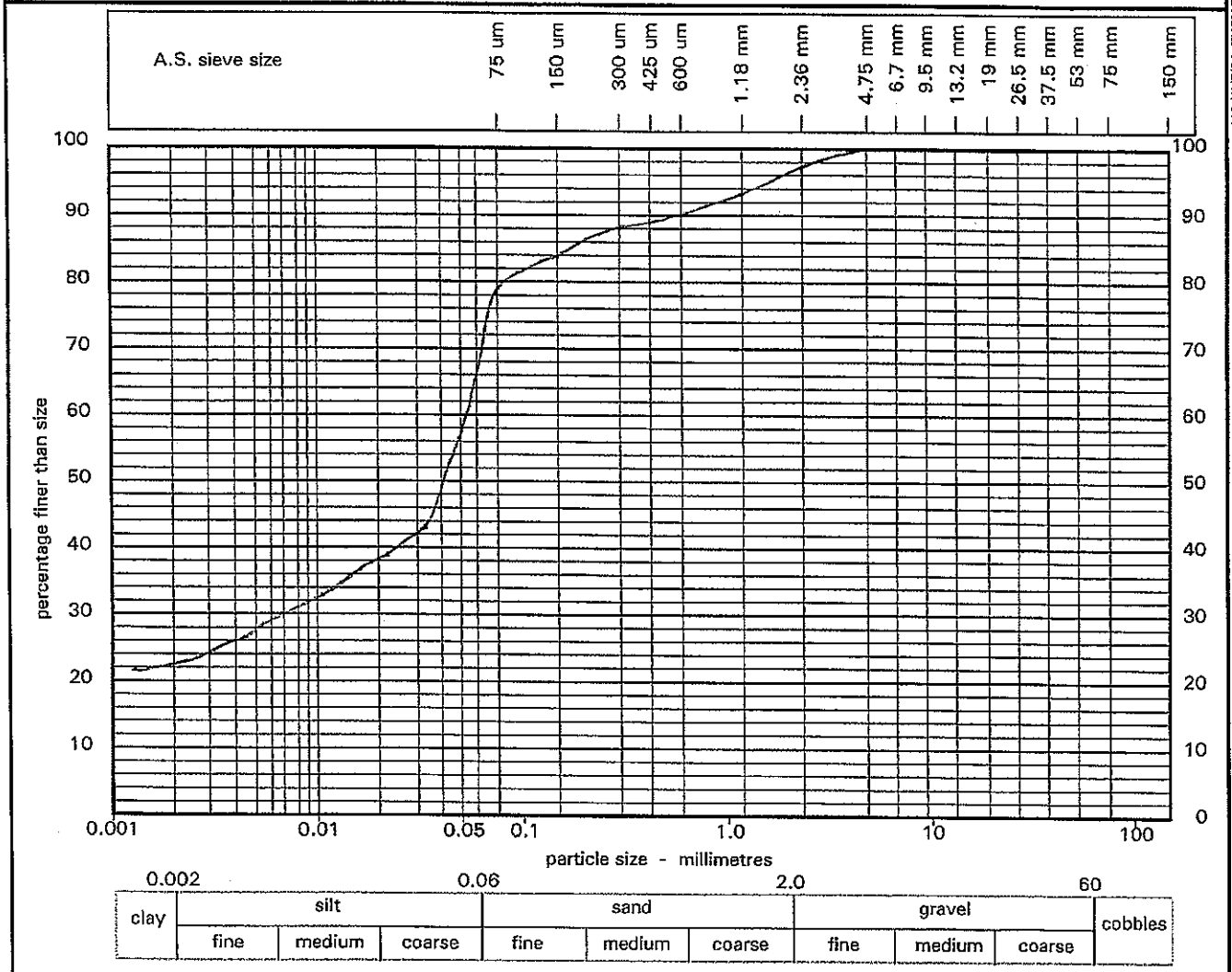
coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

particle size distribution & hydrometer

client : *COFFEY GEOTECHNICS KUNDA PARK*
job no : *LABTNATH00096aa*
principal : *NORTH PARK BUSINESS CENTRE*
laboratory : *BRISBANE*
project : *CABOOLTURE RIVER*
report date : *April 30, 2007*
location : *BEACHMERE*
test report no. : *NATH07W00362*

test procedure : *AS1289 3.6.2*
depth : *0.5-2.0m*
sample no : *NATH07S-00894*
sample identification: *BH 1*



