APPENDIX G

Geotechnical Assessment, Coffey Geotechnics Pty Ltd, June 2010



PROPOSED INDUSTRIAL BUILDINGS MASONITE ROAD, HEATHERBRAE GEOTECHNICAL ASSESSMENT

Sandvik Mining And Construction Pty Ltd

GEOTWARA21359AA-AA 22 June 2010

Coffey Geotechnics Pty Ltd ABN 93 056 929 483 19 Warabrook Boulevard Warabrook NSW 2304 Australia



22 June 2010

Sandvik Mining And Construction Pty Ltd C/- Geoff Craig and Associates Pty Ltd PO Box 595 RAYMOND TERRACE NSW 2324

Attention: Ian Hill

Dear Ian

RE: PROPOSED INDUSTRIAL BUILDINGS 431 MASONITE ROAD, HEATHERBRAE GEOTECHNICAL ASSESSMENT

Please find enclosed our report on the above project.

Further advice on the uses and limitations of this report is presented in the attached document, *'Important Information about your Coffey Report'*.

If you have any questions regarding this or any other project, please contact Andrew Tait or the undersigned.

For and on behalf of Coffey Geotechnics Pty Ltd.

Esc Le.

Jason Lee Principal Newcastle Manager

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1 INTRODUCTION

This report presents the results of a geotechnical assessment carried out by Coffey Geotechnics Pty Ltd (Coffey) on behalf of Sandvik Mining and Construction Pty Ltd for a proposed industrial buildings located within at 431 Masonite Road, Heatherbrae.

The work was commissioned by Ian Hill of Geoff Craig and Associates Pty Ltd, in an email dated 21 March 2010.

The scope of work for the geotechnical assessment included providing recommendations on:

- Site preparation and earthworks;
- Foundation recommendations;
- Retaining wall (up to 2m height) design parameters;
- Trafficability of the site during excavation and construction;
- · The suitability of site soils for reuse as engineered fill;
- Infiltration rates;
- Acid sulphate soil conditions and requirements for an acid sulphate soil management plan.

A survey plan of the site and an existing site layout plan marked up with the approximate development areas were provided by the client.

2 FIELD WORK

Field work was carried out from 9 to 15 June 2009 and comprised of:

- Boreholes at 39 locations (BH200 to BH239, excluding BH230) using hand auger methods depths of between 2m to 3m. Disturbed samples of representative materials were taken for subsequent laboratory testing from;
- Dynamic Penetrometer (DCP) testing at was undertaken at each borehole location to assess the in situ density of the sand profile;
- Two Double Ring infiltration tests to assess the permeability of the sands at each of the detention basin locations.

All field work was carried out in the full time presence of an Engineering Geologist from Coffey who located the borehole locations, carried out the sampling and testing and produced engineering logs of the boreholes. DCP results and engineering logs of the boreholes are presented in Appendix A, together with explanation sheets defining the terms and symbols used in their preparation. Borehole locations were located and pegged by survey prior to fieldwork. Borehole locations are shown on Figure AB1. Reduced levels of the boreholes have been taken from the survey data provided to Australian Height Datum (AHD) and are shown on the engineering logs.

3 SITE CONDITIONS

3.1 Surface Conditions

The proposed building area is located directly to the west of Masonite Road, Heatherbrae. The site is currently not occupied and is covered by coastal eucalyptus woodland, with a small area in the north eastern corner that appears to have been used for stockpiling of garden mulch in the past and is currently cover by numerous tall pines, large stands of lantana, medium sized trees and shrubs, tall weeds and grass.

Topographically the site is located on a sand plain with some small dunes to the south of the site. The site is flat to slightly sloping to the south.

Drainage appears to be by direct infiltration into the sandy soils with no evidence of overland flow across any part of the site.

There are currently two small wooden structures located in the north eastern portion of the site in a very poor condition, with evidence of one other structure that has completely collapsed due to neglect.

3.2 Subsurface Conditions

Reference to the 1:100,000 scale Newcastle Coalfield Regional Geological Series Sheet 9231 indicates the site is underlain by Quaternary aged deposits comprising sand associated with the Tomago Sand Beds an inner barrier dunal system.

The subsurface profiles encountered at borehole locations are presented on the appended engineering logs and have been divided into geotechnical units as summarised in Table 1.

| TABLE 1 – SUMMARY OF GEOTECHNICAL UNITS AND SOIL TYPES E | NCOUNTERED AT |
|--|---------------|
| BOREHOLE LOCATIONS | |

| GEOTECHNICAL UNIT | MATERIAL TYPE | DESCRIPTION | TYPICAL DEPTH RANGE (m) | |
|---|-------------------|---|----------------------------------|--|
| UNIT 1 | TOPSOIL* | SAND, fine to medium grained, dark grey brown to dark brown, dry to moist, typically loose. | 0.00 - 0.30 | |
| UNIT 2A | AEOLIAN | SAND, fine to medium grained, pale grey, pale brown, moist, typically medium dense. | 0.30 - 0.90 | |
| UNIT 2B | INDURATED SAND | SAND, fine to medium grained, orange to orange brown, moist, typically dense. | 0.90 - 2.00 | |
| UNIT 2C | AEOLIAN | SAND, fine to medium grained, pale yellow to white, moist, typically dense to very dense. | Below 2.00 | |
| NOTE: * = Some areas in the north eastern corner of the site may contain fill, refer to engineering logs. | | | | |

Groundwater was encountered at a depth of 1.0m at location BH 202 during the field investigation. This was the only location that ground water was encountered.

4 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on the above information, foundation soils are expected to comprise loose to medium dense layers to depths of between 0.0m to 2.7m. Options for founding load-bearing structures are therefore as follows:

- <u>Option 1 -</u> Support of load-bearing settlement sensitive structures on pile foundations founded beneath any proposed or existing fill, topsoil and loose to medium dense an variable density layers;
- <u>Option 2 -</u> Removal of all existing fill and topsoil from proposed building areas proof rolled and compact stripped surface with a large vibrating roller or impact roller followed by replacement with approved fill under 'Level 1' earthworks control, as defined in AS3798 2007 '*Guidelines on Earthworks for Commercial and Residential Developments*' and support of load-bearing structures on shallow footings. This option is only feasible provided a minimum combined cover depth of 2.0m of sand fill compacted to a minimum Density Index of 70% (AS1289 5.6.1-1998) and dense natural sand below footing level to the top of any loose to medium dense and variable density layers can be achieved.

4.2 Site Preparation

Site preparation and earthworks suitable for structure support should consist of:

- Proposed building areas should be stripped to remove all vegetation, root affected, topsoil and existing fill to a depth to be determined by the foundation / site preparation option that is adopted;
- Following stripping, the exposed subgrade materials should be proof rolled with a large vibrating (20t) roller or impact roller to densify the existing loose to medium dense sand and to identify any wet or excessively deflecting material. Any such areas should be over excavated and backfilled with an approved select material;
- Approved sand fill beneath structures should be placed in layers not exceeding 300mm loose thickness and compacted to a minimum density index of 70% (AS1289 5.6.1);
- All fill should be battered at 1V:2H or flatter and protected against erosion or else supported by properly designed and constructed retaining walls;
- Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007.

4.3 Excavation Conditions

It is expected that all site materials could be excavated by conventional bulldozer blade or excavator bucket at least to the depths indicated on the appended borehole logs and DCP test results. The excavator should use a 'gummy' bucket to avoid over-disturbance of the sands below the depth of excavation.

Due to the sandy nature of site soils, temporary excavations greater than 1m depth should be battered at 1V:2H or supported by a suitable shoring system such as driven sheet piles. Minimum sheet pile wall embedment depths, maximum bending moments and anchor forces may be determined in accordance with the British Steel and Piling Handbook, Seventh Edition, 1997.

Temporary shoring should be designed for surcharge loading from structures or slopes behind the walls. Excavations below the water table will also require dewatering.

Due to the sandy nature of site soils, temporary shallow excavations such as those for footing trenches could also experience some instability and may require some form of temporary support.

4.4 Foundations

4.4.1 Pile Footings

Suitable pile options include grout injected piles, 'Atlas' screw piles, driven piles or steel screw piles. Large heavily driven piles are not recommended due to the potential effect of vibration on neighbouring structures. Conventional bored piles are not recommended due to the potential for collapse of the wet sands.

Piles founded into dense to very dense Unit 2 sands may be designed for the Ultimate Geotechnical Strength parameters provided in Table 2.

| | ULTIMATE EI PRESSUI | ND BEARING RE ¹ (kPa) | ULTIMATE SHAFT RESISTANCE (kPa) | |
|--|--|--|--|--|
| FOUNDING MATERIAL | Non-Displacement Piles (i.e. Grout injected or steel screw piles) | Displacement Piles (i.e. 'Atlas' screw or driven piles) | Non-Displacement Piles (i.e. Grout injected or steel screw piles) | Displacement Piles (i.e. 'Atlas' screw or driven piles) |
| UNIT 2 (variable density to 2.7m depth) | 1,600 | 3,000 | 16 ² | 35 |
| UNIT 2 (dense to very dense below 2.7m depth) | 5,500 | 10,000 | 45 ² | 85 |
| NOTES: | | | | |

TABLE 2 – ULTIMATE GEOTECHNICAL STRENGTH PARAMETERS

1 – Ultimate values occur at large settlements (>5% of pile diameter).

2 - No shaft resistance to be allowed for in design using steel screw piles.

A geotechnical reduction factor of 0.45 should be applied to ultimate capacities to obtain limit state design parameters. It is anticipated that serviceability end bearing pressures will cause settlement of 1% of pile diameter.

The capacity of piles driven to a refusal set may be evaluated by the Hiley pile driving formulae once the pile capacity and hammer size and type are known. Depth to the required set will be dependent on required capacity and size of piles and would be best evaluated by driving test piles.

4.4.2 Shallow Footings

Proposed structural elements may be founded on shallow footings, provided a minimum combined cover depth of 2.0m of sand fill compacted to a minimum Density Index of 70% (AS1289 5.6.1-1998) and dense natural sand below footing level to the top of any loose to medium dense and variable density layers can be achieved.

Shallow footings founded as described above may be proportioned for a maximum allowable bearing pressure of 150kPa. It is anticipated that this bearing pressure will cause a maximum settlement of 25mm.

4.5 Retaining Wall Design Parameters

Recommended design parameters for permanent retaining walls are summarised in Table 6.

| | PARAMETER | | | |
|-----------------------------------|--------------------------|--------------------------------------|--|---|
| GEOTECHNICAL UNIT | UNIT WEIGHT (γ kN/m³) | EFFECTIVE FRICTION ANGLE (Ø'°) | ACTIVE EARTH PRESSURE COEFFICIENT (Ka) | PASSIVE EARTH PRESSURE COEFFICIENT (Kp) |
| UNIT 2 (Aeolian and Indurated) | 21 | 34 | 0.28 | 3.5 |

TABLE 3 – SUMMARY OF RETAINING WALL DESIGN PARAMETERS

The pressure distribution assumed for retaining walls should take into account the amount of movement that can occur. The earth pressure coefficients provided in Table 3 will typically result in movements of about 1% of the wall height. If movements are to be restrained by struts or anchors a higher earth pressure coefficient should be adopted.

Retaining walls should be designed for hydrostatic water pressures unless effective drainage is provided or the ground dewatered behind the walls. The above parameters make no allowance for surcharge loading from existing or proposed slopes or structures.

