

CABOOLTURE RIVER DREDGING

GEO-ENVIRONMENTAL INVESTIGATIONS

Northeast Business Park Spring Hill

GEOTKPAR01150AA/A 3 May 2007



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	S2709.108 E15303.605	BH 11	- 2.5 m AHD	S2708.654 E15302.076
	- 6.0 m AHD			- 4.3 m AHD	
BH 2	- 2.5 m AHD	S2709.066	BH 12	- 3.0 m AHD	S2708.483
	- 5.1 m AHD	E15303.425		- 5.25 m AHD	E15302.092
BH 3	- 2.5 m AHD	S2709.008	BH 13	- 3.5 m AHD	S2708.323
	- 5.2 m AHD	E15303.257		- 5.8 m AHD	E15302.118
BH 4	- 3.5 m AHD	S2709.074	BH 14	- 3.0 m AHD	S2708.193
	- 6.0 m AHD	E15303.104		- 5.4 m AHD	E15302.182
BH 5	- 3.5 m AHD	S2709.134	BH 15	- 2.5 m AHD	S2708.008
	- 5.2 m AHD	E15302.947		- 4.55 m AHD	E15302.271
BH 6	- 3.5 m AHD	S2709.178	BH 16	- 2.5 m AHD	S2707.910
	- 5.75 m AHD	E15302.791		- 4.6 m AHD	E15302.184
BH 7	- 4.0 m AHD	S2709.190	BH 17	- 2.5 m AHD	S2707.751
	- 6.3 m AHD	E15302.621		- 4.5 m AHD	E15302.083
BH 8	- 3.0 m AHD	S2709.072	BH 18	- 2.5 m AHD	S2707.620
	- 5.0 m AHD	E15302.079		- 5.1 m AHD	E15301.984
BH 9	- 3.5 m AHD	\$2708.957	BH 19	- 2.5 m AHD	S2707.645
	- 5.75 m AHD	E15302.009		- 5.05 m AHD	E15301.799
BH 10	- 3.5 m AHD	S2708.811	BH 20	- 3.5 m AHD	S2707.599
	- 5.8 m AHD	E15302.075		- 6.0 m AHD	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.

Caboolture River Dredging Geo-environmental Investigations

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 16^{th} to 19^{th} 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 preoxidation 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. Caboolture River Dredging
Geo-environmental Investigations

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

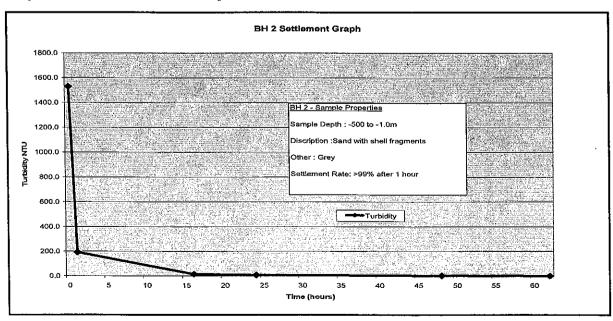
Twelve composite soil samples were selected for settlement rate and turbidity testing. Six samples were selected from areas with a sandy profile within the study area and six were selected from areas with a clayey profiles. Settlement rate was determined by the laboratory measurement of suspended solids 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:-

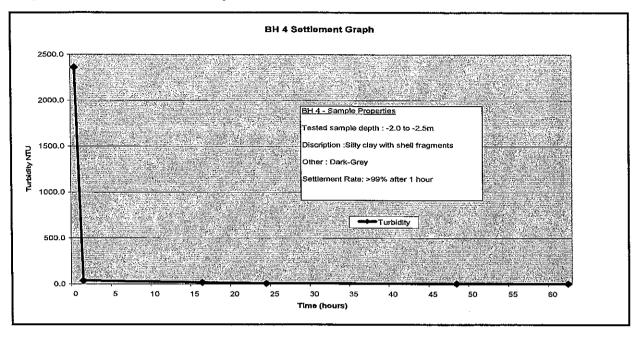
- The selected samples were oven dried in accordance AS 1289 2.1.1, and then sieved over the 2.36mm sieve.
- To achieve the 1:6.5 soils to water ratio of a typical dredging operation, 150 grams of dried sample was weighed and then saturated with 850ml of distilled water. The sample was then left undisturbed 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.

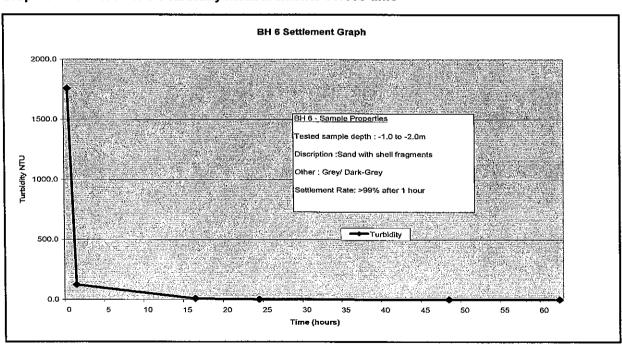
Graph 1 illustrates BH 2's turbidity measurements verses time



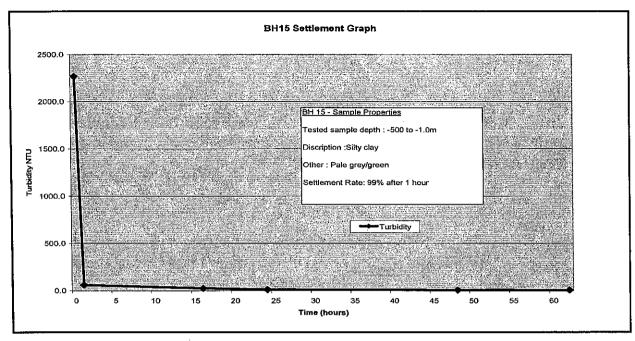
Graph 2 illustrates BH 4's turbidity measurements verses time



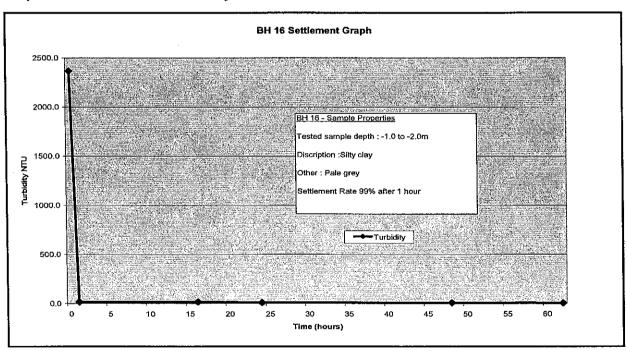
Graph 3 illustrates BH 6's turbidity measurements verses time



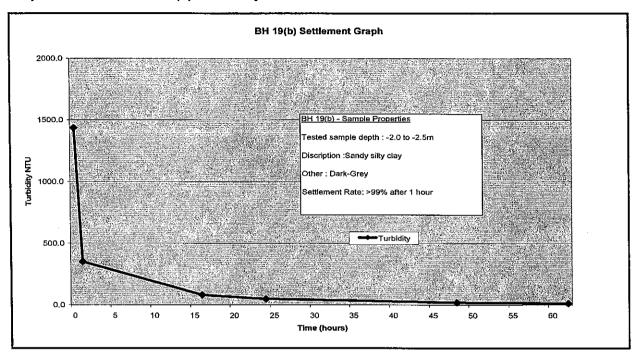
Graph 6 illustrates BH 15's turbidity measurements verses time



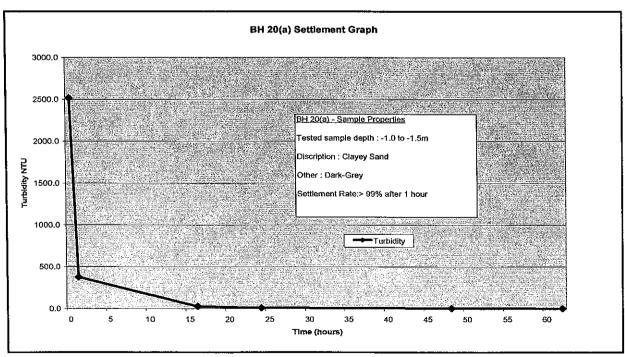
Graph 7 illustrates BH 16's turbidity measurements verses time

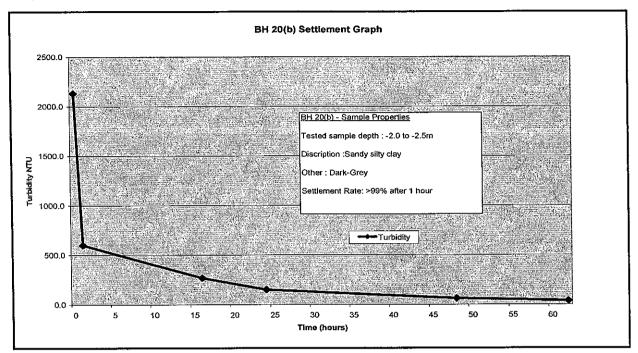


Graph 10 illustrates BH 19(b)'s turbidity measurements verses time



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.

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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
ВН 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.

Caboolture River Dredging Geo-environmental Investigations

For and on behalf of Coffey Geotechnics Pty Ltd

Ron McMahon

Principal Engineer



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.

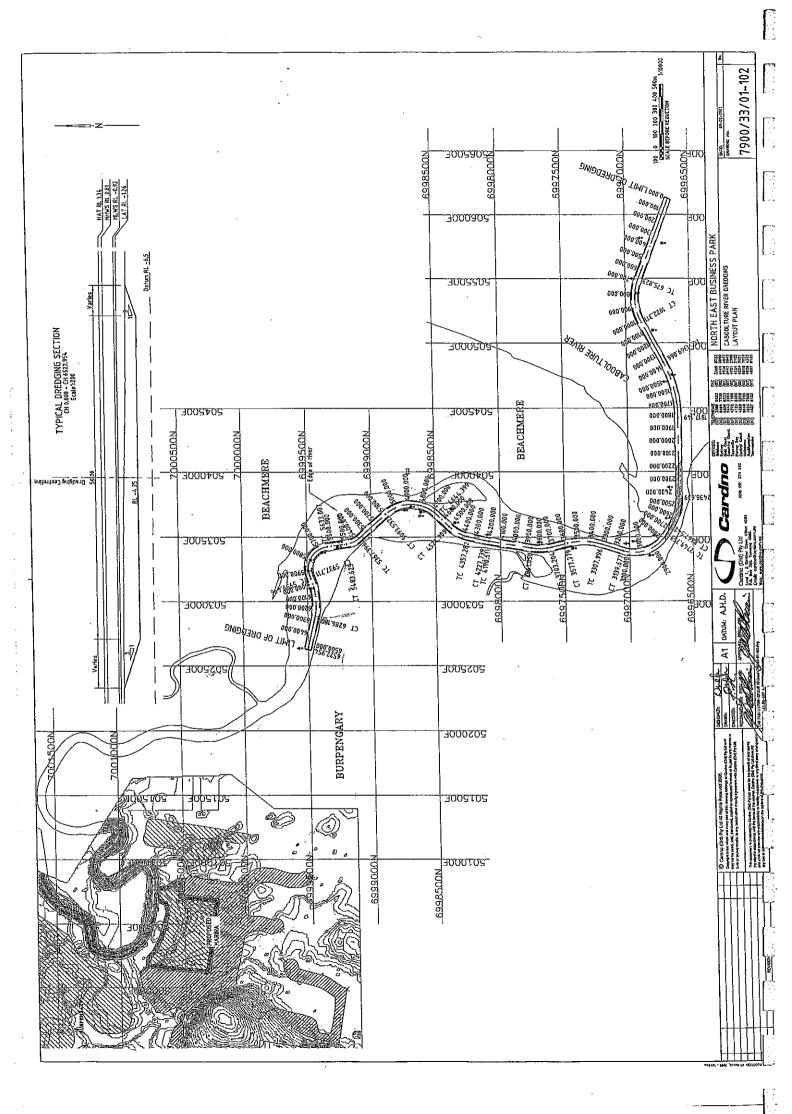
Your report is prepared for specific purposes and persons

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.