Atterberg Limit :		
liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History
natural state ☐
air dried ☐
oven dried ☐
other ☐

Preparation Method
dry sieving ☐
wet sieving ☐

Linear Shrinkage
Mould size mm
crumbing ☐
curling ☐

classification :

NATA Accredited Laboratory No. 431
Approved Signatory: *Chris Park*
Date : *30/4/07*

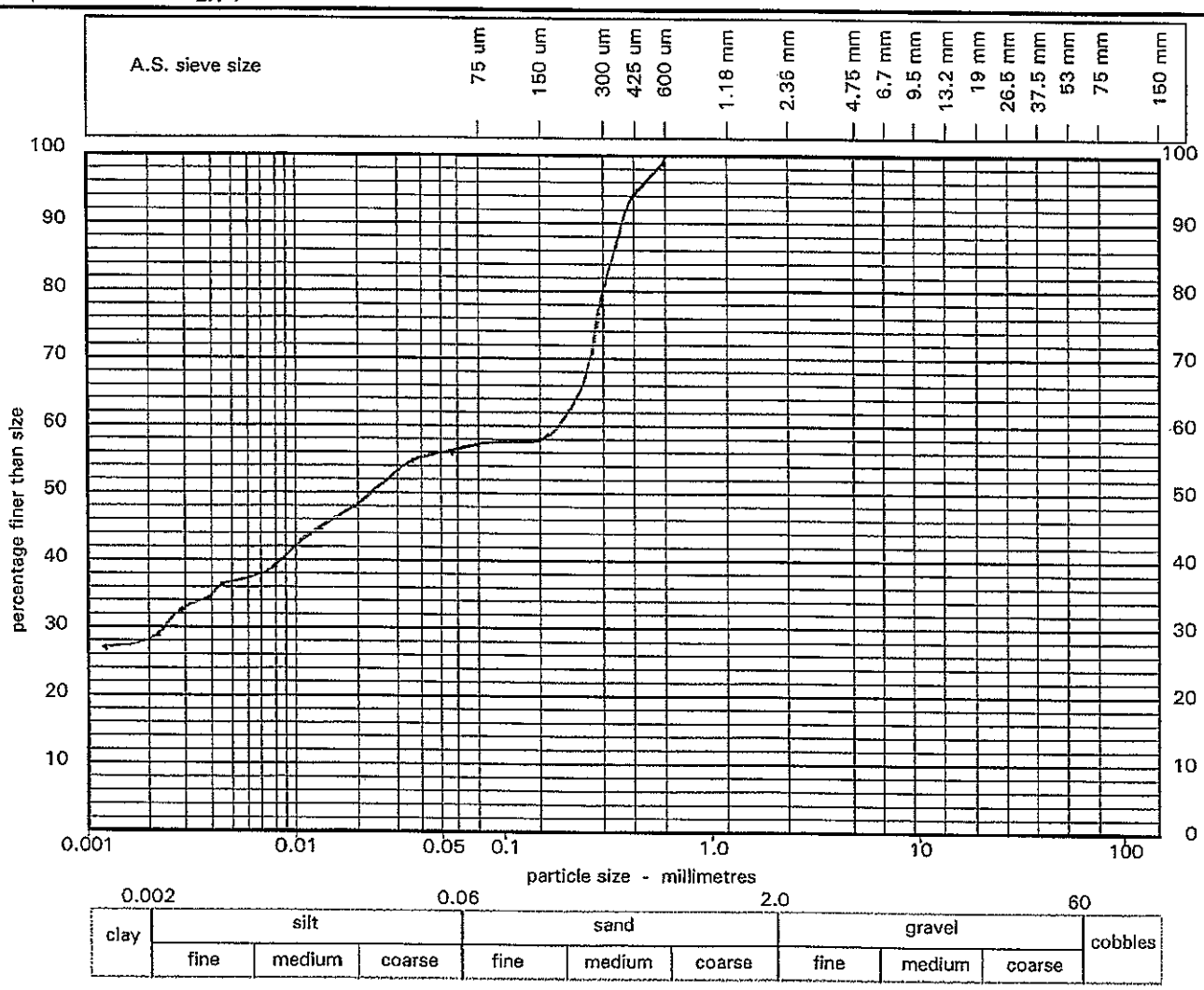
coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

particle size distribution & hydrometer

client :	*COFFEY GEOTECHNICS KUNDA PARK*	job no :	*LABTNATH00096aa*
principal :	*NORTH PARK BUSINESS CENTRE*	laboratory :	*BRISBANE*
project :	*CABOOLTURE RIVER*	report date :	*April 30, 2007*
location :	*BEACHMERE*	test report no. :	*NATH07W00362*

test procedure : *AS1289 3.6.2* depth : *0.35-2.5m*
sample no : *NATH07S-00895*
sample identification: *BH 4*