4.6 Trafficability During Construction

The subsoil profile encountered within the proposed terminal building area comprised either sand fill or aeolian sand. Construction equipment should be chosen with this in mind. Trafficability for quarry trucks on exposed sands is likely to be a problem and provision for a construction platform should be made to allow such trucks to access the site.

4.7 Reuse as Site Soils

All site soils excluding the upper root affect zone of vegetated areas, which is expected to a maximum depth of about 0.4m, and some deeper possible topsoil layers are considered suitable for re-use as controlled fill beneath structures.

4.8 Depth to Groundwater

The depth at which the water table was encountered at borehole locations is shown on the appended borehole logs. Groundwater inflows are likely to occur where excavations proceed below these depths. Such inflows are likely to cause collapse of unsupported excavations and construction will require dewatering the area to be excavated using a speerpoint dewatering system, although indurated sand layers in the upper profile could make installation difficult.

The field work consisted of the cleaning and excavation of the site using a small excavator fitted with a gummy bucket followed by the infiltration test and finally the excavation of a test pit to determine subsurface profile beneath the area tested.

5 INFILTRATION ASSESSMENT

The infiltration tests were carried out generally in accordance with the procedure prepared by Coffey and approved by Council. The procedure essentially follows the test procedure ASTMD3385 - Infiltration Rate of Soils Using Double Ring Infiltrometer. A copy of the procedure and reference is included in Appendix C. The procedure also follows the essential elements of the Draft Infiltration Rate Procedure prepared by Port Stephens Council in regard to pre-wetting and extending the testing period to obtain a consistent result.

5.1 Results of Testing

A summary of the results of the infiltration and permeability testing is presented in Table 4 below:

| TEST LOCATION | TEST TYPE | TIME TEST (min) | RESULT m/day | COMMENTS |
|---------------|-----------|--------------------|-----------------|------------------|
| BH 203 | DRI | 70 | 51 | Topsoil removed. |
| BH234 | DRI | 90 | 51 | Topsoil removed. |

TABLE 4 – SUMMARY OF INFILTRATION TEST RESULTS

5.2 Conclusion and Recommendations

5.2.1 General

The double ring infiltrometer measures the vertical permeability of the soil below the testing apparatus and in the absence of a clogging layer or some artificial reconstruction the permeability will be roughly equal to the infiltration rate.

The infiltration rate will vary depending on the presence of a clogging layer, the height of water above the clogging layer and the thickness and permeability of the clogging layer. Providing the permeability of the underlying sand aquifer is higher than that of the clogging layer the actual permeability of the sand aquifer is almost irrelevant to the infiltration rate of the clogged soil profile.

There is virtually no benefit from extensive detailed testing of the permeability of the sand deposit. Extending the testing to refine the estimate of permeability beyond a 90% degree of confidence is a waste of resources.

It is more important to provide a realistic assessment of the permeability of the clogging layer that may develop on the surface of the soils in the infiltration area.

The SAND is unquestionably very permeable and this will not change with time. The clogging is a surface phenomenon only. The surface soils will be subject to clogging and the infiltration will be reduced with time as the clogging layer develops. Further discussion of the clogging is presented in Section 5.2.2 below.

Infiltration testing was conducted on sands of the same formation directly to the south of the site and these results have been reviewed to aid in the assessment of the infiltration rate for this site.

5.2.2 Infiltration Rates of Materials without Clogging

The testing has indicated the following general conclusions:

- Dune SAND unaffected by topsoil or induration has an infiltration rate or permeability of 30m/day to 65m/day. A lower bound design number of 30m/day would appear reasonable;
- Dune SAND with the natural topsoil present has an infiltration rate of 12m/day to 40m/day depending on the fines content in the sand. A lower bound design number of 12m/day would be a reasonable assumption;
- Dune SAND with some induration present has an infiltration rate of 6m/day to 40m/day depending on the degree of induration and the continuity of the indurated layer. A lower bound design number for indurated SAND of 6m/day would be a reasonable assumption;
- Recompacted SAND compacted to a density index of 70% and 75% had a laboratory permeability ranging from 9m/day to 36m/day indicating that the permeability of the compacted SAND is lower but not affected in a major way. A lower bound design number of 9m/day would be a reasonable assumption for re-compacted material.

5.2.3 Infiltration Rates with Clogging

The permeability of the various materials in the local area has been established with a reasonable degree of confidence. The infiltration capacity of the materials is highly dependent on the permeability of the immediate surface soils which are decreased by deposition of fines to form a clogging layer. The clogging layer consists of fine silt and debris eroded from elsewhere on site to accumulate in the low portions of the site and infiltration areas. The assessment of the permeability (and hence effective infiltration rate) of this clogging layer is far more important than the permeability of the deeper sands. If the permeability of the clogging layer is less than that of the deeper soils then no perched water table that could affect the surface infiltration will form and the deeper soils will remain unsaturated down to the water table.

The aquifer on this site is over 30m deep and thus even prolonged wet weather results in only minor variations in groundwater levels. In general stormwater infiltration will not have a significant effect on regional groundwater levels.

The permeability of the clogging layer may or may not have a relation with the permeability of the underlying SAND depending on the origin of the fines forming the clogging layer. If the clay soils are present in the catchment then the clogging layer could have a very low permeability. A major highway produces runoff with a high proportion of rubber fines, oils, greases and dust which has a lower permeability.

Fortunately the catchment area consists of SAND dunes with no major highway present within the subdivision area itself.

The permeability (and therefore the infiltration rate) of the clogging layer is also dependent on the pretreatment of the water prior to its entry into the infiltration area.

The permeability of the clogging layer is also dependent on the treatment of the infiltration area. The provision of a turfed surface consisting of imported clay soil base attached to the turf may result in a drastic reduction in infiltration rate. Conversely a vigorous growing turf that grows faster than the deposition rate may maintain a high infiltration rate by providing permeability paths through the root penetration of the clogging layer.

The tests in the local area indicate that the natural topsoil even when replaced has a permeability of about 12m/day. This was about the lower bound of the infiltration rate in the excavated and topsoiled drains in the area. The extent that the permeability of the clogging layer will decrease with time is a matter of judgement.

For the catchment area consisting of sand, with no major inputs of fines, the permeability of the clogging layer should be somewhere near the permeability of the soil with topsoil or turf in place with some allowance for further clogging.

Applying a clogging factor of 2 to the permeability of topsoil or turfed layer to future clogging gives a design infiltration rate of 6m/day.

5.2.4 Establishment and Maintenance of Infiltration Capacity

The establishment of an infiltration area should include the excavation of any indurated sand layers within 1.5m of the base of the area and replacement with clean sand from elsewhere on site. Although the indurated sand tested had a reasonable permeability of 6m/day it is thought that some of the indurated layers may have a lower permeability. The indurated layers, particularly in such sand dune areas, are known to be highly variable with large changes in vertical permeability over small distances. Thus to ensure that the infiltration rate is obtained in the critical infiltration areas it is considered prudent to replace the indurated material with clean sand. Provided there is 1.5m of clean sand below infiltration areas it is assessed that the infiltration capacity will not be affected.

Maintenance of the infiltration capacity will depend on the development or otherwise of a clogging layer. This is turn depends on the activities in the catchment areas that result in the generation of fines. If the natural soils are the main contributors to the fines then the infiltration should remain at a reasonable level. The presence of grass or tree roots penetrating the clogging will assist in maintaining a reasonable permeability but the build up may eventually require removal of the clogging layer.

5.3 Design Infiltration Rate

Based on the discussions above the recommended design infiltration rate is 6m / day which takes into account clogging of the surface soils.

6 ACID SULPHATE SOILS (ASS) ASSESSMENT

6.1 Acid Sulphate Soils Risk Map

Reference to the Acid Sulfate Soils Risk Map for Beresfield indicates that the site is located in an area where there is a low probability of occurrence of acid sulfate soil materials greater than 3m below the ground surface.

6.2 Laboratory Testing

21 samples obtained during the field investigation were screened for the presence of actual and potential acid sulfate soils using methods 21Af and 21Bf of the 1998 ASSMAC Guidelines. The results of screening tests are presented in Appendix B and are summarised below:

- pH values in 1:5 soil to distilled water mix ranged from 5.09 to 6.35. A pH of <4 in this test can
 indicate the presence of actual ASS;
- pH values of soil in 30% H₂O₂ were between 3.98 to 4.85. A pH of <3 in this test can indicate the
 presence of potential ASS;
- A maximum pH change of 1.83 after oxidation with H₂O₂ was recorded. Significant pH changes (>2) after oxidation with H₂O₂ can indicate potential ASS;
- Slight effervescence was observed during oxidation with H₂O₂ in six of the 21 samples tested.
 Vigorous effervescent reactions with oxidation in H₂O₂ can indicate potential ASS;
- No odour was released upon oxidation with H₂O₂ in all samples tested. A sulphurous odour is often associated with oxidising potential ASS;
- Temperatures of 18°C to 21°C were recorded for all H₂O₂ oxidation screening tests. Generally the
 oxidation of significant quantities of pyrite in this test will generate temperatures to >60°C.

Based on the results of screening tests, one sample from BH T8 was sent to Southern Cross University for SPOCAS analysis. The result of SPOCAS analysis is presented in Appendix B and indicates the sample tested is not an actual or potential acid sulfate soil.

6.3 Interpretation of Results

The results of ASS screening tests indicate all of the samples tested are not actual or potential ASS. In addition, sandy soils above the water table would be considered oxidised and therefore not potentially ASS. Therefore an ASS management plan for works involving disturbance of site soils to the depth of investigation is not considered to be necessary.

7 CONSTRUCTION RISK

The extent of testing associated with this assessment is limited to discrete test locations and variations in ground conditions can occur between and away from such locations. If subsurface conditions encountered during construction differ from those given in this report further advice should be sought without delay.

Further advice on the uses and limitations of this report is presented in the attached document, 'Important Information about your Coffey Report'.