27°08'31.22" S | 153°02'59'77" E | elev

11.0





Client: NORTHEAST BUSINESS PARK

Principal: Project:

CABOOLTURE RIVER

Borehole No. BH1

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

Logged by:

18.4.2007 18.4.2007

Date completed:

LC

3ore	ehok	e L	oca	tio	n: <i>REF</i>	ER I	PLAI	٧			(Checke	ed by	<i>r</i> :	LC
	mode 			oun	·		CORE			Easting: slope: -90°	,			R.L.	. Surface; -3.5
	diam Iling			nat		mm		mant		Northing bearing:				datu	ım: AHD
rethod	no penetration	toda		Water	notes samples, tests, etc	RL	depth metres	aphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	o y pocket	'a	structure and additional observations
						4.0	- -		SP SC	SAND: fine to medium grained, dark grey, with shell fragments. CLAYEY SAND: fine to medium grained, dark grey, with shell fragment banding. SILTY CLAY: medium to high plasticity, dark grey.	W	L/MD	100	30	ALLUVIAL MARINE CLAY
					ASS & 2 BULK	4.5	1. <u>0</u> -			with shell fragments.					
					BOLK	5.0	1. <u>5</u>								
						5.5	-								
1	+	H	†	\dashv		6.0	2.5	V / X / /		Borehole BH1 terminated at 2.5m	 	-	+	H	
						6.5	3.0						, , , , , , , , , , , , , , , , , , , ,		
net	hod					7.0	- - - 4.0								
NS ND RR N CT AA CT AA CT A	shown	ı by s	aug rolle was cab han diat blar V bi TC	er dr er/tric shbor le too d au ube nk bit it bit	re ol ger	M C pe	10/1/9	no resista ranging to refusal 8 water te showr	level	U ₈₀ undisturbed sample 50mm diameter based of the control of the	cation sy ceription in unified re ry noist ret lastic limit	classifical			consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable Vt. 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.



NORTHEAST BUSINESS PARK

Principal:

Project: CABOOLTURE RIVER

Borehole Location: REFER PLAN

Borehole No.

BH₂

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started: 18.4.2007

Date completed: 18.4.2007

LC Logged by:

LC Checked by: drill model and mounting: VIBROCORE Easting: slope: R.L. Surface: -2.5 hole diameter: mm Northing bearing: datum: AHD drilling information material substance classification symbol notes penetratio consistency/ density index pocket penetro meter graphic log structure and samples, moisture condition additional observations tests, etc water soil type: plasticity or particle characteristics, kPa depth metres RL colour, secondary and minor components. 123 5885 SAND: fine to course grained, dark grey, with silt and clay bands, and shell fragments throughout. ALLUVIAL 0.5 _-3.0 1.0 -3.5 CLAYEY SAND: fine to course grained, dark grey, MARINE CLAY with shell fragments throughout. ASS & 2 BULK SANDY SILTY CLAY: medium to high plasticity, S dark grey, with shell fragments. 1.5 -4 N 2.0 2.5 -5.0 Borehole BH2 terminated at 2.6m 3.0 -5.5 3.5 -6.0 4 0 method consistency/density index AS auger screwing* M mud notes, samples, tests very soft classification symbols and AD RR auger drilling* undisturbed sample 50mm diameter S soft soll description penetration roller/tricone undisturbed sample 63mm diameter Ues based on unified classification firm W washbore disturbed sample system СТ cable tool Ν standard penetration test (SPT) VSt very stiff HA hand auger N* SPT - sample recovered hard moisture DT diatube SPT with solid cone Fb friable blank bit 10/1/98 water level vane shear (kPa) VL very loose М maist V bit pressuremeter loose wet TC bit MD bulk sample medium dense plastic limit water inflow suffix dense environmental sample liquid limit ADT water outflow very dense refusal

GD. COFFEY FILE: COFGEOTECHVER7REV1.GLB. LIBRARY GK01150AA.GPJ. PROJECT FILE:



NORTHEAST BUSINESS PARK

Principal:

Project: CABOOLTURE RIVER

Borehole No. BH3

Sheet

1 of 1

Project No: GEOTKPAR01150AA

Date started: 18.4.2007

Date completed: 18.4.2007

Logged by: LC

Boi	reho	ie l	-00	atio	n: REF	ER I	PLAI	V				C	hecke	d by:		LC
Į.				nour	•		CORE			Easting: slope:	-90°			F	R.L.	Surface: -2,5
	e dia: illin			mai	tion	mm		mate	rial sı	Northing bearing:				C	datu	m: AHD
method	12	Distribution of the control of the c	support	water	notes samples, tests, etc	RL	depth metres	graphic fog	classification symbol	material soil type: plasticity or particle characteristic colour, secondary and minor components	S.	moisture condition	consistency/ density index	200 A penetro-	1	structure and additional observations
					ASS & 2 BULK	3.5	1.0		SC	SAND" fine to course grained, dark grey, with fragments, with clay & silt banding. CLAYEY SAND: fine to course grained, with sfragments. SILTY CLAY: medium to high plasticity, pale with some fine to course grained sands and sh fragments.	shell	M	MD			MARINE CLAY
A:	D R /	1	a re w	uger		-6.1 -6.1 SI			N nil	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₅₁ undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT)	soil des	eation sy eription n unified				consistency/density Index VS very soft S soft F firm St stiff VSt very stiff
	Т	own t	d b V T by su	iatub Iank ' bit 'C bit	bit	<u>▼</u>	vater v 10/1/ on da wate	refusal '98 wate. ate show	ilevel ก	N' SPT - sample recovered Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sample R refusal	M m W w Wp p	ry noist vet lastic limit quid limit				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



Client: NORTHEAST BUSINESS PARK

Principal: Project:

Borehole No. BH4

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

18.4.2007 18.4.2007

Date completed:

	ject:				4 <i>B</i> 00			IVER				L	_ogged	l by:		LC		
				on: R								(Checke	ed by:		LC		
	mode diam			unting:		OCORE			Easting:	slope:	-90°				R.L. S	urface:	-3.5	
				ation	mm		mate	erial sı	Northing Ibstance	bearing	j: -				atum	:	AHD	
method	noiserstion	toddr		note sampl	es, etc	depth metres	aphic log	classification symbol	mal soil type: plasticity or colour, secondary ar			moisture condition	consistency/ density index	200 x pocket 300 x penetro-	ı		tructure and onal observations	3
					4.	-		СН	CLAYEY SAND: fine to c with shell fragments. SILTY CLAY: medium to with shell fragments.			M	MD		A	ARINE CL	AY	
				ASS & BUL		-												-
					-6,	2.5			Borehole BH4 terminated a	at 2.5m						•		
					6. 7.	3. <u>5</u>							1974					
AS AR W CT HAT B V T	shown	a v c h d b t	nuger oller/f vasht able and liatub lank bit C bit	tool auger ee bit	N C p	ater 10/1/9	no resista ranging to refusal 8 water se shown	level '	notes, samples, tests U _{so} undisturbed sample D disturbed sample N standard penetratic N* SPT - sample recor Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sam R refusal	e 63mm diameter on test (SPT) vered e	W we Wo pla	eription unified o				consistence VS S F St VSt H Fb VL L MD D VD	y/density index very soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense	



NORTHEAST BUSINESS PARK Client:

Principal: Project:

CABOOLTURE RIVER

Borehole Location: RFFFR DI AM

Borehole No. BH5

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

18.4.2007 Date started:

18.4.2007 Date completed:

Logged by:

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					n: <i>REFI</i>	ER I	PLAN	V				C	Checke	d by:		LC	
drill	mod	el a	nd i	mou	nting: \	/IBRO	CORE			Easting: slope:	-90°			}	R.L. 5	Surface: -3.5	
	dia					mm				Northing bearing);				datun	n: AHD	
dr	_	_	nfo	ma	tion			mate		ıbstance							
method	1 2		support	water	notes samples, tests, etc	RL.	depth metres	graphic log	classification symbol	material soil type: plasticity or particle character colour, secondary and minor compon	istics, ents.	moisture condition	consistency/ density index	100 200 A penetro-	a	structure and additional observation	s
					ASS & 2 BULK	4.5	-		SP	SAND: fine to course grained, dark grey, of fragments. CLAYEY SAND: fine to course grained, do with shell fragments. SAND: fine to medium grained, grey, with fragments. dark grey.	ark grey,	V	MD		_	ALLUVIAL	
						5.5	2. <u>0</u> -		sc	CLAYEY SAND: fine to medium grained grey, with shell fragments.	, dark						- - -
						6.0	2. <u>5</u> -			Borehole BH5 terminated at 2.3m							-
1						6.5	3. <u>0</u>										- - -
						7.0	-										- - - - -
GEO 5.3 Issue 3 Rev.2	O R T A T		a v c h d b T oy su	uger oller/t vashb able land a liatub dank / bit TC bit	tool auger e bit	M C pe	mud casing enetration 2 3 4 2 3 4 2 3 4 3 4 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	on no resist ranging to refusal 98 water ite show	level n	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 semple E environmental sample R refusal	soil des based o system moistur D d M m W w	cation sy cription n unified re ry noist ret lastic limit	classifica			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



Sheet

BH8

Project No:

1 of 1 GEOTKPAR01150AA

NORTHEAST BUSINESS PARK

Date started:

Date completed:

Borehole No.

17.4.2007

Principal:

17.4.2007

CABOOLTURE RIVER LC Project: Logged by: Borehole Location: REFER PLAN Checked by: LC VIBROCORE drill model and mounting: -90 Easting: slope: R.L. Surface: -3.0 Northing hole diameter mm bearing: datum: AHD drilling information material substance classification symbol consistency/ density index notes pocket penetro meter material penetral structure and samples, maisture condition additional observations graphic method Support tests, etc water kPa soil type: plasticity or particle characteristics, colour, secondary and minor components. depth metre RL 5885 123 ALLUVIAL fine to course grained, pale brown/grey, with shell grit. ...dark grey.