Atterberg Limit :		
liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History
- natural state ☐
- air dried ☐
- oven dried ☐
- other ☐

Preparation Method
- dry sieving ☐
- wet sieving ☐

Linear Shrinkage
- Mould size mm
- crumbing ☐
- curling ☐

classification :

NATA Accredited Laboratory No. 431
Approved Signatory: *Chris Park*
Date : *30/4/07*

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

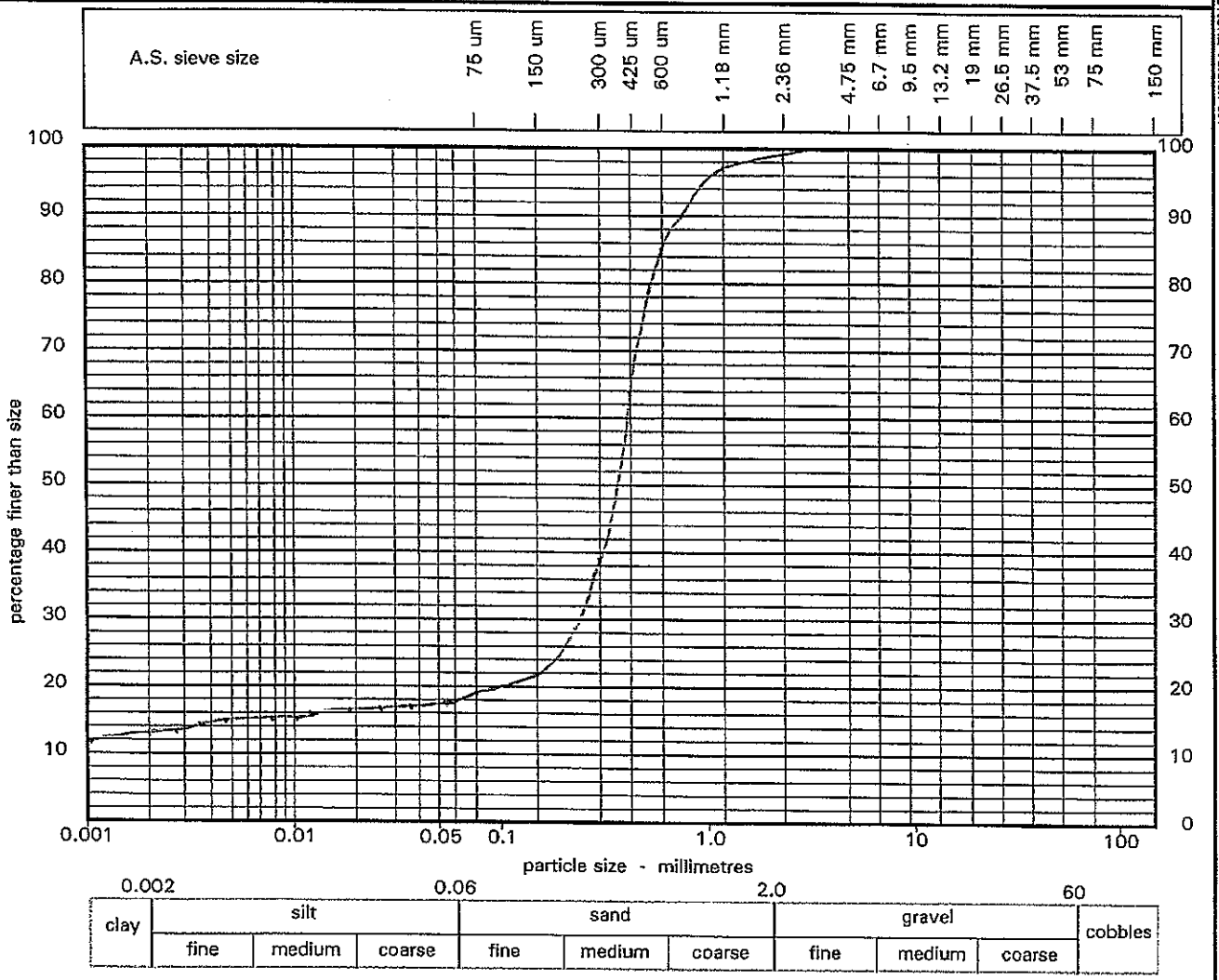
particle size distribution & hydrometer

client : *COFFEY GEOTECHNICS KUNDA PARK*
principal : *NORTH PARK BUSINESS CENTRE*
project : *CABOOLTURE RIVER*
location : *BEACHMERE*