For and on behalf of Coffey Geotechnics Pty Ltd

Esc Les

Jason Lee Principal Newcastle Manager



Important information about your Coffey Report

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

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

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

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give

preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

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



Important information about your Coffey Report

Interpretation by other design professionals

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

Data should not be separated from the report*

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

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

Geoenvironmental concerns are not at issue

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

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

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

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

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

Figures



Appendix A

Results of Field Investigations



Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

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

PARTICLE SIZE DESCRIPTIVE TERMS

| NAME | SUBDIVISION | SIZE |
|----------|-------------|-------------------|
| Boulders | | >200 mm |
| Cobbles | | 63 mm to 200 mm |
| Gravel | coarse | 20 mm to 63 mm |
| | medium | 6 mm to 20 mm |
| | fine | 2.36 mm to 6 mm |
| Sand | coarse | 600 μm to 2.36 mm |
| | medium | 200 μm to 600 μm |
| | fine | 75 μm to 200 μm |
| 1 | | |

MOISTURE CONDITION

- Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
- **Moist** Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
- Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

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

DENSITY OF GRANULAR SOILS

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

MINOR COMPONENTS

| TERM | ASSESSMENT GUIDE | PROPORTION OF MINOR COMPONENT IN: |
|-----------|--|---|
| Trace of | Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component. | Coarse grained soils: <5% Fine grained soils: <15% |
| With some | Presence easily detected by feel or eye, soil properties little different to general properties of primary component. | Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30% |

SOIL STRUCTURE

| | ZONING | 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 WEATHERED I | . ORIGIN N PLACE SOILS |
|------------------------------------|--|
| Extremely weathered material | Structure and fabric of parent rock visible. |
| Residual soil | Structure and fabric of parent rock not visible. |
| TRANSPORTE | D SOILS |
| Aeolian soil | Deposited by wind. |
| Alluvial soil | Deposited by streams and rivers. |
| Colluvial soil | Deposited on slopes (transported downslope by gravity). |
| Fill | Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils. |
| Lacustrine soil | Deposited by lakes. |
| Marine soil | Deposited in ocean basins, bays, beaches and estuaries. |

coffey **>**

Soil Description Explanation Sheet (2 of 2)

| (Exclu | uding | FIE particle | LD IDENTIF s larger than 6 | ICATI 50 mm | ON PROCEDURE and basing fractions | S on estimated mass) | USC | PRIMARY NAME | | | | | | | |
|---------------------------------|---|-------------------------------|---|-----------------------|--|-------------------------------------|-----|---------------|--|--|--|--|--|--|--|
| | | arse 2.0 mm | EAN /ELS ttle no es) | Wide amou | range in grain size a Ints of all intermediat | nd substantial e particle sizes. | GW | GRAVEL | | | | | | | |
| 3 mm is | | /ELS If of co | CLE GRANE (Lit | Predo with r | ominantly one size or more intermediate siz | a range of sizes es missing. | GP | GRAVEL | | | | | | | |
| SOILS than 60 | eye) | GRAV than ha is large | /ELS FINES ciable unt nes) | Non- proce | plastic fines (for ident | tification) | GM | SILTY GRAVEL | | | | | | | |
| AlINED ials less 0.075 m | e naked | More | GRAN WITH I (Appre amo of fir | Plasti see C | c fines (for identificat L below) | ion procedures | GC | CLAYEY GRAVEL | | | | | | | |
| ARSE GF of mater jer than | ble to th | trse 0.0 mm | AN DS S) S) | Wide amou | range in grain sizes a ints of all intermediat | and substantial e sizes | SW | SAND | | | | | | | |
| COA an 50% larç | ticle visi | IDS If of coa er than 2 | CLE SAN (Litt or r | Predo with s | ominantly one size or some intermediate siz | a range of sizes zes missing. | SP | SAND | | | | | | | |
| More the | llest par | SAN than ha is smalle | VDS FINES eciable ount nes) | Non- proce | plastic fines (for ident dures see ML below) | tification). | SM | SILTY SAND | | | | | | | |
| | the sma | More | SAI WITH (Appre amo | Plast see C | c fines (for identificat L below). | tion procedures | SC | CLAYEY SAND | | | | | | | |
| | out | | IDENTIFICAT | ION PI | ROCEDURES ON FR | ACTIONS <0.2 mm. | | | | | | | | | |
| uan nan | s ab | | DRY STREN | GTH | DILATANCY | TOUGHNESS | | | | | | | | | |
| 01LS less th 075 mr | rticle i | CLAYS limit tn 50 | None to Low | 1 | Quick to slow | None | ML | SILT | | | | | | | |
| ED SC aterial an 0.0 | nm pa | TS & _ _iquid ess the | Medium to H | ligh | None | Medium | CL | CLAY | | | | | | | |
| BRAIN of m aller th | .075 r | 10 1 9 | Low to medi | um | Slow to very slow | Low | OL | ORGANIC SILT | | | | | | | |
| FINE O n 50% is sma | (A O | LAYS nit tin 50 | Low to medi | um | Slow to very slow | Low to medium | MH | SILT | | | | | | | |
| re tha 3 mm | | S & Cl quid lir ter the | High | | None | High | СН | CLAY | | | | | | | |
| Mc 66 | P P P P P P P P P P P P P P P P P P P P P | | | | | | | | | | | | | | |
| HIGHL' SOILS | Y OF | RGANIC | Readily ident | tified b / fibrou | y colour, odour, spon s texture. | gy feel and | Pt | PEAT | | | | | | | |
| • Low p | lasti | city – Liqu | uid Limit W _L les | s than | Low plasticity – Liquid Limit W ₁ less than 35%. Medium plasticity – W ₁ between 35% and 50%. | | | | | | | | | | |

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

COMMON DEFECTS IN SOIL

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

72810-03/02/2009



Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993. DEFINITIONS: Rock substance, defect and mass are defined as follows: Rock Substance In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic. Defect Discontinuity or break in the continuity of a substance or substances. Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or Mass more substances with one or more defects. SUBSTANCE DESCRIPTIVE TERMS: **ROCK SUBSTANCE STRENGTH TERMS ROCK NAME** Simple rock names are used rather than precise Abbrev- Point Load Field Guide Term Index, I_S50 (MPa) geological classification. iation PARTICLE SIZE Grain size terms for sandstone are: Coarse grained Mainly 0.6mm to 2mm Mainly 0.2mm to 0.6mm Very Low VL Less than 0.1 Material crumbles under firm Medium grained blows with sharp end of pick; Mainly 0.06mm (just visible) to 0.2mm Fine grained can be peeled with a knife: pieces up to 30mm thick can FABRIC Terms for layering of penetrative fabric (eg. bedding, be broken by finger pressure. cleavage etc.) are: Massive No layering or penetrative fabric. 0.1 to 0.3 Easily scored with a knife: Low L Indistinct Lavering or fabric just visible. Little effect on properties. indentations 1mm to 3mm show with firm bows of a Layering or fabric is easily visible. Rock breaks more Distinct pick point; has a dull sound easily parallel to layering of fabric. under hammer. Pieces of core 150mm long by 50mm CLASSIFICATION OF WEATHERING PRODUCTS diameter may be broken by Term Abbreviation Definition hand. Sharp edges of core may be friable and break RS Soil derived from the weathering of rock; the during handling. Residual Soil mass structure and substance fabric are no longer evident; there is a large change in 0.3 to 1.0 volume but the soil has not been significantly Medium Μ Readily scored with a knife; a piece of core 150mm long by transported. , 50mm diameter can be broken by hand with difficulty. xw Extremely Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or Weathered can be remoulded in water. Original rock fabric Material Hiah н 1 to 3 A piece of core 150mm long still visible. by 50mm can not be broken by hand but can be broken нw Rock strength is changed by weathering. The Highly by a pick with a single firm whole of the rock substance is discoloured, Weathered blow; rock rings under usually by iron staining or bleaching to the Rock extent that the colour of the original rock is not hammer. recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by Very High VH 3 to 10 Hand specimen breaks after leaching or may be decreased due to the more than one blow of a deposition of minerals in pores pick: rock rings under Moderately MW The whole of the rock substance is discoloured, hammer. usually by iron staining or bleaching , to the Weathered extent that the colour of the fresh rock is no Rock Extremely EH More than 10 Specimen requires many longer recognisable. blows with geological pick to High Rock substance affected by weathering to the break; rock rings under Slightly SW extent that partial staining or partial hammer Weathered discolouration of the rock substance (usually by Rock limonite) has taken place. The colour and texture of the fresh rock is recognisable: strength properties are essentially those of the Notes on Rock Substance Strength: fresh rock substance. 1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may Fresh Rock FR Rock substance unaffected by weathering. break readily parallel to the planar anisotropy. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein Notes on Weathering: 1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of makes it clear that materials in that strength range are soils in substance weathering conditions between XW and SW. For projects where it is engineering terms. not practical to delineate between HW and MW or it is judged that there is no 3. The unconfined compressive strength for isotropic rocks (and advantage in making such a distinction. DW may be used with the definition anisotropic rocks which fall across the planar anisotropy) is typically given in AS1726. 10 to 25 times the point load index (Is50). The ratio may vary for 2. Where physical and chemical changes were caused by hot gasses and liquids different rock types. Lower strength rocks often have lower ratios associated with igneous rocks, the term "altered" may be substituted for than higher strength rocks. "weathering" to give the abbreviations XA, HA, MA, SA and DA.



Rock Description Explanation Sheet (2 of 2)

| COMMON ROCK MA Term | DEFECTS IN SSES Definition | Diagram | Map Symbol | Graphic Log (Note 1) | DEFECT SHAPE Planar | TERMS The defect does not vary in orientation |
|--------------------------------|---|----------|----------------|-------------------------|-----------------------------|--|
| Parting | A surface or crack across which the rock has little or no tensile strength. | | 20 | | Curved | The defect has a gradual change in orientation |
| | (eg bedding) or a planar anisotropy | · · · · | 20 Clean | | Undulating | The defect has a wavy surface |
| | In the fock substance (eg, cleavage). May be open or closed. | | Gleav | (Note 2) | Stepped | The defect has one or more well defined steps |
| Joint | A surface or crack across which the rock has little or no tensile strength. | 1.55 | | | Irregular | The defect has many sharp changes of orientation |
| | but which is not parallel of sub parallel to layering or planar anisotropy in the rock substance. | | 1 60 | (Note 2) | Note: The assess influenced | ment of defect shape is partly by the scale of the observation. |
| | | | | | ROUGHNESS Slickensided | FERMS Grooved or striated surface, usually polished |
| Sheared Zone | Zone of rock substance with roughly parallel near planar, curved or | | | | Polished | Shiny smooth surface |
| (NOLE 3) | undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of | | 35 | | Smooth | Smooth to touch. Few or no surface irregularities |
| | the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks. | . / | | [*-] | Rough | Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper. |
| Sheared Surface (Note 3) | A near planar, curved or undulating surface which is usually smooth, polished or slickensided. | | 40 | | Very Rough | Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper. |
| Crushed Seam | Seam with roughly parallel almost | | | | COATING TER | MS No visible coating |
| (Note 3) | disoriented, usually angular fragments of the host rock substance which may be more | | 50 50 50 | | Stained | No visible coating but surfaces are discoloured |
| | weathered than the host rock. The seam has soil properties. | | | | Veneer | A visible coating of soil or mineral, too thin to measure; may be patchy |
| Infilled Seam | Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface. | | ALL ALL | 65 | Coating | A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein. |
| Extremely | Seam of soil substance. often with | | | | BLOCK SHAPE Blocky | TERMS Approximately equidimensional |
| Weathered Seam | gradational boundaries. Formad by weathering of the rock substance in place. | 8000 NO. | | IL DI | Tabular | Thickness much less than length or width |
| | | Seam | | 1 | Columnar | Height much greate than cross section |
| Notes on D | efects: | | | | | |

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.

^{2.} Partings and joints are not usually shown on the graphic log unless considered significant.