CLAYEY SAND: fine to medium grained, dark SC grey. 0.5 -3.5SP SAND: fine to medium grained, dark grey, with clay and silt fines. ...with SC lenses, ASS & 2 BULK 1.0 _-4.0 1.5 2.0 -5.0 Borehole BH8 terminated at 2m 2.<u>5</u> -5.5 3.0 -6.0 3.<u>5</u> -6.5

COFFEY GLB. COFGEOTECHVER7REV1

AS AD GFO 5.3 Issue 3 Rev.2 W CT HA DT

auger screwing* auger drillings roller/tricone washbore cable tool hand auger diatube blank bit V bit

TC bit

ADT

*bit shown by suffix

M mud C casing penetration ranging to

water inflow

water outflow

4.0

on date shown

Bs

imples, tests undisturbed sample 50mm diameter Ugg undisturbed sample 63mm diameter D, disturbed sample standard penetration test (SPT) N٢ SPT - sample recovered Nc SPT with solid cone vane shear (kPa) Р pressuremeter

bulk sample

environmental sample

classification symbols and soil description based on unified classification system moisture o dry

moist

wet

plastic limit

liquid limit

М

٧S St VSt Н

soft firm stiff very stiff hard friable VL

very loose loose МD medium dense dense VD very dense



NORTHEAST BUSINESS PARK

Principal: Project:

CABOOLTURE RIVER

Borehole No. BH9

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

17.4.2007

Date completed: 17.4.2007

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 penetration classification symbol notes pocket penetro-meter consistency/ density index material structure and samples. graphic additional observations tests, etc water soil type: plasticity or particle characteristics, colour, secondary and minor components. kPa depth metres RL 123 \$888 \$ SAND: fine to medium grained, dark grey, with silt and clay fines, with shell fragments. 0.5 _4.0 SILTY CLAY: medium to high plasticity, dark grey. S MARINE CLAY 1.<u>0</u> -4.5 ASS & 2 BULK SAND: fine to medium grained, dark grey, with silty MD ALLUVIAL clay banding, with shell fragments. 1.5 -5.0 2.0 -5.5 Borehole BH9 terminated at 2,25m 2.<u>5</u> -6,0 3.0 -6.53.<u>5</u> -7.0 method consistency/density index AS auger screwing* M mud N nil ٧S classification symbols and very soft AD RR auger drilling* C casing undisturbed sample 50mm diameter S soil description roller/tricons penetration undisturbed sample 63mm diameter based on unified classification firm W washbore disturbed sample St stiff СT cable tool N N* standard penetration test (SPT) VSI very sliff HA hand auger H Fb SPT - sample recovered hard moisture DT diatube water No SPT with solid cone friable dry blank bit 10/1/98 water level vane shear (kPa) ٧L very loose moist V bit on date shown pressuremeter bulk sample loose W wet TC bit Bs ΜĐ medium dense plastic limit water inflow shown by suffix environmental sample dense liquid limit ADT water outflow refusal very dense

3,5,07 DATE: (BOREHOLE. TEMPLATE FILE: FILE: COFGEOTECHVER7REV1.GLB. LIBRARY GK01150AA.GPJ.



Sheet

BH10

Project No:

1 of 1 GEOTKPAR01150AA

Client:

NORTHEAST BUSINESS PARK

Date started:

Borehole No.

17.4.2007

Principal: Project:

CABOOLTURE RIVER

Date completed: Logged by:

17.4.2007 LC

ill n	rodel a	ınd ı	noui	nting: V	/IBRO	CORE			Easting: slope: -9	0°		-	R.L.	Surface: -3.5
	diamet				mm				Northing bearing:				datu	ım: AHD
iril	ling i	nfo	ma	tion			mate		bstance					
nemon	benetration	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	consistency/ density index	200 A pocket	a	structure and additional observations
1						-		SP	SAND: fine to course grained, dark grey, with traces of shell.	 w	-	\prod		ALLUVIAL
						- -	//	SC	CLAYEY SAND: fine to medium frained, dark grey, with traces of shell.	<u> </u>				
					4.0	0. <u>5</u>	7 7	SP	SAND: fine to medium grained, dark grey, with traces of shell.					
						-								
					4.5	1. <u>0</u>		СН	SILTY CLAY: medium to high plasticity, dark grey, with traces of shell.	_	F/St	$\left\{ \left \cdot \right \right\}$		MARINE CLAY
				ASS & 2 BULK		-			with naces of stigit.					
				<u> </u>		-								
					5.0	1. <u>5</u> -								
						-								
					5.5	2.0								
						-								
					6.0	2. <u>5</u>			Borehole BH10 terminated at 2.3m					
						-								
					-6.5	3.0	1							
					-0.5	0.0								
							1							
					7.0	3. <u>5</u>								
							1							
nei	hod				-7.5	5 4.0	_							ongletone dalament da da
S AD RR V CT AA OT		e v c	oller/i vashb able and	tool auger	M C pri	mud casing enetrati 2 3 4	ı	vi nil ance to	U _{so} undisturbed sample 50mm diameter base undisturbed sample 63mm diameter base of D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered mois	sification : descriptio ed on unifie em	n			consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard
3 / [shown	t \	iiatub ilank / bit ifC bit	bit	<u>*</u>		98 water		NC SPT with solid cone D V vane shear (kPa) M P pressuremeter W Bs bulk sample Wp E environmental sample W.	dry moist wet plastic lii	mit			Fb frieble VI. very loose L loose MD medium dense D dense



Client: NORTHEAST BUSINESS PARK

Principal:

Project: **CABOOLTURE RIVER** Borehole No.

BH7

Sheet Project No: 1 of 1 GEOTKPAR01150AA

Date started:

18.4.2007

Date completed:

18.4.2007

Logged by:

LC

Bo	reho	le I	.oc	atio	n: <i>REF</i>	ER I	PLAI	٧				C	Checke	d by	r;	LC
drill	mod	el a	nd r	nour	nting: \	/IBRC	CORE			Easting: slope:	-90°				R.L	. Surface: -4,0
	e dia: illin			mai		mm		mate	rial c	Northing bearing:					dat	tum; AHD
method	1 2		poddns	water	notes samples, tests, etc	RL	depth metres	aphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition	consistency/ density index	200 N pocket	'a	
		3			ASS & 2 BULK	4.5	- 0. <u>5</u> -		SP	SAND: fine to course grained, dark grey, with she fragments. CLAYEY SAND: fine to course grained, dark grewith shell fragments. SANDY SILTY CLAY: medium to high plasticity, dark grey, with shell fragments.	ell	M	L/MD	16	30	ALLUVIAL -
						5.5 6.0	1. <u>5</u>			Borehole BH7 terminated at 2.3m						
						6.5 7.0	3.0			Boresiole BH7 terminated at 2.3m						
GEO 5.3 Issue 3 Rev.2	O R F A T		ai ro ca ha di bi V T- ry su	uger biler/tr ashb able tr and a iatubo lank l bit C bit	ool auger e	M C pr	mud casing enetration 2 3 4 ater 10/1/s on da	on no resista ranging to refusal 98 water te show	level	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT)	oil descr sed on stem oisture dry moi wet p plas	iption unified	mbols ar			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: COFGEOTECHVERTREV1,GLB. TEMPLATE FILE: COFFEY.GDT



NORTHEAST BUSINESS PARK

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: REFER PLAN

Borehole No. BH6

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

18.4.2007 18.4.2007

Date completed: Logged by:

LC

Checked by:

LC

rill model and mounting: VII	R PLAN BROCORE	Easting:		Checke		LC
		•	slope: -90	·		Surface: -3.5
ole diameter: m drilling information		Northing ial substance	bearing:	 -	datur	n: AHD
				_×	<u>.</u> þ	
samples, tests, etc	depth de Rt. metres 5	경 영 왕 왕 발 양 당 양 양 양 양 양 양 양 양 양 양 양 양 양 양 양 양 양	naterial or particle characteristics, and minor components.	moisture condition consistency/ density index	100 x pocket 200 x penetro- 300 m meter	structure and additional observations
ASS & 2 BULK	1 1	SP SAND: fine to course fragments. with shell matrix. with shell fragments.	grained, grey, with shell	W		ALLUVIAL .
	-6.0 2. <u>5</u>	Borehole BH6 terminate	ed at 2.25m			
	-6.5 3. <u>0</u>					
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	support M mud N C casing penetration 1 2 3 4 manging to refusal water 10/1/98 water le on date shown	U ₅₀ undisturbed sa U ₆₃ undisturbed sa Ce D disturbed samp N* SPT - sample NC SPT with solid	mple 63mm diameter based based system ration test (SPT) ecovered cone D			consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VI. very loose L loose

PROJECT FILE: GK01150AA, GPJ. LIBRARY FILE: COFGEOTECHVER7REV1.GLB. TEMPLATE FILE: COFFEY.GDT



NORTHEAST BUSINESS PARK

Principal:

Project: CABOOLTURE RIVER

Borehole No. BH11

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

17.4.2007 17.4.2007

Date completed:

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Projec							RE RI	VER			L	ogged	by:	LC	
				n: REF							c	hecke	d by:	LC	
drill mod			noun	ting: \	/IBRO	CORE			Easting: slope:	-90°			ı	R.L. Surface:	-2.5
nole dia					mm			-7-1	Northing bearing:					datum:	AHD
drillin	_	ii Of	mat				mate		ibstance		1		1	" " 	
22 I	က penetration	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	consistency/ density index	200 y pocket	a	ructure and nal observations
				ASS & 2 BULK	3.0	0. <u>5</u>		CL	SAND: fine to medium grained, dark grey, with shell fragments, with traces of silts. fine to course grained. SILTY CLAY: low to medium plasticity, pale grey/green.		M	St		PRE-HOLO CLAYS	CENE ALLUVIAL
					4.0	1. <u>5</u>									
					4.5	2. <u>0</u> -			Borehole BH11 terminated at 1.8m						
					5.0	2. <u>5</u>							***		
					_+5.5	3.0									
					6.0	3. <u>5</u>									
method AS AD RR W CT HA DT B V T		at ro ca ba di bl V	uger d ashbo ashle to and ar atube ank b bit C bit	ool uger	M C pe	mud casing enetration 2 3 4 2 3 4 ater 10/1/9	on - no resist: ranging t refusal 98 water ate show	level	U _{so} undisturbed sample 50mm diameter U _{so} 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		ption inified (classifica		consisten VS S F St VSt H Fb VL L MD D	cy/density index very soft soft firm stiff very stiff hard friable very loose loose medium dense dense

PROJECT FILE: GK01150AA.GPJ. LIBRARY FILE: COFGEOTECHVER7REV1.GLB. TEMPLATE FILE: COFFEY.GDT

2.