job no : *LABTNATH00096aa*
laboratory : *BRISBANE*
report date : *April 30, 2007*
test report no. : *NATH07W00362*

test procedure : *AS1289 3.6.2*
sample no : *NATH07S-00896*
sample identification: *BH 11*

depth : *0.25-2.0m*



Atterberg Limit :		
liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History

- natural state ☐
- air dried ☐
- oven dried ☐
- other ☐

Preparation Method
- dry sieving ☐
- wet sieving ☐

Linear Shrinkage
- Mould size mm
- crumbing ☐
- curling ☐

classification :

NATA Accredited Laboratory No. 431
Approved Signatory: *Chris Park*

Date : *30/4/07*

Form Number L1.8R2 Version 6.1

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

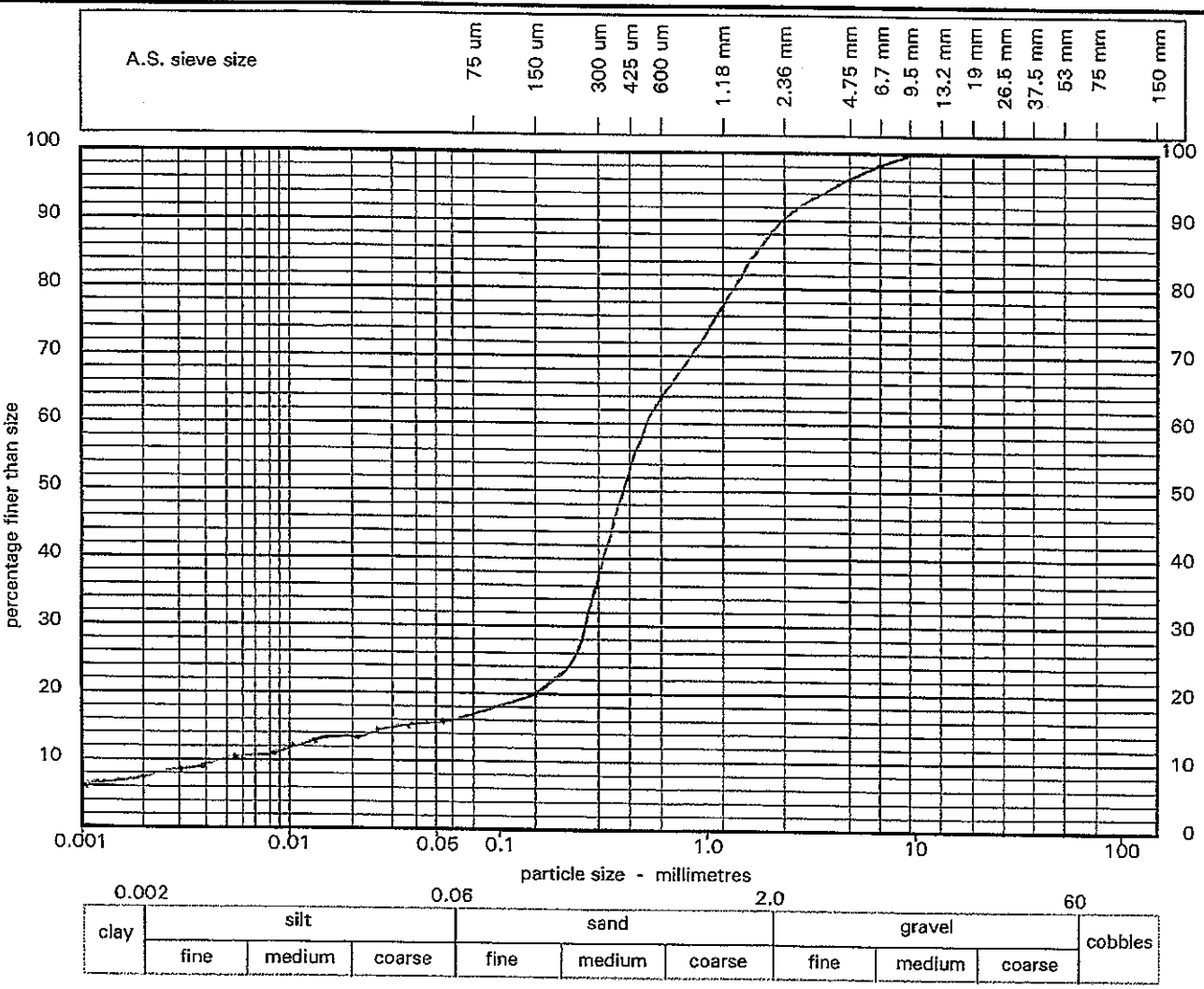
particle size distribution & hydrometer

client : *COFFEY GEOTECHNICS KUNDA PARK*