^{3.} Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

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| drilł | mod | iel ar | nd mo | unting: | Hand | Auger | | | Easting: 382013 slope: | -90° | | R.L. | Surface: 6.1 |
| nole dri | llin | mete g in | r: form | ation | 82 mr | n | mate | erial s | Northing 6371590 bearing ubstance | g: | | datu | m: m AHD |
| ethod | penetration | | Jpport ater | notes samples, tests, etc | | depth | aphic log | assification /mboi | material soil type: plasticity or particle characte | nistics, io | ondition onsistency/ ensity index | a pocket benetro- meter | structure and additional observations |
| ع ح | 12 | 3 | ∞ ≥ √ | | RL. | metres | Б | ටගි SP | colour, secondary and minor compor SAND: fine to medium orained, pale orev to | ents. E | 8 88 1 1 | 5886 | |
| H | | | N | | _6.0 | 0.5 | | ər | trace of fines. Becomes orange | , grey, r | | | - - - |
| | | | bserved | | _5.0 | 1. <u>0</u> - | | | | | MD | | |
| | | | None O | | _4.5 | 1. <u>5</u> - - 2.0 | | | | | | | |
| | | | | | _4.0 | - 2. <u>5</u> | | | Becomes pale yellow to white | | | | - |
| | | | | E | | 3.0 | | | | | D | | به ۱ ۱ ۱ |
| | | | | | _3.0 | 3.5 | | | Borehole BH 200 terminated at 3m | | | | a a a a a a a a a a a a a a a a a a a |
| meth AS AD RR W CT HA DT B V T *bit sł e.g. | i di | Lulua a r v c h d b b t b y s L P | auger s auger c oller/tri vashbo able to able to and au liatube lank bi f bit C bit offix ADT | crewing* krilling* cone re wot yger t | sup M C pen 1 2 Wat | ration a display the second s | N prosistan enging to fusal water le shown flow otflow | nil co vel | Notes, samples, tests U _{b0} undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sample R refusal | classification soil descriptic based on unifi system moisture D dry M moist W wet Wp plastic li W _t liquid lin | mit | on | consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense |

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| drill | mo | del | and | mou | nting: | Hand | Auger | | <i>y</i> , 114 | Easting: 381934 slope: | -90° | | 01100100 | R.L | L. Surface; 7.0 |
| hole | e dia | ıme | eter: | | | 82 mn | n | | | Northing 6371581 bearing: | | | | dat | itum: m AHD |
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| method | - | benetratio | support | water | notes samples, tests, etc | RL | depth | graphic log | classificatior symbol | material soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture | condition | consistency/ density inde | 80 Appenetr 80 ad penetr meter | structure and additional observations |
| ЧA | | | N | | | | | ••••• | SP | SAND: fine to medium grained, pale grey to pale | | b | L | | |
| | | | | | | | - | | | orange, trace or mes. | | | | | |
| | | | | | | _6.5 | 0. <u>5</u> | | | Becomes orange | | M | | | |
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| | | | | None Obs | | 6.0 | 1.0 | | | | | | MD | | |
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| | | | | | E | 5.0 | 2.0 | | | Borehole BH 201 terminated at 2m | | | | | |
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| drill mod | el anc | mou | nting: | Hand | Auger | | , | Easting: 382157 slope: -9 | 0° | | R.L. | Surface: Not Measured |
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| tethod penetrat | upport | rater | samples, tests, etc | | depth | raphic log | lassificatio ymbol | material soil type: plasticity or particle characteristics, | noísture | onsistency lensity inde | backe backe meter | structure and additional observations |
| E 12 ≤ | 3 ° 1 N | 5 | | | metres | ნ | SP SP | SAND: fine to medium grained, pale grey to pale | | L-MD | 2884 | |
| ۹H | R | None Observed | E | | 0. <u>5</u> | | 54 | SAND: fine to menum grained, pails grey to pails brown, trace of fines. | W | ivi0 | | |
| | | | | | 1.5 | | | Borehole BH 202 terminated at 1.5m | | | | |
| method AS AD RR W CT HA DT T S bit shown | atta atta ro wa cz ha di bli V T T t by suf | ger so ger d ller/tric ashbor ble to ank bit bit bit bit c bit fix c bit | prewing* illing* pone e ol ger | sup M I C C Pen 1 2 Wat | 4.0 a.5 | N o rosistan fusal water lee shown filow | nil co vel | notes, samples, tests classi U ₅₀ undisturbed sample 50mm diameter soil dr U ₆₀ undisturbed sample 63mm diameter based D disturbed sample system N standard penetration test (SPT) moistur N* SPT - sample recovered moistur Nc SPT with solid cone D V vane shear (kPa) M P pressuremeter W Bs bulk sample Wp E environmental sample Wt R refusal Viter | fication sy ascription on unified a ure dry moist wet plastic limit liquid limit | ymbols an I classificat | d | consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense |

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| Вог | - ehole | e Lo | catio | on: MAS | SON | ITE | ROA | D, HE | ATHERBRAE | | С | hecke | d by: | Ctit- |
| drill | model | and | mou | nting: | Hand | Auger | | - | Easting: 382111 slope: | -90° | | | R.I | Surface: 3.8 |
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| method | 5 penetrat | support | water | samples, tests, etc | RL | depth metres | graphic log | classificatic symbol | material soil type: plasticity or particle characteris colour, secondary and minor compone | stics, to | condition | consistency density inde | 200 X pocke 200 U penet | structure and additional observations |
| ЧH | | N | | | | - | | SP | SAND: fine to medium grained, grey, trace of | fines. | м | L | | |
| | | | | | 3.5 | - | | | Becomes pale grey | | | | | |
| | | | | | | 0. <u>5</u> | | | | | | | | |
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| | | | erved | | _3.0 | - | | | | | | | | - |
| | | | Obse | | | 1.0 | | | | | | | | |
| | | | None | E | - | - | | | Becomes orange brown, slightly indurated | | | | | |
| | | | | | 2.5 | _ | | | | | | | | - |
| | | | | | | _ | | | | | | | | - |
| | | | | | | 1.5 | | | | | | | | |
| | | | | | | | •••••• | | | | | | | - |
| | | | | | _2.0 | - | | | | | | | | - |
| | | <u></u> | | | | 2.0 | · · · · | | Reschale DU 202 terminated at 2m | | | | | |
| | | | | | | - | | | DOIGHDIG DA 203 (GUIRRAIEU AL 200 | | | | | - |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | | 25 | | | | | | | | - |
| | | | | | | 2. <u>0</u> | | | | | | | | |
| | | | | | | - | | | | | | | | |
| | | | | | 1.0 | - | | | | | | | | - |
| | | | | | | 3. <u>0</u> | | | | | | | | |
| | | | | | | | | | | | | | | _ |
| | | | | | _0.5 | - | | | | | | | | |
| | | | | | | 35 | | | | | | | | - |
| | | | | | | <u></u> | | | | | | | | - |
| | | | | | 0.0 | | | | | | | | | - |
| | | | | | 0.0 | - | | | | | | | | - |
| meth | ođ | | | | sur | 4.0 oport | | | notes, samples, tests | classification | n sym | bols and | | consistency/density index |
| AS AD | | au au | ger so ger di | rewing* illing* | M C | mud casing | N | nil | U ₅₀ undisturbed sample 50mm diameter U ₆₀ undisturbed sample 63mm diameter | soil descript based on uni | ion fied cla | assificatio | m | VS very soft S soft |
| RR W | | rol wa | ler/tric ishboi | ione ie | pen 1 2 | etration | n Io resista | nco | D disturbed sample N standard penetration test (SPT) | system | | | | F firm St stiff |
| CT HA | | ca ha | ble to nd au | ol ger | | | anging to ofusal | | N° SPT - sample recovered No SPT with solid cone | moisture D dry | | | | VSt very stift H hard Eb friable |
| B V | | dia bla V P | nube ank bil ait | | wai | ier 10/1/98 op.date | 3 water F | evel | v vane snear (KPa) P pressuremeter Bs hulk samole | w moist W wet Wo plastic | limit | | | VL very loose |
| T *bit s | nown h | νι TC γsuff | bit İx | | | water in | nlow | | E environmental sample R refusal | W _L liquid li | mit | | | MD medium dense D dense |
| e.g. | | AC | т | | -4 | water o | ulflow | | | | | | | VD very dense |



| Æ | • | <i>~</i> | 4 | :د | ~~ / | | > , | | oto | obnice | | | | | | |
|----------------|---------------|-----------|-------------|---------------------|---------------------------------|-----------------|---------------------|--------------------------|--------------------------|---|---|-----------------------|-------------------------------|-------------|-----------|---|
| C | <u>,</u> (| U | | | ey | | í | 70 | | 50111105 | | ···· | Boreho | le No |). | BH 205 |
| E | n | a | in | e | erino | ı L | .00 | | Boi | ehole | | | Sheet | Mai | | 1 of 1 CEOTWARA21250AA |
| | ent | 3 | | | SAN | | IK M | ININ | G AN | | | | Project Date st | arted | | 10.6.2009 |
| Pri | ncir | hali | | | ψ/ i | | | | a 747 | | | | Date cr | omole | eted: | 10.6.2009 |
| ГЦ Der | iicik Sioo | Jai. | | | DDA | הפו | ເຮກ | เมต | ιιςτε | DIAL SITE | | | | Ibe | sica. | GDT |
| | njeu robi | а. аlа | ١٥ | ootir | | | UTE | | ייינט ער ה | | | 1 | Chooke | 1 57y. | | -Ant- |
| 00 Ilinb | mo | del | and | mou | ntina: | Hand | Auger | TUA. | υ, πι | Easting: 382084 slope; | ~90° | | Спеске | a by | R.L. i | Surface: 4.5 |
| hole | e dia | ıme | ter: | | . | 82 mn | n | | | Northing 6371568 bearin | g: | | | | datur | n: m AHD |
| dr | illin | ıg i | nfo | rma | tion | + | 1 | mat | erial s | ubstance | | | 1 | 4 | | |
| method | 12 | | support | water | notes sampies, 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 penetro | 400 meter | structure and additional observations |
| | | Π | N | | | | | | SP | SAND: fine to medium grained, pale grey to trace of fines. | grey, | М | L. | | | - |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | _4.0 | 0. <u>5</u> | | | | | | | | | |
| | | | | | | | - | | | | | | MD | | | - |
| | | | | Ned | | | - | | | | | | | | | _ |
| | | | | Obse | E | 3.5 | 1.0 | | | Becomes dark brown, indurated | | | | | | |
| | | | | Vone | | | | | | Becomes pale orange brown. | | | | | | |
| : | | | | - | | | - | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | _3.0 | 1. <u>5</u> | | | | | | | | | |
| | | | | | | | | | | | | | | | | - |
| | | | | | | | _ | | | Becomes wet | The second se | W | | | | |
| | | | | | E | 25 | 2.0 | | | | | | | | | |
| | | | | | | hand the second | | | | Borehole BH 205 terminated at 2m | | | | | | |
| | | | | | | | - | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | _2.0 | 2. <u>5</u> | | | | | | | | | |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | | 1 | | | | | | | | | |
| | | | | | | 15 | 3.0 | | | | | | | | | |
| | | | | | | | _ | | | | | | | | | |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | |
| | | | | | | _1.0 | 3. <u>5</u> | | | | | | | | | _ |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | | _ | | | | | | | | | ~ |
| | | | | | | 0.5 | 4.0 | | | | | | | | | - |
| meth AS | od | <u> </u> | aud | jer so | rewing* | sup M | port mud | N | nil | notes, samples, tests U ₂₉ undisturbed sample 50mm diameter | classificati soil descri | ion syn ption | nbols and | <u>i</u> | 1 | consistency/density index VS very soft |
| AD RR | | | aug roli | ger dr er/tric | illing* one | C pen | casing retration | 1 | | U ₆₃ undisturbed sample 63mm diameter D disturbed sample | based on u system | mified c | lassificati | ón | | S soft F firm |
| w cr | | | wa cat | shbor de to | e ol | 12 | 34 | io resistar anging to | nce | N standard penetration test (SPT) N* SPT - sample recovered | moisture | | | | - | St stiff VSt very stiff |
| HA DT | | | har dia | nd au lube | ger | wat | ier | อโนรอโ | | Nc SPT with solid cone V vane shear (kPa) | D dry M mois | st | | | | H hard Fb friable |
| 8 V T | | | bla V b | nK bit il bit | | <u> </u> | 10/1/98 on date | 8 water k shown | evel | P pressuremeter Bs bulk sample | W wet Wp plast | tic limit | | | | VL Very loose |
| 'bit s e.g. | how | n by | suffi AD | x T | | | waler ir waler o | nflow outflow | | R refusal | ու պա | e oridi | | | | D dense VD very dense |