Client: NORTHEAST BUSINESS PARK

RTHÉAST BUSINESS PARK

Principal:

Project: CABOOLTURE RIVER

Borehole Location: REFER PLAN

Borehole No. BH12

Sheet 1 of 1

Project No: GEOTKPAR01150AA

Date started: 17.4.2007

Date completed: 17.4.2007

Logged by: LC

Bor	reho	ole i	Loc	atio	n: REF	ER I	PLAN	٧						hecke	d by:	LC	
drill	mod	iel a	nd i	noui	nting: \	/IBRC	CORE			Easting:	slope:	-90°			R.	L. Surface:	-3.0
											itum:	AHD					
	_		IIOI	ma	uon	l		mate		ıbstance		 1	-	- 1	j		
method	1 %	-	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	mater soil type: plasticity or pa colour, secondary and	uticle characteristic	ics, ts.	moisture condition	consistency/ density index	100 pocket 200 pocket 300 poperetro-		structure and tional observations
						3.5	0. <u>5</u>		SP CH	SAND: fine to medium grainshell fragments, with coursedark grey. SANDY SILTY CLAY: med	sand traces.		W	L		ALLUVIAI	- - - - -
					ASS & 2 BULK	4.0	1. <u>0</u> -		031	OARD GETT GEAT. Med	en to ngu pasuc	Sity.	IVJ	St		CLAYS	OCENE ALLUVIAL
						4.5	1. <u>5</u>										- - - - -
	Ш	Ц	L						1								-
						5.5	2. <u>5</u>			Borehole BH12 terminated a	it 2.25m		August 197				- - -
						6.0	3. <u>0</u>										- - - -
:		Market Committee of the				6.	3. <u>5</u>										- - - - -
m GEO 5.3 Issue 3 Rev.2 라 그 스 템 및 된 의 중 권기 당	method AS auger screwing* AD auger drilling* C casing Perfect CT cable tool HA hand auger DT diatube B blank bit V V bit T TC bit "bit shown by suffix e.g. ADT -7, 0 4.0 support M mud C casing penetration 1 2 3 4 1 10/1/98 vater 1 10/1/98 water or					mud casing enetrating 2 3 4 4 2 3 4 4 2 3 4 4 2 3 4 4 2 3 4 4 2 3 4 4 2 4 2	on - no resist ranging refusal 98 water ate show	rlevel n	notes, samples, tests U _{so} undisturbed sample U _{so} undisturbed sample D disturbed sample N standard penetration N' SPT - sample recove Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental samp R refusal	63mm diameter n test (SPT) ered	soil des based o system moistur D di M m W w Wp pl	cation sy cription of unified re ry noist cet lastic limit	classifica		consist VS S F St VSt H Fb VL L MD D VD	tency/density index very soft soft firm stiff very stiff hard friable very toose loose medium dense dense very dense	

PROJECT FILE: GK01150AA, GPJ. LIBRARY FILE: COFGEOTECHVER7REV1.GLB. TEMPLATE FILE: COFFEY.GDT



Sheet

BH13

Project No:

Borehole No.

1 of 1 GEOTKPAR01150AA

NORTHEAST BUSINESS PARK

Date started:

17.4.2007

Principal:

Date completed:

17.4.2007

Project:

CABOOLTURE RIVER

Logged by:

LC

	and moui			CORE			·	90°			R.I	L. Surface: -3.5		
nole diameter: mm drilling information mate					mate	Northing bearing: naterial substance			datum: AHD					
penetration	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	k	300 g penetro-			
5 123		ASS & 2 BULK	4.0	0.5 1.0 1.5		SP	SAND: fine to course grained, dark grey, with shell traces. with SC bands/includes shells. grey, with shell matrix. fine to medium grained.		MD	101	000	ALLUVIAL		
			6.0	2. <u>5</u>			Borehole BH13 terminated at 2.3m							
method AS AD RR W CT HA DT B	auger roller/ washi cable	tool auger oe	C p	5 4.0 upport mud casing enetrati 2 3 4		to	U _{so} undisturbed sample 50mm diameter soil U _{so} undisturbed sample 63mm diameter bas D disturbed sample sys N standard penetration test (SPT)	ssification s description ed on unified tem sture dry moist	1			consistency/density index VS very soft S soft F firm St stiff VSt very sliff H hard Fb friable VL very lose		



Sheet

BH14

1 of 1 Project No:

GEOTKPAR01150AA

dense

very dense

NORTHEAST BUSINESS PARK

Date started:

Borehole No.

17.4.2007

Principal: Project:

CABOOLTURE RIVER

Date completed: 17.4.2007 LC

Logged by:

Borehole Location: REFER PLAN Checked by: LC drill model and mounting: VIBROCORE Easting: -90° slope: R.L. Surface: -3.0 hole diameter Northing bearing: datum: AHD drilling information material substance penetratio classification symbol notes consistency/ density index pocket penetro meter graphic log samples, structure and method moisture condition additional observations tests, etc water depth soil type: plasticity or particle characteristics. kPa RL 123 colour, secondary and minor components. 5255 SAND: fine to medium grained, dark grey, with shell fragments, with traces of course grained sands 0.5 -3.5 1.0 -4.0 ...fine to medium grained, brown/grey, with shell MD fragments, ASS & 2 BULK ...with clayey sand banding. 1.<u>5</u> 2.<u>0</u> -5.0 Borehole BH14 terminated at 2.4m 2.<u>5</u> _.-5.5 -6.0 3.<u>0</u> 3.5 -6.5 4.0 support consistency/density index AS auger screwing* mud samples, tests undisturbed sample 50mm diameter notes. AD classification symbols and very soft auger drilling* C casino s soft RR W soil description roller/tricone penetration GEO 5.3 Issue 3 Rev,2 undisturbed sample 63mm diameter based on unified classification firm washbore disturbed sample stiff СТ no resistance system cable tool standard penetration test (SPT) VSt very stiff HA DT hand auger SPT - sample recovered moisture hard diatube SPT with solid cone Fb D M friable В blank bit 10/1/98 water level vane shear (kPa) VL very loose moist V bit on date shown pressuremeter loose wet TC bit bulk sample MD Wp plastic limit medium dense water inflow

environmental sample

refusal

water outflow

liquid limit

.GDT G.B. FILE: COPGEOTECHVER7REV1. LIBRARY

*bit shown by suffix



Sheet

BH15 1 of 1

Project No:

Borehole No.

GEOTKPAR01150AA

NORTHEAST BUSINESS PARK

Date started:

17.4.2007

Principal:

Date completed:

17.4.2007

Project:

CABOOLTURE RIVER

Logged by:

LC

Bore	ehole	Loc	atio	n: <i>REFI</i>	ER I	PLAN	J					C	hecke	d by:	:	LC	
drill m	nodel a	and	moui	nting: \	/IBRC	CORE			Easting:	slope:	-90°				R.L.	Surface: -2.5	
	ole diameter. mm drilling information mate						Northing	bearing:					datu	ım: AHD			
arıı		nto	rma	поп		•	mate		ibstance								
method	t penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	soil type: plasticity	material or particle characteris y and minor componer		moisture condition	consistency/ density index	100 pocket 200 a penetro-	a	structure and additional observa	
					3.0	-		SP	SAND: fine to course fragmentsfine to medium grains fragments, with traces	ed, dark grey, with she		W	L			ALLUVIAL	
				ASS & 2 BULK	3.5	1. <u>5</u>		СН	SILTY CLAY: mediur with red orange brown course grained sands.	n to high plasticity, pal mottling, with traces of	e grey, f fine to	М	St			PRE-HOLOCENE ALLU CLAYS	VIAL
					4.5	5 2. <u>0</u>								Ш	Ц		
					5.(5 3.0			Borehole BH15 termin	ated at 2.05m		- Address - Addr					
AS AD RR CT HA DT B V	t shown	n by s	auger roller/ washi cable hand diatut blank V bit TC bi	tool auger be bit	Δ 0 1 1	vater 1 mud 2 casing 2 3 4 2 3 4 vater 4 10/1. on d	on - no resis - no resis - ranging - refusal - refusal - resusal	to r level #N	U ₆₃ undisturbed s D disturbed san	etration test (SPT) recovered d cone (Pa) er	soil des based of system moistur D of M n W v		classifica			consistency/density in VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable Vt. very loo: L loose MD medium D dense VD very der	se dense



NORTHEAST BUSINESS PARK

Principal: Project:

CABOOLTURE RIVER

Borehole No. **BH16**

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

very dense

Date started:

17.4.2007 17.4.2007

Date completed:

LC

Logged by: Borehole Location: REFER PLAN LC Checked by: drill model and mounting: VIBROCORE Easting: slope: R.L. Surface: -2,5 hole diameter Northing bearing: AHD datum: drilling information material substance classification symbol penetratio notes consistency/ density index pocket penetro meter samples, structure and moisture condition method additional observations tests, etc water depth soil type: plasticity or particle characteristics, kPa RL 123 metres colour, secondary and minor components. 5883 fine to medium grained, brown/grev, with ALLUVIAL shell fragments. 0.5 -3.0 ...dark grey, with silt and clay fines. 1.0 ASS & 2 BULK SANDY SILTY CLAY: medium to high plasticity, grey, with orange brown streaking. St PRE-HOLOCENE ALLUVIAL 1.5 -4.5 2.0 Borehole BH16 terminated at 2.1m -5.0 2.<u>5</u> 3.0 _-5,5 3.<u>5</u> -6.0 support consistency/density index AS auger screwing* mud mples, tests very soft AD classification symbols and auger drilling* roller/tricone C casing undisturbed sample 50mm diameter s soft soil description RR penetration undisturbed sample 63mm diameter Uss W CT HA based on unified classification firm washbore D disturbed sample stiff system cable tool N standard penetration test (SPT) VSt very stiff hand auger SPT - sample recovered moisture hard ÐΤ diatube water SPT with solid cone Fb friable В V blank bit 10/1/98 water level vane shear (kPa) VL very loose М moist V bit on date shown pressuremeter loose wet TC bit ₿s MD bulk sample medium dense plastic limit water inflow *bit sh environmental sample liquid limit ADT

COFFEY TEMPLATE FILE: LIBRARY GK01150AA.GPJ.

e.g.

water outflow

refusal



NORTHEAST BUSINESS PARK

Principal:

Client:

Project:

CABOOLTURE RIVER

Borehole No. **BH17**

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

17.4.2007 Date started:

17.4.2007

Logged by:

Date completed:

LC

Во	reh	ole	Loc	atio	n: <i>REF</i>	ER F	PLAN	/				(Checke	d by:	LC
drili	drill model and mounting: VIBROCORE					Easting: slope	: -90°			R	R.L. Şurface; -2.5				
	hole diameter: mm Northing bearing: drilling information material substance					da	datum; AHD								
method		2 penetration	support		notes samples, tests, etc	RL	depth metres	aphic log	classification gray	material soil type: plasticity or particle characte	eristics, nents.	moisture condition	consistency/ density index	200 x pocket 300 y penetro-	a
							0. <u>5</u>		SP	SAND: fine to medium grained, brown/gishell fragments. dark grey, with shell fragments/matrix, wickley fines traces.	ey, with	W	L	200	ALLUVIAL
					ASS & 2 BULK	3.5	-		СН	SILTY CLAY: medium to high plasticity, orange brown, with fine to course grained fine to medium grained angular and sub-a gravel.	sands, and	M	St		PRE-HOLOCENE ALLUVIAL CLAYS
				- LANGE - LANG		5.5	2. <u>5</u>			Borehole BH17 terminated at 2m			The state of the s		
m GEO 5.3 (ssue 3 Rev.2	/ [od	by s	auger coller/li washb cable nand diatub blank V bit TC bit	tool auger e bit	P 1	upport i mud i casing enetrati 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	on on no resist ranging refusal 98 water ate show	to r level vn	notes, samples, tests U ₅₀ undisturbed sample 50mm diamete U ₆₃ undisturbed sample 63mm diamete 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	soil de based system moistu D M W Wp		classifica		consistency/density index VS very soft S soft F firm St sliff VSt very sliff 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