principal : *NORTH PARK BUSINESS CENTRE*
project : *CABOOLTURE RIVER*
location : *BEACHMERE*

job no : *LABTNATH00096aa*
laboratory : *BRISBANE*
report date : *April 30, 2007*
test report no. : *NATH07W00362*

test procedure : *AS1289 3.6.2*
sample no : *NATH07S-00897*
sample identification: *BH 14*

depth : *0.5-1.5*



Atterberg Limit :		
liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History

- natural state ☐
- air dried ☐
- oven dried ☐
- other ☐

Preparation Method
- dry sieving ☐
- wet sieving ☐

Linear Shrinkage
- Mould size mm
- crumbing ☐
- curling ☐

classification :

NATA Accredited Laboratory No. 431
Approved Signatory: *Chris Park*
Date : *30/4/07*

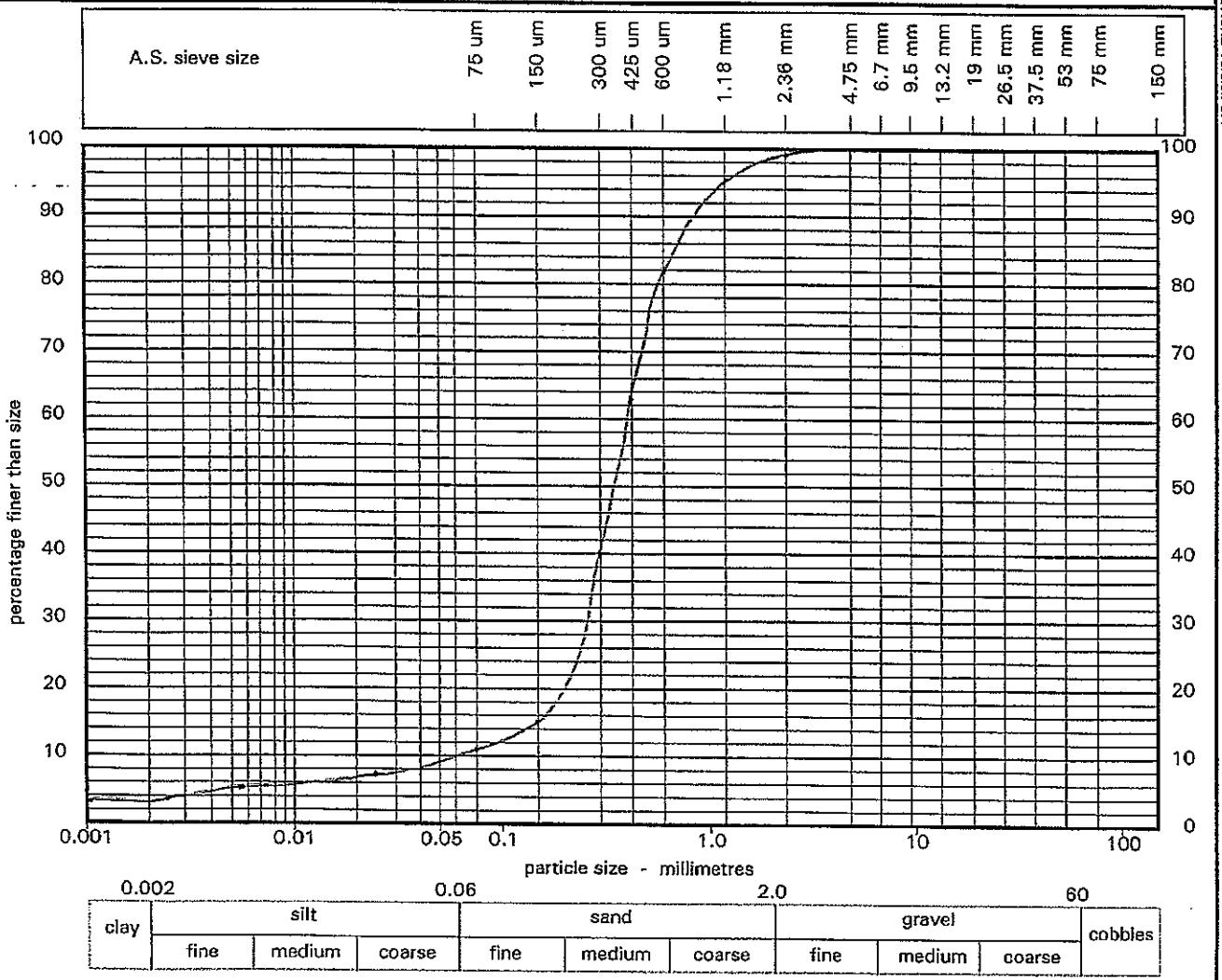
coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