| C | U | | | Ξy | 1997 | 2 | <i>,</i> | | | Ī | Boreho | ile No. | BH 206 |
|-------------|-------------|---------------------|----------------------------|---------------------------------|------------|--------------------|-------------------------|--------------------------|---|-----------------------|-----------------------------|---|---------------------------------------|
| En | n | in | 0 | - Prin <i>c</i> | n I | oa | | ദവ | rehole | | Sheet | | |
| | 9 | | | 51115 | | | | | | F | Project | No: | GEOTWARA21359A |
| Zrinei | i. inal- | | | JAN | | IT 1911 | | 5 ///19 | Decinariation | r r | Jate St | ancu. | + 10.6.2009 |
| | pai. | | | DDC | הסר | ເຮັບ | וחואו | ISTA | DIAL SITE | د ا | | l by | GDT |
| Roreł | u. Inie | Loc | atic | m MAS | SUN | UTE I | | л <i>н</i> | | (| Checke | a by: | And |
| rill mo | del | and r | nou | nting: | Hand | Auger | | | Easting: 382010 slope: -90° | | 511001(0 | R.L. | . Surface: 5.5 |
| ole di | ame | ter: | | | 82 mn | n | ¢ | | Northing 6371557 bearing: | | | datu | ım: m AHD |
| drilli | ngi ਨਿ | nfor | ma | tion | 1 | 1 | mat | erial s | ubstance | | ~ * | т Ģ | |
| | c penetrati | support | water | notes samples, tests, etc | RL | depth | graphic log | classification symbol | material soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency density inde | 200 A pocker 200 a penetr 200 meter | structure and additional observations |
| <u> </u> | | N | _ | | | | | SP | SAND: fine to medium grained, pale grey to grey. | D | L | | |
| | | | | | | _ | | SP | SAND: fine to medium grained, orange, trace of | | | | |
| | | | | | | - | | | fines. | | MD | | |
| | | | | | _5.0 | 0. <u>5</u> | | | | M | | | |
| | | | | | | - | | | | | | | - |
| | | | | | | - | | | | | | | |
| | | | | | _4.5 | 1.0 | | | | | | | - |
| | | | | | | - | ••••• | | | | | | |
| | | | serve | | | 1 | | | Thin indurated hand ~20mm thick | | | | - |
| | | | a Op | | 4.0 | 1.5 | | | | | | | - |
| | | | Ъ Р | | | _ | | | | | | | - |
| | | | | | | - | | | | | | | - |
| | | | | | | | | | | | D | | - |
| | | | | | _3.5 | 2.0 | | | Becomes wet | | | | - |
| | | | | | | - | | | | | | | - |
| | | | | | | - | | | | | | | - |
| | | | | | 3.0 | 2. <u>5</u> | | | | | | | |
| | | | | | | | | | | | | | - |
| | | | | | | - | | | | | VU | | ~ |
| | | | | | _2.5 | 3. <u>0</u> | | | Borehole BH 206 terminated at 2.9m | ···· | | | |
| | | | | | | - | | | | | | | |
| | | | | | | | | | | | | | - |
| | | | | | 20 | 3.5 | | | | | | | - |
| | | | | | | - - | | | | | | | ······ |
| | | | | | | - | | | | | | | - |
| | | | | | | - | | | | | | | |
| ethod | | | | | 1.5 sup | 4.0 | l | اند | notes, samples, tests classificat | tion sym | tools and | | consistency/density index |
| 5) 3 | | aug aug rolle | er so er dri r/Irici | rewing* illing* one | M C | mud casing | N | nil | U ₅₀ undisturbed sample 50mm diameter solt descr U ₆₃ undisturbed sample 63mm diameter based on t D disturbed sample system | រេpមេon unified cl | lassificati | on | vo very soft S soft F firm |
| | | was | hbor e toc | e e | 1 2 | 2 3 4 | o résistar anging le | 109 | N standard penetration test (SPT) system N* SPT - sample recovered moisture | | | | St stiff VSt very stiff |
| <u>.</u> | | han dial | ube daug | ger | wat | ter | nging io ifusal | | Nc SPT with solid cone D dry V vane shear (kPa) M moi | st | | | H hard Fb friable |
| | | blar V bi | k bit I | | <u> </u> | 10/1/98 on date | water le shown | avel | P pressuremeller W well Bs bulk sample Wp plas | stic limit | | | VL very loose L loose |
| | | TC I | 51 t | | | | • | | د environmental sample WL liqui | id iimit | | | wip meaium dense |

0000

| æ | | <i>~</i> | .4 | <u>.</u> | ~~~~~ # | | > , | | oto | obnice | | | | | | | |
|---|--|--|-----------------|------------------|---|------|-------------|-------------------------------|--|--|----------------|-----------------------|---------------------------|---|---|---|---|
| (| Gouey Sected Threes Borehole No. | | | | | | | | | | | | le No. | | BH 207 | | |
| E | Engineering Log - Borehole Sheet Project No: | | | | | | | | | | | | | 1 of 1 GEOTWARA21359 | 4 <i>A</i> | | |
| Cli | Client: SANDVIK MINING AND CONSTRUCTION Date started: | | | | | | | | | | | arted: | | 10.6.2009 | | | |
| Principal: Date complet | | | | | | | | | | omplete | ed: | 10.6.2009 | | | | | |
| Project: PROPOSED INDUSTRIAL SITE Logged by: | | | | | | | | | | | G <u>DT</u> | | | | | | |
| Boi | Borehole Location: MASONITE ROAD, HEATHERBRAE Checked by: | | | | | | | | | | | Clut | | | | | |
| drill | drill model and mounting: Hand Auger Easting: 381932 slope: -90° R.L | | | | | | | | | | | L. Surl | face: 5.2 | ٦ | | | |
| hole diameter: 82 mm | | | | | | | n | 1 | | Northing 6371550 be | aning: | | | da | itum: | m AHD | _ |
| ur | | iy G | | | notes | | | mat | Enais | | | | > # # 2 | | | | |
| method | 1 | c penetral | support | water | samples, tests, etc | RL | depth | graphic log | classificatio symbol | material soil type: plasticity or particle chara colour, secondary and minor com | cteristics, | condition | consistenc density ind | 100 200 A pock 300 B pene 400 mete | | structure and additional observations | |
| ш | | ĪŤ | N | | | 1 | | | SP | SAND: fine to medium grained, pale ora to orange, trace of fines. | nge brown | 7 | L | | | | _ |
| | | | | | | _5.0 | | | | | | | | | | | |
| | | | | | | 4.5 | 4.5 | | - | | | | | | | | |
| | | | | bserved | | | 1.0 | | | | | | | | | | |
| | | | | one C | | | - | | | | | | | | | | |
| | | | | Z | | _4.0 | - | | | | | | | | | | - |
| | 200000 | | | | | | | | | | | | | | | | |
| | | | | | | | 1, <u>5</u> | | | | | | MD | | | | |
| | | | | | | 3.5 | | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | ٦ |
| | | | | | | - | 2. <u>0</u> | | | | | | | | | | _ |
| | | | | | C | _3.0 | | <u>,</u> | | Borehole BH 207 terminated at 2.1m | | | | | | | _ |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | 2. <u>5</u> | | | | | | | | | | - |
| | | | | | | 0.5 | - | | | | | | | | | | - |
| | | | | | | _2.5 | - | | | | | | | | | | |
| | | | | | | | 3.0 | | | | | | | | | | - |
| | | | | | | | U. <u>U</u> | | | | | | | | | - | - |
| | | | | | | 2.0 | _ | | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | | _ |
| | | | | | | | 3. <u>5</u> | | | | | | | | | ~ | |
| | | | | | | 1.5 | | | | | | | | | | | _ |
| | | | | | | | - | | | | | | | | | | - |
| | | | | | | | 4.0 | | | natio complex tests | ofonolfication | eymb- | 10 0-1 | | | mpleteney/density index | |
| AS AD RR W CT HA DT B V | iud | auger screwing auger drilling roller/tricone washbore cable tool hand auger diatube blank bit | | | support M mud N nil C casing penetration 1 2 3 4 no resistance ranging to water 10/1/98 water level | | | nil nco avel | notes, samples, tests classificati U _{so} undisturbed sample 50mm diameter soll description U _{to} undisturbed sample 63mm diameter based on u D disturbed sample system N standard penetration test (SPT) moisture Nc SPT - sample recovered moisture Nc SPT with solid cone D dry V vane shear (kPa) M moist | | | nified classification | | | S very soft soft firm stiff St very stiff hard friable very loose loose | | |
| T *bit s e.g. | how | n by | TC suf AC | bit fix DT | on date water i water o | | | te shown inflow outflow | | Bs bulk sample Wp pla E environmental sample W _t liqu R refusal | | | iastic kmit quid limit | | | D medium dense dense D very dense | |