Client: NORTHEAST BUSINESS PARK

Principal: Project:

CABOOLTURE RIVER

Borehole No. BH18

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

Date started:

18.4.2007

Date completed:

18.4.2007 LC

Logged by:

	nodel			on: REF		CORE			Easting: slope:	-90°		Checke		LC .L. Surface:	
	diame				mm				Northing bearing:					atum:	AHD
drii	lling i	nfo i	rma	ition	+	i	mate		ubstance						
riellion	t penetration	poddns	water	notes samples, tests, etc		depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition	consistency/ density index	100 pocket 200 penetro- 300 penetro-		structure and ditional observations
				ASS & 2 BULK	3.5	1.0		SP	SAND: fine to course grained, dark grey, with CL banding throughout, with traces of silt and clay fin traces of shell fragments throughout.	nes,	W	UMD		ALLUVI	AL .
\dashv	╂	╀			ļ	 			Borehole BH18 terminated at 2.6m						****
					-5.5	- - 3. <u>0</u>			Solonole Di 110 terminated at 2.6M						
					6.0	3. <u>5</u>									
RR V	nod shown b	ai ro ca di bi V Ti y su	uger ashb able t and a atubi ank t bit C bit	ool uger >	M C pee 1	pport mud casing netratio 2 3 4 ater 10/1/9	n resista ranging to refusa! 8 water e showr	level	U ₅₀ undisturbed sample 50mm diameter soi U ₅₁ undisturbed sample 63mm diameter bas D disturbed sample N standard penetration test (SPT)	il descri sed on u stem visture dry moi: wet	iption unified o	nbols an		consie VS S F St VSt H Fb VL L MD D VD	very soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense

PROJECT FILE; GK01150AA, GPJ. LIBRARY FILE; COFGEOTECHVER?REV1,GLB. TEMPLATE FILE; COFFEY.GDT



NORTHEAST BUSINESS PARK

Principal:

Project: **CABOOLTURE RIVER**

Borehole Location: REFER PLAN

Borehole No.

BH19

Sheet

1 of 1

Project No:

GEOTKPAR01150AA

very dense

Date started:

18.4.2007 18.4.2007

Date completed: Logged by:

LC

LC Checked by: drill model and mounting: VIBROCORE Easting: slope: R.L. Surface: -2.5 hole diameter: mm Northing bearing: datum: AHD drilling information material substance penetration notes classification symbol pocket penetro meter consistency/ density index material samples, structure and method additional observations support tests, etc water depth metres soil type: plasticity or particle characteristics, kPa RL 123 colour, secondary and minor components. 5888 CLAYEY SAND: fine to course grained, dark grey, with SP banding containing silt and clay fines, with shell fragments. ALLUVIAL 0.5 -3.01.0 _-3.5 ASS & 2 BULK 1.<u>5</u> SILTY CLAY: medium to high plasticity, dark grey, s MARINE CLAY with shell fragments, 2.0 -4.5 2.<u>5</u> -5.0 Borehole BH19 terminated at 2.55m -5.5 3.0 3.5 -6.0 4.0 consistency/density index AS auger screwing* M mud notes imples, tests very soft AD RR classification symbols and auger drilling* C casing undisturbed sample 50mm diameter s soft soil description roller/tricone penetration undisturbed sample 63mm diameter U₆₃ based on unified classification w firm washbore D disturbed sample St stiff CT no resistance system cable tool Ν standard penetration test (SPT) VSt very sliff hand auger SPT - sample recovered moisture Н hard ĎΤ diatube SPT with solid cone Fb friable ₿ blank bit 10/1/98 water level vane shear (kPa) VL very loose М moist V bit on date shown pressuremeter loose wet TC bit bulk sample MD Wp plastic limit medium dense *bit shown by suffix water inflow environmental sample dense liquid limit water outflow

refusal

DATE: 3.5.07 BOREHOLE. TTLE FRAME <u>.60</u> COFFEY LIBRARY FILE: COFGEOTECHVER7REV1.GLB. GK01150AA.GPJ. PROJECT FILE:



Sheet

BH20

Project No:

Borehole No.

GEOTKPAR01150AA

NORTHEAST BUSINESS PARK

Date started:

18.4.2007

Principal:

CABOOLTURE RIVER

Date completed:

18.4.2007

Project:

Logged by:

plastic limit

liquid limit

dense

very dense

LC Borehole Location: REFER PLAN Checked by: LC VIBROCORE Easting: drill model and mounting: slope: -3.5 R.L. Surface: Northing hole diameter: bearing: mm datum: AHD drilling information material substance classification symbol pocket penetro meter notes consistency/ density index <u>6</u> material structure and samples, moisture condition additional observations graphic } method support tests, etc water kPa soil type: plasticity or particle characteristics, depth RL metre colour, secondary and minor components. 8888 123 SANDY SILTY CLAY: low to medium plasticity, ALLUVIAL SC CLAYEY SAND: fine to medium grained, dark L CL SANDY SILTY CLAY: low to medium plasticity. S 0.5 dark grey. SAND: fine to medium grained, grey, with clay and L/MD 1.0 silt fines ASS & 2 SC SLAYEY SAND: fine to medium grained, dark MD BULK 1.<u>5</u> -5.0 SILTY CLAY: medium to high plasticityt, dark grey. S/F MARINE CLAY 2.0 2.5 Borehole BH20 terminated at 2,5m 3.0 -6.5 3.<u>5</u> _-7.0 consistency/density index N nil AS auger screwing M mud VS very soft classification symbols and ΑD auger drilling* C casing S soft undisturbed sample 50mm diameter soil description RR roller/tricone penetration GEO 5.3 Issue 3 Rev.2 undisturbed sample 63mm diameter based on unified classification washbore W D St stiff disturbed sample system no resistance ranging to СТ very stiff cable tool N N* standard penetration test (SPT) VSt hand auger SPT - sample recovered moisture Dī diatuoe Nc SPT with solid cone Fb friable dry 10/1/98 water level on date shown 8 blank bit vane shear (kPa) VL very loose moist M V bit loose Р pressuremeter wet TC bit Вs MD medium dense . bulk sample

environmental sample

water outflow

DATE: 3,5.07 BOREHOLE. FRAME COT COFFEY 1.GLB. COFGEOTECHVER7REV1 LIBRARY FILE:

*bit shown by suffix



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

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

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 Su (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	CE	MENTING
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 Structure and fabric of parent rock visible. weathered material

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).

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.

graphic symbols soil and rock



Explanation Sheet 2

SOIL



Asphaltic Concrete or Hotmix

Concrete

Topsoil

FIII

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

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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 LUKE CRAIG

Page 1 of 1 Report Pages.

CLIENT NAME
CLIENT FIRM
CLIENT ADDRESS
PROJECT NAME

YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA

NUMBER OF SAMPLES

LUKE CRAIG
COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFEREN
PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
40 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
SAMPLES LABELLED - INTACT
1/8/2007

PACKAGING SAMPLES DISPOSED ON 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 T	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 8 no TAA & no TPA & low sulphide
BH 1	0.75	7.5 7.2 -0.3 4	
BH 1	1.00	7.7 7.3 -0.4 4	
BH 1	1.25		
BH 1	1.50	7.7 5.8 -1.9 4	10 no TAA & no TPA & low sulphide 7 no TAA & low TPA
BH 1	1.75		14 no TAA & low TPA
BH 1	2.00	7.8 5.1 -2.7 3	
BH 1	2.25	8.0 4.2 -3.8 3	
BH 1	2.50		
BH 2	0.25	_	7 no TAA & low TPA & sulphide possible 11 no TAA & low TPA
BH 2	0.50		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	
BH 2	1.25	7.8 4.9 -2.9 4	
BH 2	1.50	7.8 5.1 -2.7 4	
BH 2	1.75	8.0 6.0 -2.0 4	7 no TAA & low TPA & sulphide possible 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
вн 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
вн 3	1.25	7.9 7.1 -0.8 3	8 no TAA & no TPA & low sulphide
вн з	1.50	7.8 7.2 -0.6 3	6 no TAA & no TPA & low sulphide
вн з	1.75	7.9 7.5 -0.4 3	6 no TAA & no TPA & low sulphide
вн 3	2.00		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. Pohnton

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

Page 1 of 1 Report Pages.

CLIENT NAME
CLIENT FIRM
CLIENT ADDRESS
PROJECT NAME
NUMBER OF SAMPLES

YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA

2/ APRIL 2007
LUKE CRAIG
COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFEREN
PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
45 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
SAMPLES LABELLED - INTACT
1/8/2007

PACKAGING SAMPLES DISPOSED ON 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
ВН 5	0.25	6.7 6.9 0.2 1 0	no Man c mpa a a a a a a a
вн 5	0.5	6.8 7.0 0.2 1 4	no TAA & no TPA & low sulphide
вн 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
вн 5	1.25	7.6 5.8 -1.8 3 3	no TAA & no TPA & low sulphide
BH 5	1.5	7.4 6.0 -1.4 4 1	no TAA & low TPA no TAA & low TPA
BH 5	1.75	7.2 6.9 -0.3 3 5	
BH 5	2.0	7.1 5.6 -1.5 1 0	no TAA & no TPA & low sulphide
BH 5	2.25	7.0 6.1 -0.9 1 3	no TAA & low TPA
BH 6	0.25	6.9 6.9 0.0 1 9	no TAA & low TPA & low sulphide
вн 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
вн 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
вн 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 & no TPA & low sulphide
BH 7	0.5	7.0 4.8 -2.2 4 4	no TAA & low TPA & low sulphide no TAA & low TPA & sulphide possible
BH 7	0.75	$7.0 \ 5.6 \ -1.4 \ 1 \ 1$	no TAA & low TPA
вн 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
вн 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
ВН 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
ВН 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
ВН 9	2.5	7.4 3.8 -3.6 4 0	no TAA & high sulphide/low buffer

P. Edulow

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

Page 1 of 1 Report Pages.

YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA

DATE OF REPORT
CLIENT NAME
CLIENT FIRM
CLIENT ADDRESS
PROJECT NAME
NUMBER OF SAMPLES
PACKAGING

27 APRIL 2007
LUKE CRAIG
COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFEREN
PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
42 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
SAMPLES LABELLED - INTACT

SAMPLES DISPOSED ON 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
BH 10	0.5		7 no TAA & moderate TPA & high sulphide/low buffer
BH 10	0.75		8 no TAA & moderate TPA & high sulphide/low buffer
BH 10	1.0		13 NO TAA & 10W TPA & sulphide possible
BH 10	1.25		11 no TAA & no TPA & low sulphide
BH 10	1.5		4 no TAA & no TPA & low sulphide
BH 10	1.75		4 no TAA & no TPA & low sulphide
BH 10	2.0		0 no TAA & no TPA & low sulphide
BH 10	2.25	8.0 8.1 0.1 2	4 no TAA & no TPA & low sulphide
BH 11	0.25	8.2 8.1 -0.1 1	3 no TAA & no TPA & low sulphide
BH 11		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	o no TAA & low TPA
BH 11	1.0	7.4 5.2 -2.2 1	9 no TAA & low TPA & sulphide possible
	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	o no TAA & no TPA & low sulphide
BH 11	1.75	$\frac{8.0}{1}$ 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	7.4 6.7 -0.7 3 7.8 5.9 -1.9 1 7.3 4.2 -3.1 1 7.8 6.8 -1.0 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 7.7 6.9 -0.8 3	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
вн 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 $7.4 2.8 -4.6 3$	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	7.4 5.1 -2.3 3 7.1 6.4 -0.7 2 7.1 4.2 -2.9 2	10 no TAA & low TPA & low sulphide
BH 13	1.5	7.1 4.2 -2.9 2	5 no TAA & sulphide possible
ВН 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	
BH 13	2.25	7.4 3.3 -4.1 1	
BH 14	0.25	7.4 4.1 -3.3 1	
BH 14	0.5	7.2 4.2 -3.0 1	
BH 14	0.75	7.2 4.1 -3.1 1	
BH 14	1.0	7.3 5.1 -2.2 1	
BH 14	1.25	7.3 5.1 ~2.2 1	
BH 14	1.5	6-9 3.9 -3.0 1	· wew rem a parbitrae bossible
BH 14	2.0	6.9 4.1 -2.8 1	
BH 14	2.25	7-2 4.1 -3.1 1	4 no TAA & sulphide possible 2 no TAA & high sulphide/low buffer
		5.1 1	2 по TAA & high sulphide/low buffer

P. Colmbon

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 LUKE CRAIG

Page 1 of 1 Report Pages.

YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA

CLIENT NAME
CLIENT FIRM
CLIENT ADDRESS
PROJECT NAME

LUKE CRAIG
COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFEREN
PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
34 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
SAMPLES LABELLED - INTACT
1/8/2007

NUMBER OF SAMPLES

PACKAGING

SAMPLES DISPOSED ON 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	7.5 5.9 -1.6 3 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	7.9 6.8 -1.1 3 8.3 7.3 -1.0 3 7.4 5.6 -1.8 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	U 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 7.3 2.8 -4.5 3	9 no TAA & moderate TPA & high sulphide/low buffer
BH 18	2.0		U 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. Columbian

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

Page 1 of 1 Report Pages.

YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA

DATE OF REPORT
CLIENT NAME
CLIENT FIRM
CLIENT ADDRESS
PROJECT NAME
NUMBER OF SAMPLES
PACKAGING

27 APRIL 2007
LUKE CRAIG
COFFEY GEOTECHNICS PTY LTD YOUR PROJECT/JOB REFERENCE
PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER SAMPLING DATE 17-18/4/2007
20 SAMPLE TYPE SOIL SAMPLE FOR ACID SULFATE STUDY
SAMPLES LABELLED - INTACT
1/8/2007
23 APRIL 2007 LAB REE 1023047 645

SAMPLES DISPOSED ON 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
ВН 19	1.25	7.4 3.2 -4.2 4	21 no TAA & moderate TPA & high sulphide/low buffer
ВН 19	1.50	7.3 4.2 -3.1 3	1 no TAA & high sulphide/low buffer
ВН 19	1.75	7.4 2.8 -4.6 4	17 no TAA & moderate TPA & high sulphide/low buffer
BH 19 BH 19 BH 19 BH 20	2.00 2.25 2.50	7.6 3.0 -4.6 4 7.5 4.1 -3.4 4 7.2 2.7 -4.5 4	no TAA & moderate TPA & high sulphide/low buffer no TAA & high sulphide/low buffer no TAA & moderate TPA & high sulphide/low buffer
BH 20	0.25	6.7 4.8 -1.9 4	8 no TAA & low TPA 11 no TAA & moderate TPA & high sulphide/low buffer 2 no TAA & moderate TPA & high sulphide/low buffer no TAA & high sulphide/low buffer
BH 20	0.50	7.1 3.2 -3.9 4	
BH 20	0.75	6.9 2.7 -4.2 4	
BH 20	1.00	7.3 3.7 -3.6 3	
BH 20	1.25	7.3 3.9 -3.4 4	23 no TAA & high sulphide/low buffer 20 no TAA & sulphide possible 7 no TAA & high TPA & high sulphide/low buffer
BH 20	1.50	7.0 4.3 -2.7 4	
BH 20	1.75	7.2 2.3 -4.9 4	
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. Columbian

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS

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

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

LR23047.615 DATE OF REPORT 29 APRIL 2007 @17:01:44
LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPARO1150AA
17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008 LAB REFERENCE SAMPLING DATE DATE RECEIVED PROJECT NAME

4 Report Pages.

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.

LIME: rates calculated to neutralise IPA (or IAA if >TPA)+ as RAS -ANC_E/1.5 LIME2 rates calculated to neutralise IPA or IAA if >TPA)+ as RAS -ANC_E/1.5 LIME2 rates calculated to neutralise in the carrier of the convert to kg/m3.

Note the 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.

Ca/ar mg/kg	124997 9857 9107 40077 3256 12232 16231 16221 16231 16231 17329 4541 1115 38946 14772 28341 1115 51433 98460 27535 385
sANC_E % s19A2	0.18 0.03 0.03 0.07 0.07 0.07 0.07 0.07 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.07
.IME2 s/ kg/t	22.12 2.45 2.65 2.65 2.65 2.65 2.65 2.65 2.65 2.6
LIME1 L kg/t	2,52,53 2,60 2,60 2,60 2,60 2,60 2,60 2,60 2,60
CBN POS m/t a23U&X	22 22 20 24 24 24 24 24 24 24 24 24 24 24 24 24
Mg P CBI mg/kg 231m a	598 785 147 587 587 587 110 575 2762 2762 2762 2762 2699 34 521 125 687 307 100 100
Mg KCl mg/kg 23sm	589 1369 1365 298 298 520 435 493 547 649 1019 165 165 200 182 200 183 248
Ca P M mg/kg 23Wh	2182 307 1942 307 1605 252 8914 1535 633 9583 8670 5198 1756 1768 1789 1789 1789 1789 1789 1789 1789 178
Ca KCl mg/kg 23vh	11245 1491 1423 1505 507 491 1034 1018 11395 11380 11187 703 830 830 830 842 742 617
ស ចិន្តស ភូគួ	0.087 0.704 0.705 0.705 0.035 0.059 0.634 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052 0.052
s-RAS % s23Re	0.58 0.58 0.75 0.17 0.17 0.17 0.17 0.17 0.17 0.17 0.17
S Cr s % 228 s	
S POS % 23Ee	0.09 0.12 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.0
S P S 23De	0.03 0.03 0.03 0.03 0.04 0.04 0.04 0.04
KCl % 23Ce 2	0.00 0.10 0.10 0.00 0.00 0.00 0.00 0.00
TSA S m/t 23H Z	0 m 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TPA T m/t m 23G 2	27,7 % % % % % % % % % % % % % % % % % %
	574
1 TAA 1 23F	
рн ох 23в	8.55.75.75.75.88.25.89.85.75.75.75.75.89.85.89.85.75.75.75.75.89.85.89.85.89.85.89.89.89.89.89.89.89.89.89.89.89.89.89.
K PF	9.88.88 9.72.88 9.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.72.88 8.73.88
ID. DEPTH m Analytical Method Codes	
DEPTH m tical Meth	000000000000000000000000000000000000000
ID. DE	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Y I	

For and on behalf of Bin-Track Pty Ltd

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS



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

4 Report Pages,

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

LR23047.615 DATE OF REPORT 29 APRIL 2007 a17:02:22
LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008 CLIENT NAME PROJECT NAME SAMPLING DATE LAB REFERENCE DATE RECEIVED

Sample ID as received. METHODOLOGY: As per (DNR GASSIT 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 >1PA)+ as RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TPA 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.

Finaness 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.

a Sq.	10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Ca/ar mg/kg	6835 3569 3066 10657 16657 282 4678 3153 6168 6123 6419 1371 1371 1371 1371 1371 146 17128
ANC_E s19A2	60.01 60.01 60.01 60.01 60.01 60.01 60.01 60.01 60.01 60.01
LIME2 SANC_E kg/t s19A2	84.00 84
LIME1 I kg/t	4.55.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.
CBN POS m/t a23U&X	468 681 681 10 10 10 10 10 10 10 10 10 10 10 10 10
Mg P CB mg/kg 231m a	1066 4139 6011 330 136 136 137 1263 834 834 834 834 834 834 834 834 834 83
4g KCl mg/kg 23sm	1199 1232 1081 403 338 241 280 757 440 236 1093 1175 680 685 695 419 424 392 196 264
Ca P 1 ng/kg 23.th	2322 5700 6353 408 327 216 206 539 5146 773 1124 286 773 260 207 207 207 207 207 207 207 207 207 20
Ca KCl mg/kg r 23Vh	1127 1124 841 394 551 160 689 689 689 689 575 579 517 579 517 517 518 405 296 296 901 265 188
ა ეკო ა	2.474 3.771 0.301 0.301 0.089 0.089 0.089 0.020 0.025 0.025 0.002 0.027 0.023 0.023 0.023 0.023 0.023 0.023 0.023
s-RAS % s23Re	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
S Cr 228	• • •
S POS % 23Ee	0.57 0.07
S P % 23De	2.57 3.84 3.84 0.01 0.02 0.02 0.03 0.03 0.03 0.03 0.03 0.03
s KCl % 23Ce	0.10 0.10 0.07 0.05 0.05 0.03 0.03 0.03 0.03 0.03 0.03
TSA m/t 23H	439 658 685 33 33 60 00 00 00 00 00 00 00 00 00 00 00 00
TPA m/t 23G	658 685 685 685 60 00 00 00 00 00 00 00 00 00 00 00 00
1AA m/t 23F	
23g 平	2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
PH KCL 23A	8.8.8.22 8.8.22 8.8.22 7.28 8.8.33 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.77 7.7.82 7.7.82
10. DEPTH m Analytical Method Codes	2.25 2.25 2.25 2.10 2.25 2.25 2.25 2.25 2.25 2.25 2.25 2.2
ID. Analyt	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2

For and on behalf of Bio-Track Phy Lid

CERTIFICATE OF ANALYSIS

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

آن ان ان

LRZ3047.615 DATE OF REPORT 29 APRIL 2007 a17:03:01
LUKE CRAIG c/o COFFEY GEOTECHNICS PTY LTD PO BOX 5537 MAROOCHYDORE QLD 4558
CABOOLTURE RIVER YOUR PROJECT/JOB REFERENCE GEOTKPAR01150AA
17-18/4/2007 NUMBER OF SAMPLES 80 Samples supplied by client SAMPLE TYPE:SOIL SAMPLE FOR ACID SULFATE STUDY
23 APRIL 2007 PACKAGING SAMPLES LABELLED - INTACT Ground Oven Dry Samples DISPOSED ON 1/1/2008 PROJECT NAME SAMPLING DATE DATE RECEIVED LAB REFERENCE CLIENT NAME

Page 3 of 4 Report Pages.