particle size distribution & hydrometer

client : *COFFEY GEOTECHNICS KUNDA PARK*
job no : *LABTNATH00096AA*
principal : *NORTH PARK BUSINESS CENTRE*
laboratory : *BRISBANE*
project : *CABOOLTURE RIVER*
report date : *April 30, 2007*
location : *BEACHMERE*
test report no. : *NATH07W00362*

test procedure : *AS1289 3.6.2*
depth : *0.5-2.0m*
sample no : *NATH07S-00898*
sample identification: *BH 18*



Atterberg Limit :		
liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History

- natural state ☐
- air dried ☐
- oven dried ☐
- other ☐

Preparation Method
- dry sieving ☐
- wet sieving ☐

Linear Shrinkage
- Mould size mm
- crumbing ☐
- curling ☐

classification :

NATA Accredited Laboratory No. 431
Approved Signatory: *Chris Park*
Date : *30/4/07*

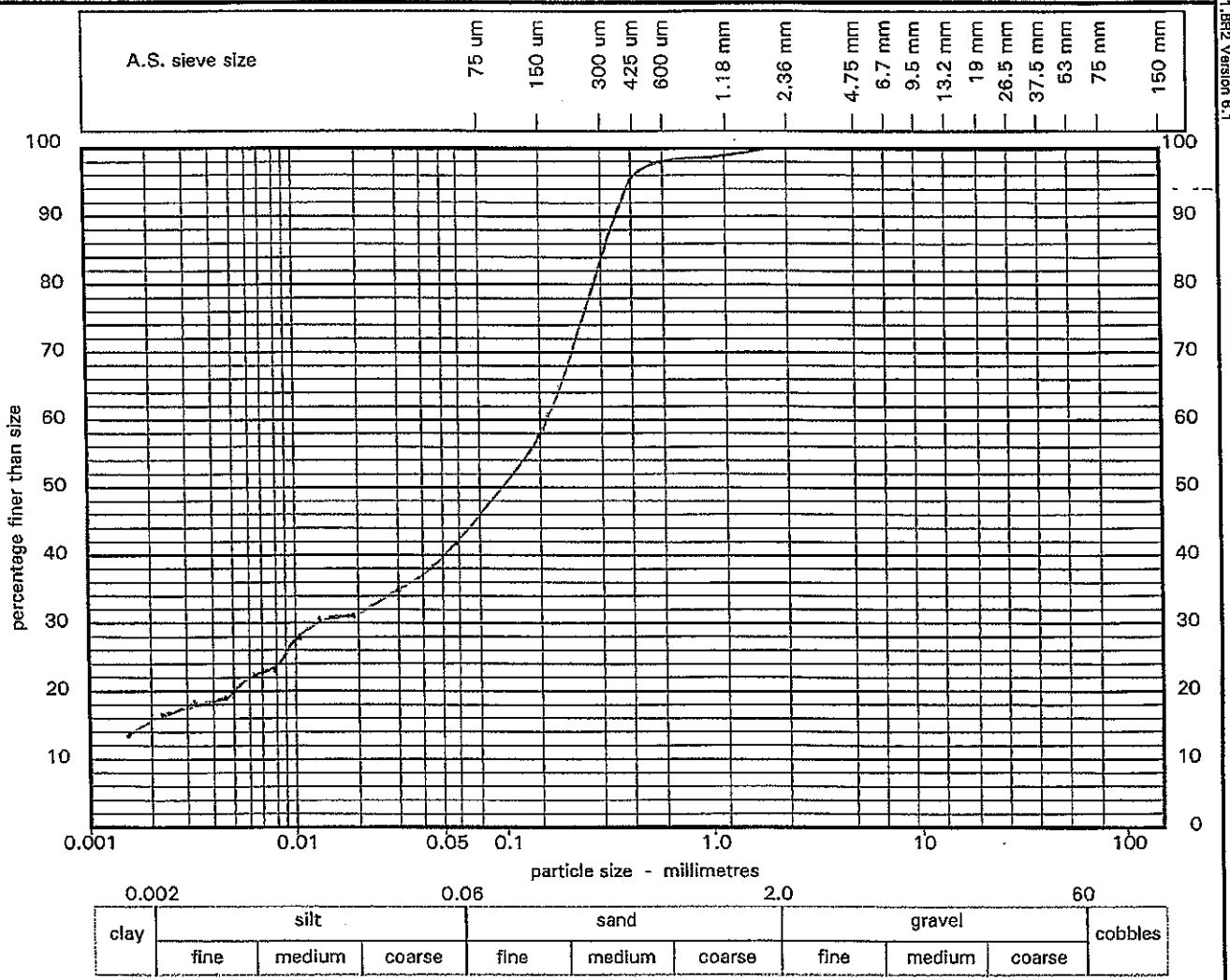
coffey geotechnics
SPECIALISTS MANAGING THE EARTH