| ø | antechnice | | | | | | | | | | | | | |
|----------------------------------|---|-------------|--------------------------|--------------------|----------------------------------|-----------|--------------------|----------------------|--------------------------|--|--|--|--|---|
| L | Borchole No | | | | | | | | | | | | ole No. | BH 209 |
| E | Engineering Log - Borehole Sheet Project No: | | | | | | | | | | | | t No: | 1 of 1 GEOTWARA21359AA |
| Cli | Client: SANDVIK MINING AND CONSTRUCTION Date started: | | | | | | | | | | | tarted: | 10.6.2009 | |
| Pri | ncip | al: | | | | | | | | | | Date o | omplete | d: 10.6.2009 |
| Pro | ojec | t: | | | PRC | PO | SED | IND | USTR | RIAL SITE | | Logge | d by: | GDT |
| Во | reho | ole I | Loca | tion: | MAS | SON | ITE | ROA | D, HE | ATHERBRAE | | Check | ed by: | Etht |
| drill | moc | iel a | nd m | ounting: | | Hand | Auger | | | Easting: 381803 slop | e: -90° | | R.L | Surface: 6.3 |
| drilling information material su | | | | | | | | mat | erial s | Northing 6371535 bearing: ubstance | | | dat | um: m AHD |
| method | 1 Denatration | ionemand 3 | support | no san test | o tes aples, s, etc | RL | depth | graphic log | classification symbol | material soil type: plasticity or particle charact colour, secondary and minor compr | teristics, ion contact teristics teristica teristics teristics teristics teristics teristics teristics teristics ter | condition consistency/ density index | 00 × pocket 200 v penetro- 300 w meter | structure and additional observations |
| ĂH | | Ť | N | | | | _ | | SP | SAND: fine to medium grained, grey, trac | e of fines. M | | | |
| | | | | | | _6.0 | - | | | Becomes pale grey Becomes orange | | | | |
| | | | | | | | | | | | | | | _ |
| | | | | | | | - | • • • | | | | MD | | |
| | | | | | | _0.0 | - | | | | | | | |
| | | | | | | | 1.0 | | | | | | | |
| | | | 0 | | | | - | | | | | | | |
| | | | Served | | | 5.0 | - | | | | | | | |
| | | | e Obs | | | | 1. <u>5</u> | | | | | | | |
| | | | NoN | | | | _ | | | | | | | - |
| | | | | | | _4.5 | | | | | | | | - |
| | | | | | | | 2. <u>0</u> - | | | | | | | - |
| | | | | | | _4.0 | - 2. <u>5</u> | | | | | D | | - |
| | | | | | | _3.5 | - | | | | | | | |
| | ЩĮ. | | | ļ | | | 3.0 | · · · · | | | | | | |
| | | | | | | _3.0 | - | | | Borehole BH 209 terminated at 3m | | | | |
| | | | | | | | 3. <u>5</u> | | | | | | | - |
| | | | | | - | | | | | | | | | |
| | | | | | _ | .2.5 | | | | | | | | |
| meth AS | od | <u>_ا</u> _ | auger | screwing | . | sup Mr | port mud | <u>I</u> N | nil | notes, samples, tests U _{sa} undisturbed sample 50mm diameter | classification s soil description | ymbols and | 1 | consistency/density index VS verv soft |
| AD auger dri RR roller/trice | | | | trilling* icone | ng* Co ne nen | | | •• | | D disturbed sample | based on unified system | d classificati | on | S soft F firm |
| W CT | | v c | washb cable t | ore ool | | 12 | 3 4 no ra | resistan nging to | сө | N standard penetration test (SPT) N* SPT - sample recovered | moisture | |] | St stiff ∀St very stiff |
| HA DT B | | t C | hand a diatube | uger H | ger water | | | | | Nc SPT with solid cone V vane shear (kPa) | D dry M moist | | | H hard Fb friable |
| v F | | د ۱ | / bit / bit FC bit | | | <u> </u> | 10/1/98 on date | water le shown | vei | Bs bulk sample E environmental sample | Wp plastic lim | nit t | | v⊾ very toose L loose MD medium deose |
| 'bitsh ∋.g. | own | by su A | uffix NDT | | water inflow | | | | | R refusal | | • | | D dense VD very dense |

BOREHOLE BH 200-238, GPJ COFFEY, GDT 23, 6, 10

| | - | | | L.C. | . | | ò. | ~~ | ~ +~ | abaiaa | | | | | | |
|--|---|----------|-----------------|--------------------------|----------------|----------|--|-------------------------|----------------|---|-----------------------------|-----------------|--------------------------|---|--|--|
| (| COILEY Sected finds Borehole No. | | | | | | | | | | | | ole No. | BH 210 | | |
| E | Engineering Log - Borehole Sheet Project No: | | | | | | | | | | | | t No: | 1 of 1 GEOTWARA21359AA | | |
| Cli | Client: SANDVIK MINING AND CONSTRUCTION Date started: | | | | | | | | | | | tarted: | 10.6.2009 | | | |
| Pri | nci | pal | l: | | | | | | | | C | | | d: 10.6.2009 | | |
| Project: PROPOSED INDUSTRIAL SITE | | | | | | | | | | | | Logge | GDT | | | |
| Во | Borehole Location: MASONITE ROAD, HEATHERBRAE Checked by: | | | | | | | | | | | (-tht- | | | | |
| drill | Irill model and mounting: Hand Auger Easting: 381827 slope: -90° R. | | | | | | | | | | | R.L | ., Surface: 7.2 | | | |
| hole diameter: 82 mm | | | | | | | | . | | Northing 6371569 bearing: | | | datum: m AHD | | | |
| ar | drilling information mater | | | | | | | mat | erial s | ubstance | | <u> </u> | + ¢ | | | |
| R | | netrati | t | | samples, | | | ic log | ficatio | material | ure | stency. | pocke penetr meter | structure and additional observations | | |
| metho | 1 | 8. 23 | Subpc | water | iesis, eic | RL | depth metres | graph | classi symb | soil type: plasticity or particle characteristics, colour, secondary and minor components. | moist | consit densi | kPa ខ្លួនខ្លួទ្ | | | |
| ΨH | | ĪŤ | N | | | | <u>† </u> | | SP | SAND: fine to medium grained, grey, trace of fines. | | L | | | | |
| | | | | | | 7.0 | _ | · · · · · · | - | | | | | | | |
| | | | | | | | - | | | | | | | | | |
| | | | | | | | 0. <u>5</u> | | | | | | | | | |
| | | | | | | 6.5 | - | | • | Becomes orange | M | | | | | |
| | | | | rved | | | - | | | | | | | - | | |
| | | | | Obse | | | 1.0 | | | | | MD | | - | | |
| | | | | None | | | - | · . · | | | | | | - | | |
| | | | | | | _6.0 | - | | | | | | | - | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | 1. <u>5</u> | | | | | | | | | |
| | | | | | | 5.5 | - | · · · · · | | | | | | - | | |
| | | | | | | | | | | | | | | | | |
| | | | | | E | | 2.0 | | | | | | | - | | |
| | | | | | | | | | | Borehole BH 210 terminated at 2m | | | | ······································ | | |
| | | | | | | 5.0 | | | | | | | | | | |
| | | | | | | | | | | | | | | - | | |
| | | | | | | | 2. <u>5</u> | | | | | | | | | |
| | | | | | | 4.5 | | | | | | | | - | | |
| | | | | | | | - | | | | | | | - | | |
| | | | | | | | 3.0 | | | | | | | _ | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | _4.0 | - | | | | | | | - | | |
| | | | | | | | | | | | | | | - | | |
| | | | | | | | 3. <u>5</u> | | | | | | | _ | | |
| | | | | | | _3.5 | - | | | | | | | | | |
| | | | | | | | | | | | | | | - | | |
| | | | | | | | 4.0 | | | | | | | - | | |
| metł AS | lod | | aı | iger so | rewing* | sup M | iport mud | N | nil | notes, samples, tests class U ₆₀ undisturbed sample 50mm diameter soil o | ification sy tescription | mbols and | d I | consistency/density index VS very soft | | |
| AD RR | AD auger drilling* RR roller/tricone | | | | illing* one | C pen | casing etration | 1 | | U ₆₃ undisturbed sample 63mm diameter baser D disturbed sample syste | d on unified m | classificali | on | S soft F firm | | |
| W CT | | | wa ca | ishbor ble too | e bl | | | o resistar anging to | nce | N standard penetration test (SPT) N* SPT - sample recovered mois No SPT with pariet area | ture | | | St stiff VSt very stiff | | |
| DT B | | | na dia RP | nu au alube ank 58 | Acı | water | | | | V vane shear (kPa) M P pressuremeter | moist wet | | | n naro Fb friable Vi verviose | | |
| v T | V V bit I/1/198 water T TC bit | | | | | | on date | shown | avel | F pressuremene VV Wet VL V8 Bs bulk sample Wp plastic limit L low F environmental sample W/ limit limit | | | | L loose MD medium dense | | |
| *bit shown by suffix e.g. AOT water inflo | | | | | | | water in water o | iflow utflow | | R refusal | | | | D dense VD very dense | | |



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Form



GEO 5.3 issue 3 Rev.2

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| | <i>~</i> ~~ | . | 6_ | • • • | | | | oto | obnice | | | |
|--|---------------|---|--|-------------------------------|---|---|---|------------------|--|--|---------------------------------|--|
| C | U | | 16 | ¢y | | ļ | Je | Jie | 50111105 | Bore | hole No. | D. BH 214 |
| En | gi | in | e | ring | g L | .og | - | 30 | rehole | Shee Proje | t ct No: | 1 of 1 GEOTWARA21359A / |
| Client | t: | | | SAI | VDV | IK M | ININ | G AN | D CONSTRUCTION | Date | started: | : 10.6.2009 |
| Princi | pal: | | | | | | | | | Date | complete | eted: 10.6.2009 |
| Projec Boreh | ct: iole i | Loca | tion: | PRC MA | OPO SON | SED IITE I | IND: ROA | USTI D, HI | RIAL SITE EATHERBRAE | Logg Chec | ed by: ked by: | GDT |
| drill mo | del a | ind m | ounti | ng: | Hand | Auger | | | Easting: 381875 slope: -90° | | R. | R.L. Surface: 7.3 |
| hole dia | amete | er: oform | oatic | | 82 mr | n | mat | orial a | Northing 6371619 bearing: | | da | datum: m AHD |
| lethod | penetration | pport | s te | notes amples, ests, etc | | depth | aphic log | assification p | material soil type: plasticity or particle characteristics, | ondition onsistency/ | ady pocket benetro- meter | a structure and additional observations |
| | 23 | N I | \$ | | RL | metres | 6 | ට්ගි SP | colour, secondary and minor components. | | 5 8 8 8 4 1 1 1 1 | 18 |
| Η | | | | | _7.0 | 0.5 | | J | Becomes orange | MD | | |
| | | None Ohcented | | | _6.0 | 1.5 | | | Becomes pale yellow to white | D | | |
| | | | | E | 5.0 4.5 | 2.5 | | | | | | ـــــــــــــــــــــــــــــــــــــ |
| | | | | | | 3.0 | | | Borehole BH 214 terminated at 3m | | | |
| | | | | | _4.0 _3.5 | 3.5 | | | | | | |
| method AS AD RR W CT HA DT B V T *bit shows e.g. | n by s | auger roller/l washt cable hand a diatub blank V bit TC bit uffix ADT | screw drilling ricone lool auger e bit | ing* 5* | sup M C pen 1 2 W T W W at | 4.0 port mud casing tetration 3.4 ra ra on date water in water of | N resistan nging to fusal water le shown flow | nìl ce wel | notes, samples, tests classification Uso undisturbed sample 50mm diameter soil descriptin Uso undisturbed sample 63mm diameter based on unifi D disturbed sample system N standard penetration test (SPT) moisture N* SPT - sample recovered moisture Nc SPT with solid cone D dry V vane shear (kPa) M moist P pressuremeter W wet E environmental sample Wull liquid lim R refusal refusal | i symbols a on ied classifici iimit iimit nit | nd ation | 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 |