Sample ID as received, METHODOLOGY: As per (DNR GASSIT May 2004), oven dried (85/C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.

ILIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ as RAS -ANC_E/1.5 LIME2 rates calculated to neutralise TPA (or TAA if >TPA)+ as RAS -ANC_E/1.5 LIME2 rates calculated to 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 POSS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCI) + (Mg POS - Mg KCI) 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 calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

Ca/ar mg/kg	356 356 707 707 185 617 617 626 626 626 625 625 625 625 625 625 625
sANC_E % \$19A2	0.02 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.03
LIME2 s/ kg/t	844460000000000000000000000000000000000
LIME1 kg/t	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
SN POS m/t a23U&X	10 88 12 12 16 16 16 17 17 17 17 17 17 17 17 17 17 17 17 17
Mg P CBN POS mg/kg m/t 237m a23U&X	313 152 253 253 266 293 168 495 120 1210 1210 1210 1210 1231 1231 1231
Mg KCl mg/kg 23sm	242 178 117 117 117 118 118 118 119 119 119 119 119 119 119
Ca P l mg/kg 23wh	628 318 293 294 196 290 955 3158 3661 885 3297 1439 1079 856 1155 420 4270 4270
Ca KCl mg/kg 23vh	542 187 167 167 167 167 167 167 167 167 167 16
ა ნე % ა	0.035 0.038 0.029 0.029 0.038 0.038 0.037 0.038 0.078 0.078 0.078 0.078 0.078 0.078 0.078 0.078
	0.000000000000000000000000000000000000
5 PDS 23E&	0.03 0.01 0.01 0.01 0.01 0.01 0.03 0.03
о 34 н О О	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
s KCl % 23Ce	200 10 10 10 10 10 10 10 10 10 10 10 10 1
TSA m/t 23H	
TPA m/t 23G	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TAA m/t 23F	00000000000000000000000000000000000000
238 238	2. 35 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
PH KCL 23A	9.36 7.77 7.77 7.73 7.73 8.17 8.17 8.17 8.17 8.17 7.10 7.10 7.10 7.10 7.10 8.10 8.10 8.10 8.10 8.10 8.10 8.10 8
ID. DEPTH m Analytical Method Codes	
DEPTH m tical Metho	2.25 2.25 2.25 2.25 2.25 2.25 2.25 2.25
). DEF m malytica	££444445££\$656667777788888666
ID. Ana	***************************************

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

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

4 Report Pages.

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_PAS -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/fon. 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

1. Ca/ar is the acid	/ar /kg	2369 1937 438 565 1428
acid exilact) may be zero for undisturbed soil. (ia KCl Ca P Mg KCl Mg P CBN POS LIME1 LIME2 sANC E mg/kg mg/kg mg/kg mg/kg m/t kg/t kg/t kg/ 23vh 23wh 23sm 23Tm a23ugx	4504 453 3796 472 32.2 62.4 4251 401 4177 509 20.0 50.0 50.7 1180 165 2363 236 2.1 22.9 1755 56 1360 192 4.5 19.4 51.8 5164 75 2035 414 12.7 45.8
•	S Cr s-RAS % % 22B s23Re	0.00 0.01 0.01 0.01
	pH TAA TPA TSA S KC1 S P Ox m/t m/t m/t % % 23B 23F 23G 23H 23Ce 23De	8.21 2.54 0 624 624 0.05 2.49 2.45 7.56 2.80 0 389 389 0.04 2.16 2.12 7.37 4.40 0 40 40 <0.01 0.97 0.96 7.61 3.28 0 88 88 0.01 0.82 0.81 7.58 2.89 0 247 247 0.01 1.88 1.87
	alyti	BH 19 2.5 BH 20 0.75 BH 20 1.25 BH 20 1.75 BH 20 2.25



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-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:



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WORLD RECOGNISED ACCREDITATION 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),,,,

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

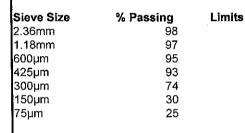
Oven

Note:

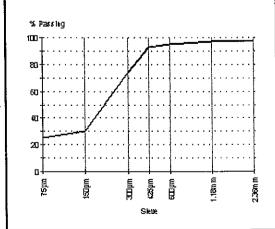
Sample Washed

Other Test Results

Description	Method	Result	Limits



Chart



Comments

N/A



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-00925

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:



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Issue No: 1

Limits

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WORLD RECOGNISED ACCREDITATION

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: Source:

18/04/2007 -2.0 to - 2.4m

Material:

Grey sand with shell fragments

Specification:

AS Grading

Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Other Test Results

Method Limits Description Result

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

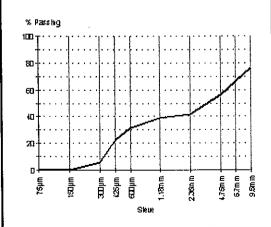
Oven

Note:

Sample Washed

ng
76
66
56
42
39
32
22
6
0
0

Chart



Comments

N/A

Form No: 18909.V1.00 (c) 2000-2006 QESTLab by SpectraQEST.com



geotechnics

SPECIALISTS MANAGING THE EARTH Kunda Park QLD 4556

Kunda Park Laboratory

Coffey Geotechnics Pty Ltd ABN 93 056 929 483 1/36 Kerryl Street

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

Aggregate/Soil Test Report

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:

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Issue No: 1

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Report No: MAT:KPAR07S-00926

17.16

WORLD RECOGNISED ACCREDITATION

Approved Signatory: Matthew Morley (Laboratory Manager)

This report replaces all previous issues of report no 'MAT:KPAR07S-00926'.

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 -0.2 to -0.5m

Source: Material:

Dark grey clayey sand

Specification:

AS Grading

Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Particle Size Distribution

Method:

AS 1289,3,6,1

Drying by:

Oven

Note:

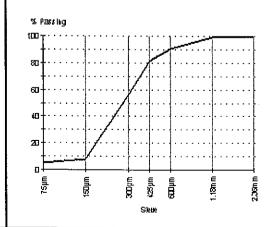
Sample Not Washed

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

Other Test Results

Description Method Result Limits

Chart



Comments

Form No: 18909.V1.00

N/A

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Geotechnics SPECIALISTS MANAGING THE EARTH Coffey Geotechnics Pt ABN 93 056 929 483 1/36 Kerryl Street Kunda Park QLD 4556

Kunda Park Laboratory Coffey Geotechnics Pty Ltd

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Aggregate/Soil Test Report

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:



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Report No: MAT:KPAR07S-00927



WORLD RECOGNISED
ACCREDITATION

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

This report replaces all previous issues of report no 'MAT:KPAR07S-00927'.

Sample Details

Sample ID:

KPAR07S-00927

Field Sample:

BH 10

Date Sampled: Source:

17/04/2007 -0.6 to -0.8m

Material:

Dark grey sand with shell fragments

Specification:

AS Grading

Sampling Method: Location:

,Refer Plan (Figure 1),,,

Particle Size Distribution AS 1289.3.6.1

Method:

Drying by:

Oven

Note:

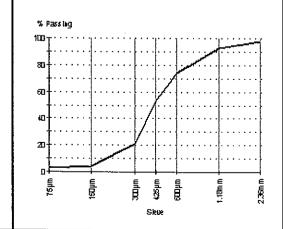
Sample Not Washed

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

Other Test Results

Description Method Result Limits

Chart



Comments

Form No: 18909.V1.00

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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-00928 Issue No: 1

Limits

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:



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WORLD RECOGNISED
ACCREDITATION

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: Date Sampled: **BH 12** 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),,,

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

Oven

Note:

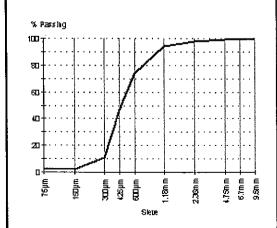
Sample Washed

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Description	Method	Result	Limits
- + + + · · · + · · · · · ·		***************************************	

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

Chart



Comments

Form No: 18909.V1.00

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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

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:

NATA

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Issue No: 1

Limits

Report No: MAT:KPAR07S-00929

This report replaces all previous issues of report no 'MAT:KPAR07S-00929'.

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A PAGE

WORLD RECOGNISED ACCREDITATION

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: Date Sampled:

17/04/2007

Source: Material:

-1.5 to - 1.8m Dark grey sand AS Grading

Specification: Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Other Test Results

Description	Method	Result	Limits
Describacii	Menioa	Result	Limits

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

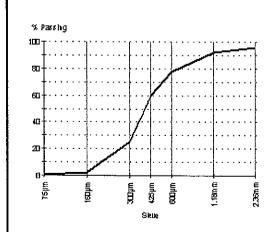
Oven

Note:

Sample Not Washed

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

Chart



Comments

N/A

Form No: 18909.V1.00

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Kunda Park Laboratory Coffey Geotechnics Pty Ltd

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

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:



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WORLD RECOGNISED
ACCREDITATION

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: Date Sampled: BH 15 17/04/2007

Source:

-0.7 to -0.9m

AS Grading

Material:

Brown sand with shell fragments

Specification:

Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

Oven

Note:

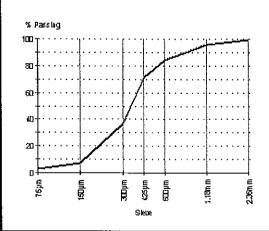
Sample Not Washed

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

Other Test Results

Description Method Result Limits

Chart



Comments

Form No: 18909.V1.00

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Geotechnics SPECIALISTS MANAGING THE EARTH Coffey Geotechnics Pt ABN 93 056 929 483 1/36 Kerryl Street Kunda Park QLD 4556

Kunda Park Laboratory Coffey Geotechnics Pty Ltd

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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:



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ACCREDITATION

Approved Signatory: Matthew Morley

(Laboratory Manager)

NATA Accredited Laboratory Number: 431 Date of Issue: 1/05/2007

Limits

Sample Details

Sample ID:

KPAR07S-00931

Field Sample:

BH 19

Date Sampled: Source:

18/04/2007 -1.0 to -1.4m

Material:

Dark grey clayey sand

Specification:

AS Grading

Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Particle Size Distribution

Method:

AS 1289,3,6,1

Drying by:

Oven

Note:

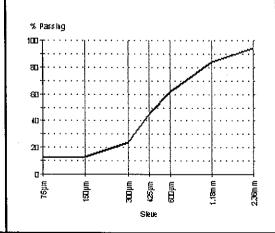
Sample Not Washed

Other Test Results

Description Method Result Limits

% Passing
94
84
62
45
24
13
12

Chart



Comments

Form No: 18909.V1.00

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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

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:

Report No: MAT:KPAR07S-00932

Issue No: 1

Limits

This report replaces all previous issues of report no 'MAT:KPAR07S-00932'.