53B Fairlawn Street, Nathan, QLD, 4111
Ph: (07) 3274 4411 Fax: (07) 3274 4977

particle size distribution & hydrometer

client :	COFFEY GEOTECHNICS KUNDA PARK	job no :	LABTNATH00096AA
principal :	NORTH PARK BUSINESS CENTRE	laboratory :	BRISBANE
project :	CABOOLTURE RIVER	report date :	April 30, 2007
location :	BEACHMERE	test report no. :	NATH07W00362

test procedure : AS1289 3.6.2 depth : 0.25-2.25m
sample no : NATH07S-00899
sample identification: BH 20



Atterberg Limit :

liquid limit	%	-
plastic limit	%	-
plasticity index	%	-
linear shrinkage	%	-
natural moisture	%	-

Sample History
natural state ☐
air dried ☐
oven dried ☐
other ☐

Preparation Method
dry sieving ☐
wet sieving ☐

Linear Shrinkage
Mould size mm
crumbing ☐
curling ☐

classification :

Form Number L1.BR2 Version 6.1

NATA Accredited Laboratory No. 431
Approved Signatory:
Chris Park

Date : *30/4/07*

ALS Environmental

Analytical Results

				Client Sample ID :	BH 1-10 TO -150	BH 7-10 TO -150	BH 14-10 TO -150	BH 20-10TO -150	
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	
				Sample Date / Time :	18 Apr 2007 15:00	18 Apr 2007 15:00	18 Apr 2007 15:00	18 Apr 2007 15:00	
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EB0704263-001	EB0704263-002	EB0704263-003	EB0704263-004	
EA055: Moisture Content									
Moisture Content (dried @ 103°C)		1.0	%		27.6	21.8	24.0	37.4	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		6	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg		22	6	10	24	
Copper	7440-50-8	5	mg/kg		<5	<5	<5	9	
Lead	7439-92-1	5	mg/kg		<5	<5	<5	5	
Nickel	7440-02-0	2	mg/kg		9	2	4	10	
Zinc	7440-66-6	5	mg/kg		24	8	12	30	
EG035T: Total Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	
EP090: Organotin Compounds									
Tributyltin	56573-85-4	0.5	µgSn/kg		<0.5	<0.5	<0.5	<0.5	
EP090S: Organotin Surrogate									
Tripropyltin		0.1	%		82.2	90.6	95.2	78.6	

ALS Environmental

Surrogate Control Limits

Matrix Type: SOIL - Surrogate Control Limits

Method name	Analyte name	Surrogate Control Limits	
		Lower Limit	Upper Limit
EP090: Organotin Analysis			
EP090S: Organotin Surrogate	Tripropyltin	34	108