ji J

| | | <u> </u> | within too and | | | ~~~ | -+- | abaiaa | | | | |
|--|--|--|---|--|---|--|-------------------|--|---|-----------------------------|--------------------------|---|
| C |)] | T | ey | Ŵ | Ç | jeo | JIE | CHHICS | | Borehc | ole No. | BH 215 |
| Enc | in | 1e | ering | a L | .og | - E | 3or | ehole | ŝ | Sheet Project | No: | 1 of 1 GEOTWARA21359AA |
| Client: | | | SAN | , IDVI | IK MI | NINC | G AN | D CONSTRUCTION | | Date st | arted: | 10.6.2009 |
| Principa | d: | | | | | | | | [| Date co | ompleted | : 10.6.2009 |
| Project: | | | PRC | PO | SED | IND | JSTR | IAL SITE | I | .oaaec | l bv: | GDT |
| Borehoi | e Lo | catio | on: MAS | SON | ITE I | ROAI | D. HE | ATHERBRAE | (| Checke | ed by: | (- Cut- |
| drill mode | and | ៣០ប | nting: | Hand | Auger | | | Easting: 381955 slope: -90° | | | R.L. | Surface: 6.4 |
| hole diam | eter: | | | 82 mn | n | | | Northing 6371618 bearing: | | | datu | m: m AHD |
| drilling | | orma | tion | 1 | | mate | eriai si | Ibstance | Î | > X | τ, έ | |
| nethod penetrati | tupport | vater | notes samples, tests, etc | 5 | depth | graphic log | lassificatio | material soil type: plasticity or particle characteristics, | noisture | consistency Jensity inde | o dy pocke o dy penet | structure and additional observations |
| - 12; ⊈ | 3 ° N | > | | RL | metres | | SP | SANDL fine to medium grained, pale grey to grey, | | | 5883 | |
| H | | | | _6.0 | 0.5 | | | trace of fines. | M | MD | | - - - - - |
| | | ved | | _5.5 | 1.0 | | | Becomes brown, slightly to moderately indurated | | | | |
| | | None Obser | | _5.0 | 1.5 | | | Becomes pale yellow | | | | |
| | | | | _4.5 | - 2. <u>0</u> | | | | | | | |
| | | | | _4.0 | - 2. <u>5</u> - | | | | | | | אין ד אין אין אין אין אין אין אין אין אין אין |
| | | | E | | | · · · · · · | | | | | | |
| | | | | _3.5 | | | | Borehole BH 215 terminated at 2.8m | | | | - |
| | | | | _3.0 | - - 3. <u>5</u> | | | | | | | |
| | | | | _2.5 | | | | | 4 | | | - |
| method AS AD RR W CT HA DT B V V T T *bit shown I e.g. | au rol wa cal ha dia bla bla TC TC Sy suff | ger so ger di ler/tric ishboi ble toi nd au itube ank bil bit i bit îx 07 | crewing* illing* ione e bl ger | sup M C pen 12 wat wat | port mud casing retration 3 4 n retration retr | N o resistan anging to ofusai water le shown oflow utflow | nil ce evel | notes, samples, tests classific: classific: undisturbed sample 50mm diameter classific: soil desc U ₆₀ undisturbed sample 63mm diameter based on system D disturbed sample 63mm diameter based on system N standard penetration test (SPT) moisturber N* SPT - sample recovered moisturber Nc SPT with solid cone D dry V vane shear (kPa) M mc P pressuremeter W we Bs bulk sample Wy pla E environmental sampte Wt liquid R refusal intervention | ation syn ription unified c / / sist t t sist t uid limit | iassificati | | VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense |



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| 650 | | <u></u> | 4 | . C | ~ * | | >, | nor | otc | chnics | | | | |
|--|-------|---------------|---|--|---|---------------------------------------|--------------------------------|--|--------------------------|---|---|-------------------------------|--|--|
| C | ار | | | | ey | | í | 30 | Ole | | | Boreho | ole No. | BH 217 |
| E | n | g | in | e | ering | g L | .og | | Boi | ehole | | Sheet Project | No: | 1 of 1 GEOTWARA21359AA |
| Cli | ent | : | | | SAI | VDV | IK M | ININ | G AN | D CONSTRUCTION | | Date st | arted: | 10.6.2009 |
| Pri | nci | bal | | | | | | | | | I | Date co | omplet | ted: 10.6.2009 |
| Pro | ojec | t: | | | PRO | DPO | SED | IND | USTF | RIAL SITE | I | Logged | l by: | GDT |
| Bo | reh | oie | Lo | cati | on: MA | SON | ITE | ROA | D, HE | ATHERBRAE | (| Checke | ed by: | CM |
| drill bok | mo | dei | and | mou | inting: | Hand | Auger | | | Easting: 381834 slope: -90 | 0 | | R. | R.L. Surface: 7.3 |
| dr | illir | ine ig i | info | rma | tion | 02 118 | | mat | erial s | ubstance | | | 30 | atum: m AHD |
| method | | o penetration | support | water | notes samples, tests, etc | RL | depth | graphic log | classification symbol | material soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | 88 8 Appenetro- 89 Denetro- meter | e structure and additional observations |
| ΑH | | \square | N | | | | | | SP | SAND: fine to medium grained, grey to grey-brown, with trace of fines | м | L | - 0.07 | 4 |
| | | | | | | _7.0 | | | | war trace of fines. | | | | |
| | | | | | | | 0. <u>5</u> | | | Becomes pale grey | | | | |
| | | | | /ed | | _6.5 | - | | | | | | | |
| | | | | e Obsen | | | 1. <u>0</u> | | | | | MD | | |
| | | | | Non | | 6.0 | - | | | | | | | |
| | | | | | | | 1.5 | | | Becomes orange brown. | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | 5.5 | - | | | | | | | |
| | | 888 | | | E | | 2. <u>0</u> | | | | | | | |
| | | | | | | 5.0 | | | | Borehole BH 217 terminated at 2.1m | | | | |
| | | | | | | | 2.5 | | | | | | | - |
| | | | | | | | - | | | | | | | |
| | | | | | | _4.5 | - | | | | | | | |
| | | | | | | | 3. <u>0</u> - | | | | | | | |
| | | | | | | _4.0 | - | | | | | | | |
| | | | | | | | 3.5 | | | | | | | - |
| | | | | | | | - | | | | | | | - |
| | | | | | | _3.5 | | | | | | | | |
| | | | | | | | 4.0 | | | | | | | - |
| meth AS AD RR W CT HA DT B V T | od | | aug aug rolli was cab har dial blai V b TC | jer so jer dr er/tric shbor le too id au- ube nk bit it hit | rewing* illing* one e si ger | sup M C 1 2 H I Wat | etration 10/1/98 on date | N o resistar anging to afusal i water k shown | nil nce evel | notes, samples, tests classific U _{so} undisturbed sample 50mm diameter soil dest U _{so} undisturbed sample 63mm diameter based or D disturbed sample soil dest N standard penetration test (SPT) moisture N* SPT - sample recovered moisture Nc SPT with solid cone D dr V vane shear (kPa) M m P pressuremeter W w Ss bulk sample W w | e cription n unified c e y oist et astic limit wild limit | ibols and | n | 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 doese |
| 'bit s e.g. | howr | ı by | suffi AD | ы к Г | | | water in water o | iflow utflow | | R refusal YV _L IIQ | piro arritt | | | D dense VD very dense |

| æ | • | ~ | | C | ~~ * # | | | | -tc | obnics | | | | | |
|---------------------|--------------|------------|---------------------|-----------------------------|---------------------------|----------|---------------------------|-------------------------|----------------|--|-----------------------|-------------|---------------------|-----------------------------|---------------------------------------|
| C | <i>,</i> (| J | | | ey | 100 | ç | JE | | 0111105 | | E | Boreho | le No. | BH 218 |
| Ε | n | gi | in | e | ering | y L | .og | - B | Bor | ehole | | S F | Sheet Proiect | No: | 1 of 1 GEOTWARA21359AA |
| Clie | ent: | _ | | | SAN | - VDV | IK M | ININ | G AN | D CONSTRUCTION | | Ľ | , Date st | arted: | 10.6.2009 |
| Pri | ncip | al: | | | | | | | | | | Ľ | Date co | mplete | d: 10.6.2009 |
| Pro | jeci | t: | | | PRC | OPO | SED | IND | USTR | RIAL SITE | | L | .ogged | by: | GDT |
| Boi | eho | ble | Loo | catio | on: MAS | SON | ITE I | ROA | D, HE | EATHERBRAE | | C | Checke | d by: | |
| drill | moo | iel a | and | mou | nting: | Hand | Auger | | | Easting: 381866 slope: | -90° | | | R.L | . Surface: 7.6 |
| hoie dri | dia Illin | met g i | er: nfo | rma | tion | 82 mr | n | mat | erial s | Northing 6371703 bearin ubstance | g: | | | dat | um: m AHD |
| pc | netration | ionensii | Ľ | | notes samples, | | | tic log | fication ol | material | | ure tíon | stency/ ty index | pocket penetro- meter | structure and additional observations |
| meth | 12 | 3 | oddns | water | 10010, 010 | RL | depth metres | grapł | class symb | soil type: plasticity or particle character colour, secondary and minor compon | istics, ents. | condi | consi densi | kPa ଌୄୖୖୖୖୖୖୖୖୢୡୖୖୢୡ | |
| Η | | | N | _ | | _7.5 | - | • • • • | SP | SAND: fine to medium grained, grey to brow of fines. | vn, trace | D | L | | |
| | | | | | | | - | | | | | | | | - |
| | | | | | | | - | | | | | | | | - - - - |
| | | | | | | 70 | 0.5 | · · · · | | Becomes orange brown | _ | M | | | |
| | | | | | | | _ | | | | | | | | |
| | | | | | | | _ | | | | | | | | |
| | | | | | | | 1.0 | | | | | | | | |
| | | | | | | _6.5 | - | | | | | | | | |
| | | | | erved | | | | | | | | | MD | | - |
| | | | | Obse | | | 1. <u>5</u> | ••••• | | | | | | | |
| | | | | None | E | 6.0 | - | | | | | | | | |
| | | | | | | | - | | | | | l | | | - |
| | | | | | | | | | | | | | D | | |
| | | | | | | _5.5 | 2. <u>0</u> | | | | | | | | |
| | | | | | | | - | | | | | | | | |
| | | | | | | | - | | | | | | | | |
| | | | | | | | 2. <u>5</u> | | | Beomes pale yellow | | | | | |
| | | | | | | 5.0 | - | | | | | | | | - |
| | | | | | | | - | | | | | | | | - |
| | | | | | | | 3.0 | •••••• | | | | | | | - |
| | | | | | | _4.5 | - | | | Borehole BH 218 terminated at 3m | | | | | - |
| | | | | | | | - | | | | | | | | - |
| | | | | | | | 3.5 | | | | | | | | - |
| | | | | | | _4.0 | | | | | | | | | |
| | | | | | | | - | | | | | | | | - |
| | | | | | | | _ | | | | | | | | - |
| meth | od | | | | | sup | 4.0 | | | notes, samples, tests | classificatio | on sym | bols and | | consistency/density index |
| AS AD RR | | | aug aug rolle | jer so jer dr er/tric | rewing" illing" one | C I | mud casing etcetion | N | វារ | U _{so} undisturbed sample 50mm diameter U _{so} undisturbed sample 63mm diameter D disturbed sample | based on ur system | nified cl | assificatio | on | vo very son S soft F firm |
| W CT | | | was cab | shbor le too | e ol | 1 2 | | o resistar anging te | 108 | N standard penetration test (SPT) N* SPT - sample recovered | moisture | | | | St stiff VSt very stiff |
| HA DT | | | han dial | id au ube | ger | wat | er (* | ngang tu atusal | | Nc SPT with solid cone V vane shear (kPa) | D dry M moist | | | | H hard Fb friable |
| B V T | | | blar V bi | hk bit it ธะเ | | <u>¥</u> | 10/1/98 on date | water le shown | evel | P pressuremeter Bs bulk sample | W wet Wp plasti | c limit | | | VL very loose |
| ı *bitsi e.g. | hown | by : | suffi AD | oit K T | | A | water in water o | iflow utflow | | R refusal | AA ^T Ndnig | ar e ML | | | D dense VD very dense |