This document is issued in accordance with NATAs accreditation requirements. Accredited for compliance with ISO/IEC 17025.

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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 18/04/2007

Date Sampled: Source:

-1.3 to -1.6m

Material:

Dark grey clayey sand

Specification:

AS Grading

Sampling Method:

Location:

,Refer Plan (Figure 1),,,

Particle Size Distribution

Method:

AS 1289.3.6.1

Drying by:

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Oven

Note:

Sample Not Washed

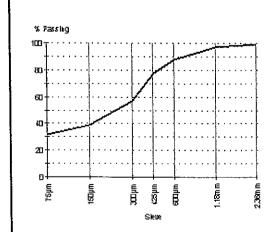
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	SIEVE SIZE	76 Passing
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1	1.18mm	97
	600µm	88
1	425µm	77
	300µm	57
	150µm	39
	75µm	32

Other Test Results

Description	 Method	Result	Limits

Chart



Comments

N/A

Form No: 18909,V1,00

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53B Fairlawn Street, Nathan, QLD, 4111

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No. 431

Approved Signatory:

Chris Park

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53B Fairlawn Street, Nathan, QLD, 4111

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Chris Park

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53B Fairlawn Street, Nathan, QLD, 4111

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Chris Park

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ACCREDITATION

53B Fairlawn Street, Nathan, QLD, 4111

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Chris Park

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

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plast	icity	index	%		-		History		drie				ear S		age	1											
linea	r sh	rinkage	%		-		Sample		n di	ied		1	ould s umbir		mn	n											
natu	ral n	noisture	e %		-		1	oth	er		L.		rling	TA's								Dot					-



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NATA Accredited Laboratory No. 431

Approved Signatory:

Chris Park





: COFFEY GEOTECHNICS . 3 of 4 Page Number Client

: EB0704263

Work Order	: EB0704263
A real traffic at	Client Sample
Analytical Results	Results Sample Matrix Type / Descrip

1		Client Sample ID :	BH 1.10 TO .150	BH 7-40 TO -450	RH 14.10 TO .150	BH 20-10TO -140	
Analytical Results	Sample	Sample Matrix Type / Description :		SOIL	TIOS	SOIL	
	-	Sample Date / Time :	18 Apr 2007	18 Apr 2007	18 Apr 2007	18 Apr 2007	
			15:00	15:00	15:00	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	9	<5	<5	<5	
Cadmíum	7440-43-9	1 mg/kg	۲۶	<1	<	<1	
Chromium	7440-47-3	2 mg/kg	22	9	10	24	
Copper	7440-50-8	5 mg/kg	<5	<5	<5	6	
Lead	7439-92-1	5 mg/kg	<5	<5	<5	\$	
Nickel	7440-02-0	2 mg/kg	6	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		
EP090: Organotin Compounds							
Tributyitin	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 ENVIORMENT

Work Order : EB0704263 Surrogate Control Limits

: COFFEY GEOTECHNICS

: 4 of 4

Page Number Client

mits	
ontro! Li	
Surrogate C	
SOIL .	
Туре:	
Matrix	

Matrix Type: SOIL - Surrogate Control Limits		••	Surrogate Control Limits
Method name	Anatyte name	Lower Limit	Upper I Imit
EP090: Organotin Analysis			
EP090S: Organotin Surrogate	Tripropyltin	34	108



Mey Geo n. N. mer. 12 - 1 hr	Coffey Geosefences Pty-Lrd - PO#KPAR070070 Lab Number Date Collected Date Andlived BH2 - 1 hr -500mm to -1.0m	HKPARO70070				
31403	26/04/2007	26/04/2007	Suspended Solids	137	mg/L	93_APHA 2540 D
y Geo	Coffey Geoscierices Pty LtdPO#KPAR076070 Lab Vomber - Duc College - Duc Imiland	KKPARO/6070				
. 24 hr	BH2 - 24 hr -500mm to -1.0m					
31404	26/04/2007	26/04/2007	Suspended Solids	4	mg/L	93_APHA 2540 D
y Georgan	Coffey Geosciences Pty_Ltd.*PO#KPAR070070 Trib Names - Date Collector - Date Analysed BH6 - 1 hr -1.0m to -2.0m	EKPAR070070 title 4848,vet			CHILL CHILL	(Section 1)
31405	26/04/2007	26/04/2007	Suspended Solids	80	mg/L	93_APHA 2540 D
y Geo Vumber 24 hr	Coffey Geosciences Pty Ltd. PO#KPAR070070 Lub Number - Date Colleged - Bure (mapsed BH6 - 24 hr1.0m to -2.0m	O#KPAR070070 Date (majood				Waltziä
31406	26/04/2007	26/04/2007	Suspended Solids	4	mg/L	93_APHA 2540 D
y Geo Vimilia	Coffey Geosciences Pty/Ltd - PO#KPAR070070 fins Number - Duck Alleant 2: Pure Indixed	#KPARO/6076				
. 1 hr	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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	93_APHA 2540 D		93_APHA 2540 D	A A STATE OF THE S	93_APHA 2540 D		93_APHA 2540 D		93_APHA 2540 D
	mg/L		T/bm		mg/L		mg/L		√g/F
$m_2 2 L^2$	Ø		77		2		130		2
	Suspended Solids		Suspended Solids		Suspended Solids	T_{ij}	Suspended Solids		Suspended Solids
offey Gerselences Pty Ltd - Po#KPAR070070 ab Viribes - Diffection Lypit - Day Trained	0m 26/04/2007	Coffey Geosciences Pty Ltd - PO#KPAR070070 Lab Vimbor - Bue Lineau	i m 26/04/2007	Coffey Geosciences Ptv/Ltdf=PO#KPARd78670 Tab.Number Back alcepta	2.5m 26/04/2007	Coffey Geosciences Pty Ltd. P6#KPAR070070	.5m 26/04/2007	Coffey Geosciences PV Ind. PO#KPAR670070 Informities Dinc (alloced	2.5m 26/04/2007
Coffey Geoscierces Pfy Ltd Lab Vurifice - Diffe Coffetted	BH8 - 24 hr -1.5m to -2.0m 31408 26/04/2007	Sciences Pty	BH13 - 1 hr -1.5m to -2.5m	sciences Pty Pare Colle	BH13 - 24 hr -1.5m to -2.5m 31410 26/04/2007	Sciences Phy	BH19 - 1 hr -1.5m to -2.5m	offey Geosciances Pty Ind = P tab Vanita - Date Calicad	BH19 - 24 hr -1.5m to -2.5m 31412 26/04/2007
Coffey Geo Trub Nights	BH8 - 24 hr	Coffey Geo	BH13 - 1 hr	Coffey Ge. Van Nambe	BH13 - 24 h	Amily and seed	BH19 - 1 hr	Coffey Ger Terb Nimin	BH19 - 24 P



Coffey Geos Lab Amber BH20 - 1 hr	Coffey Geosciences Pty Ltd PC#KPAR070070 Fib. Vimber - Date Cofferint - Date Inabsect BH20 - 1 hr -1.0m to -1.5m	#KPAR070079		New Market		
31413	26/04/2007	26/04/2007	Suspended Solids	213	mg/L	93_APHA 2540 D
Coffey Gaus Life Number	Coffey, Geostiences Pty Ltd. PO#KPAR070070 Lab Number - Date Collected - Bale Interes	OFF PAROTOOTO				
BH20 - 24 hr	BH20 - 24 hr -1.0m to -1.5m					
31414	26/04/2007	26/04/2007	Suspended Solids	15	mg/L	93_APHA 2540 D
i	Maroochy Water S	Maroochy Water Services Laboratory Services		Prepared By:	Hum	
	Contact Phil Adc Steve Ste	Contact Phil Adcock - Microbiologist 5475 7211 Steve Stewart - Chemist 5475 7212		Approved By: \\w.	Uterul-	
	Friday, 27 April 2007			j		Page 3 of 3



Suspended Solids 27/04/2007 Suspended Solids 133
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	93_APHA 2540 D		93_APHA 2540 D		93_APHA 2540 D		93_APHA 2540 D		93_APHA 2540 D
	mg/L		mg/L		mg/L		mg/L		mg/L
	460	Krall	20	m _n g.	26		17		37
	Suspended Solids		Suspended Solids		Suspended Solids		Suspended Solids		Suspended Solids
office Geosciences Pry Lite : Po#KPARO70070 for Number Date (Model : Ende Willse)	27/04/2007	Coffey Geospiences Pty Ltd - PO#KPAR070670 Ltm hmbr - Ductofter - That finited	30/04/2007	Coffey Geosciences Pty Ltd. PO#KPAR678670 Tal Number Directoffeeled Talk Augusted 3H 15 16 hrs	30/04/2007	offer Geoscieines: Pro Lua - Po#kPARo70u70 Lab Numbre - Dac Affected - Dac Affector 3H 16 16 hrs	30/04/2007	Coffey Geosciences Pty Ltd - PO#KPAR070B70 Laf Namper Dine, public of	30/04/2007
olonoss Pty Litte Directory	BH20b 1 hr -2.0m to -2.5m 31438 27/04/2007	plences Ply Lit. Duir Collected	30/04/2007	ciences Pu Etr	30/04/2007	offey Geosciences Pty Lita no Norther Turk officiel IH 16 16 hrs	30/04/2007	offey, Geosciences, Pty Eld Tub Amyr H. Than follows	30/04/2007
Coffee GBos	BH20b 1 hr -: 31438	Coffey Seos Lab Annor	31502	Coffey Geos Val Number BH 15 16 hrs	31503	Coffey Geos Fun Number BH 16 16 hrs	31504	Coffey Geos Liti Aumber	BH 18 16 hrs 31505



Coffey Seos Lith N. Pirr BH 19 16 hrs	Coffey Geosciences Printed - Po#KRAR070070 100 Vinibra - Dure Collector	ን#KPA N 0700 በመራ 4un /ved					
31506	30/04/2007	30/04/2007	Suspended Solids		49	mg/L	93_APHA 2540 D
Coffey Geo.	Coffey, Geosciences Pty Ltd - PO#KPAR070070 Lab Naplur & Duz Collected Dat Ambasid	OMKPARG70070					
BH 20 16 hrs	8						
31507	30/04/2007	30/04/2007	Suspended Solids		209	mg/L	93_APHA 2540 D
	Maroochy Water	Maroochy Water Services Laboratory Services		Prepared By:	S.D.	S.Dougs	
	Contact Phil Ad Steve St	Contact Phil Adcock - Microbiologist 5475 7211 Steve Stewart - Chemist 5475 7212		Approved By:	160,	Hammy	2
	Tuesday, 1 May 2007						Page 3 of 3

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