Maroochy Water Services - Laboratory Report

Coffey Geosciences Pty Ltd - PO#KPAR070070						
Lab Number	*Date Collected*	*Date Analysed*	*Test*	*Result*	*Units*	*Method*
BH2 - 1 hr -500mm to -1.0m						
31403	26/04/2007	26/04/2007	Suspended Solids	137	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070						
Lab Number	*Date Collected*	*Date Analysed*	*Test*	*Result*	*Units*	*Method*
BH2 - 24 hr -500mm to -1.0m						
31404	26/04/2007	26/04/2007	Suspended Solids	4	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070						
Lab Number	*Date Collected*	*Date Analysed*	*Test*	*Result*	*Units*	*Method*
BH6 - 1 hr -1.0m to -2.0m						
31405	26/04/2007	26/04/2007	Suspended Solids	80	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070						
Lab Number	*Date Collected*	*Date Analysed*	*Test*	*Result*	*Units*	*Method*
BH6 - 24 hr -1.0m to -2.0m						
31406	26/04/2007	26/04/2007	Suspended Solids	4	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070						
Lab Number	*Date Collected*	*Date Analysed*	*Test*	*Result*	*Units*	*Method*
BH8 - 1 hr -1.5m to -2.0m						
31407	26/04/2007	26/04/2007	Suspended Solids	107	mg/L	93_APHA 2540 D

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Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH8 - 24 hr -1.5m to -2.0m						
31408	26/04/2007	26/04/2007	Suspended Solids	6	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH13 - 1 hr -1.5m to -2.5m						
31409	26/04/2007	26/04/2007	Suspended Solids	77	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH13 - 24 hr -1.5m to -2.5m						
31410	26/04/2007	26/04/2007	Suspended Solids	2	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH19 - 1 hr -1.5m to -2.5m						
31411	26/04/2007	26/04/2007	Suspended Solids	130	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH19 - 24 hr -1.5m to -2.5m						
31412	26/04/2007	26/04/2007	Suspended Solids	2	mg/L	93_APHA 2540 D

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Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH20 - 1 hr -1.0m to -1.5m						
31413	26/04/2007	26/04/2007	Suspended Solids	213	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH20 - 24 hr -1.0m to -1.5m						
31414	26/04/2007	26/04/2007	Suspended Solids	15	mg/L	93_APHA 2540 D

Maroochy Water Services Laboratory Services
Contact Phil Adcock - Microbiologist 5475 7211
Steve Stewart – Chemist 5475 7212

Prepared By: P Adcock

Approved By: Steve Stewart

Friday, 27 April 2007

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Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH4 1 hr -2.0m to -2.5m						
31433	27/04/2007	27/04/2007	Suspended Solids	18	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH15 1 hr -1.0m to -1.5m						
31434	27/04/2007	27/04/2007	Suspended Solids	48	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH16 1 hr -1.0m to -2.0m						
31435	27/04/2007	27/04/2007	Suspended Solids	12	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH18 1 hr -1.0m to -2.0m						
31436	27/04/2007	27/04/2007	Suspended Solids	100	mg/L	93_APHA 2540 D

Coffey Geosciences Pty Ltd - PO#KPAR070070

Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
BH19b 1 hr -2.0m to -2.5m						
31437	27/04/2007	27/04/2007	Suspended Solids	133	mg/L	93_APHA 2540 D

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Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH20b 1 hr -2.0m to -2.5m						
31438	27/04/2007	27/04/2007	Suspended Solids	460	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 4 16 hrs						
31502	30/04/2007	30/04/2007	Suspended Solids	20	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 15 16 hrs						
31503	30/04/2007	30/04/2007	Suspended Solids	26	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 16 16 hrs						
31504	30/04/2007	30/04/2007	Suspended Solids	17	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 18 16 hrs						
31505	30/04/2007	30/04/2007	Suspended Solids	37	mg/L	93_APHA 2540 D

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Lab Number	Date Collected	Date Analysed	Test	Result	Units	Method
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 19 16 hrs						
31506	30/04/2007	30/04/2007	Suspended Solids	49	mg/L	93_APHA 2540 D
Coffey Geosciences Pty Ltd - PO#KPAR070070						
BH 20 16 hrs						
31507	30/04/2007	30/04/2007	Suspended Solids	209	mg/L	93_APHA 2540 D

Maroochy Water Services Laboratory Services
Contact Phil Adcock - Microbiologist 5475 7211
Steve Stewart – Chemist 5475 7212

Prepared By: S. Donovan

Approved By: W. Stamp

Tuesday, 1 May 2007