VD

very dense

BOREHOLE BH 200-238.GPJ COFFEY.GDT 23.6.10

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ADT

-d water outflow

| CC | | | ey | Ŵ | Ĺ | jet | いし | | | Boreho | ole No. | | BH 220 |
|-----------------|----------|---------------------|---------------------------------|------------|-----------------|-----------------------------------|--------------------------|---|--------------------------|-------------------------------|--------------|-------------|---------------------------------------|
| Fno | vin | പ | orina | γI | oa | _ F | ദപ | ehole | | Sheet | , | | |
| | <u> </u> | | <u>ст п</u> | | | NUNI | | | | Projec Data s | t No: | | GEOTWARA21359 |
| Jient: | | | SAI | | | wiiwt | 9 AN | Deconstruction | | Date s | omolete | , he | 10.6.2009 |
| rincipa | 21. | | יממ | המר | ເຮັກ | וחואו | ιοτι | | : | | d by: | 50. | GDT |
| roject. | 2 | ocativ | гт. | 500 500 | | DO AI | ייי גר ה גו | | | Chook | aby. | | Ant |
| rill mode | elan | d mou | inting: | Hand | Auger | | <i>)</i> , п | Easting: 381883 slope: -90° | 1 | Спеска | R. | L. Su | rface: 7.6 |
| ole diam | neter | : | Ū | 82 mr | n | | | Northing 6371763 bearing: | | | da | tum: | m AHD |
| drilling | inf | orma | ition | 1 | 1 | mate | erial s | ubstance | 1 | | Å | | |
| netroo | 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 | 200 A pocket | | structure and additional observations |
| Y N | | 1 | | 7.5 | | •••••• | SP | SAND: fine to medium grained, grey brown, trace of | | L | | - | |
| | | | | | | | | nines | | | | | |
| | | | | | - | | | | | | | | |
| | | | | | 0. <u>5</u> | | | Becomes pale grey | | | | | |
| | | | | _7.0 | - | | | | | MD | | | |
| | | | | | 1 | | | | | | | | |
| | | | | | | • • • • | | | | | | | |
| | | | | _6.5 | | | | Becomes orange brown, slightly indurated | | | | | |
| | | g | | | - | | | | | | | | |
| | | Serve | | | - | | | | | | | | |
| | | l to Be | | | 1.5 | | | | | | | | |
| | | N N | | _6.0 | - | | | | | | | | |
| | | | | | - | | | Becomes pale yellow to white | | D | | | |
| | | | | | 2.0 | | | | | | | | |
| | | | | _5.5 | - | | | | | | | | |
| | | | | | - | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | 5.0 | 2. <u>5</u> | | | | | | | | |
| | | | E | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | <u></u> | | | ļ | 3.0 | ••••• | | Durch she Di LOOD krawlashad at Dar | | | | | |
| | | | | 4.5 | - | | | Dorenole Dri 220 terminated at 3m | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | 4.0 | 3.5 | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | - | | | | | | | | |
| ethod | | | | 0117 | 4.0 | | | notes samples tests | ation sur | nbols an | | -, | consistency/density index |
| S D | a | uger s uger d | crewing* rillina* | M Sul | mud casino | N | nil | U _{so} undisturbed sample 50mm diameter soil desc U _{so} undisturbed sample 63mm diameter based on | cription | lassifical | ion | | /S very soft S soft |
| R | ri V | olier/tri /ashbo | cone re | per 1 | tetration |) | | D disturbed sample system N standard penetration test (SPT) | | | | l f | = firm St stiff |
| r A | c h | able to and au | ioi iger | | | o resistar inging to olusal | 100 | N* SPT - sample recovered moisture Nc SPT vith solid cone D dr | э У | | | | /St very stiff hard |
| т | d b | liatube lank bi | t | wa W | ter 10/1/98 | water le | evel | V vane shear (kPa) M mo P pressuremeter W we | oist et | | | F \ | 7b friable /L very loose |
| | ע ד | / bit 'C bit | | ≛ | on date | shown | | Bs bulk sample Wp pla E environmental sample WL liq | astic limit uid limit | | | | . loose MD medium dense |
| it shown b a | by su | iffix | | | water o | HOW HBOW | | R refusal | | | | | dense |

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|----------------|-----------------|-------------|------------------|-----------------------------|------------------------|------------|---------------------|-------------------------|-------------|--|---|----------------------|---------------------------------|---|
| (|)(| O | | | ey | | Ç | Jec | JIE | CHINCS | | Boreho | le No. | BH 221 |
| E | n | a | in | e | erino | хL | .oa | | Bor | ehole | | Sheet | No | 1 of 1 GEOTWARA21359AA |
| Cli | ent: | 3 | | | SAN | idvi | | | G AN | D CONSTRUCTION | | Date st | arted: | 10.6.2009 |
| Pri | ncip | bal: | | | | | | | | | | Date co | ompleted: | 10.6.2009 |
| Pre | ojec | t: | | | PRC | PO | SED | IND | USTR | IAL SITE | | Logged | l by: | GDT |
| Во | reho | ole | Lo | atio | on: MAS | SON | ITE I | ROA | D, HE | ATHERBRAE | | Checke | ed by: | |
| dril | mod | del a | and | mou | nting: | Hand | Auger | | | Easting: 381910 slope: | -90° | | R.L. : | Surface: 7.7 |
| hol | e dia fillin | mei na i | ter: nfo | rma | tion | 82 mn | n | mate | arial s | Northing 6371743 bearing: | | | datur | m: m AHD |
| Ē | ļ | | | | notes | Τ | | | ы | | | ję. | er o- | -t |
| poq | Conchro | enana | port | ы Б | samples, tests, etc | | | ohic loç | ssificati | | sture | isistend sity ind | bere mete | additional observations |
| met | 12 | 23 | ldns | wate | | RL | depth metres | graț | clas sym | soil type: plasticity or particle characteristic colour, secondary and minor components | s. E | con den | 200 200 403 200 200 | |
| ЧA | | | N | | | | - | ••••• | SP | SAND: fine to medium grained, pale brown to brown, traces of fines. | M | VL | | - |
| | | | | | | _7.5 | - | | | | | L. | | |
| | | | | | | | 0.5 | | | | | MD | | - |
| | | | | | | | 0.9 | | | Beomes orange | | | | |
| | | | | | | _7.0 | | | | | | | | |
| | | | | | | | - | | | | | | | |
| | | | | | | | 1.0 | | | | | | | |
| | | | | p | | _6.5 | - | ••••••• | | | | | | - |
| | | | | serve | | | | | | | | | | - |
| | | | | ne Ot | | | 1. <u>5</u> | | | | | | | |
| | | | | Ň | | _6.0 | | | | Becomes pale yellow | | | | |
| | | | | | | | - | | | | | | | |
| | | | | | | | 2. <u>0</u> | | | | | | | |
| | | | | | | 5.5 | - | | | | | | | - |
| | | | | | | | _ | | | | | | | - |
| | | | | | | | 2.5 | | | | | | | - |
| | | | | | | 50 | - | | | | | | | |
| | | *** | | | | _0.0 | - | | | | | D | | |
| | | | | | E | | 3.0 | | | | | | | |
| | | | | | | | | | | Borehole BH 221 terminated at 3m | | | | |
| | | | | | | _4.5 | - | | | | | | | - |
| | | | | | | | 25 | | | | | | | - |
| | | | | | | | 3. <u>9</u> - | | | | | | | |
| | | | | | | _4.0 | - | | | | | | | - |
| | | | | | | | - | | | | | | | |
| met | hod | | | | | su | 4.0 port | | n if | notes, samples, tests | classification s | ymbols an | d l | consistency/density index |
| AS AD RP | | | aug aug | jer so jer di er/Iri/ | rilling* cone | C . | mud casing | N | กส | U _{so} undisturbed sample 50mm diameter to U _{so} undisturbed sample 63mm diameter to D disturbed sample | son description based on unified system | l classificat | ion | vo very solt S soft F firm |
| W CT | | | wa | shba de to | re ol | per 1 2 | | o resistar anging to | 100 | N standard penetration test (SPT) N* SPT - sample recovered | moisture | | | St stiff VSt very stiff |
| HA DT | | | ha: dia | nd au lube | ger | wai | ter | ាទូតឡ ល ទាំជនឝា | | Nc SPT with solid cone V vane shear (kPa) | D dry M moist | | | H hard Fb friable |
| B V T | | | bla V b TC | nk bil it bil | l | <u> </u> | 10/1/98 on date | i water le shown | evel | P pressuremeter Bs bulk sample environmental sample | w wet Wp plastic lin W, liquirt limit | it | | v⊆ very ioose L loose MD medium dense |
| *bit e.g. | show | n by | suffi AD | x T | | A | water ir water o | nflow ulflow | | R refusal | r ordere urbi | | | D dense VD very dense |

BOREHOLE BH 200-238, GPJ COFFEY GDT 23,6,10

i

BOREHOLE BH

| C | ,(| | | e | У | | ç | Je | Ole | CHINCS | | | Boreh | ole No. | Bł | 1 222 | |
|-----------------|-------------|----------|------------------|--------------------|------------------------|------------|---------------|----------------------------------|---------------------|---|-------------------|---------------------------------------|--------------------------------------|-----------------------------|--------------------|--|-----|
| E . | ~ ~ | | ~ ~ | | - | I | ~ ~ | | | roholo | | | Sheel | | 1 o | f 1 | |
| | nõ |) | ne | eri | ng | L | .09 | - | 30 | enole | | | Proje | ot No: | GE | OTWARA213 | 59A |
| Clie | nt: | | | | SANL | DVI | KM | NIN | G AN | D CONSTRUCTION | | | Date | started: | 10. | 6.2009 | |
| Prin | cipa | al: | | | | | | | | | | | Date | completed | i: 10. | 6.2009 | |
| Proj | ect: | | | F | PROF | PO: | SED | IND | USTI | RIAL SITE | | | Logge | ed by: | GD | | |
| Bore | ehol | le L | ocal | ion: / | VASC | ON | ITE I | ROA | D, H | EATHERBRAE | | | Checi | ed by: | | | |
| drill n | node | el ar | id mo | unting: | Ha | and / | Auger | | | Easting: 381925 | slope: | -90° | | R.L | Surface: | 7.6 | |
| dril | ling | j in | form | ation | 02 | 2 1111 | 1 | mat | erial s | ubstance | bearing. | | | datt | ACT 1: | III AND | |
| thod | penetration | | in the | no sam tests | tes pies, s, etc | | | phic log | ssification abol | material | la obaractoristic | | ndition sistency/ sistv index | pocket benetro- meter | ado | structure and ditional observations | 5 |
| å | 12: | 3 | | | | RL, | metres | ĝra | cla: syr | colour, secondary and mir | nor components | 3, (). (| 8000 | 100 300 400 | | | |
| ¥ | | | 1 | | _ | 7.5 | - | | SP | SAND: fine to medium grained, trace of fines. | pale grey to gre | y, | DL | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | 7.0 | 0. <u>5</u> | | | Becomes yellow | | | M | | | | - |
| | | | | | Γ | | 1 | | | | | | | | | | |
| | | | ervec | | | | - | · · · · · | | | | | | | | | |
| | | | e Obs | | | | 1.0 | | | | | | MD | | | | - |
| | | | Non | | - | 6.5 | - | | | | | | | | | | |
| | | | | | | | _ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | 6.0 | 1. <u>5</u> | | | | | | | | | | |
| | | | | | Γ | | - | | | | | | | | | | |
| | | | | | | | - | | | Becomes pale yellow | | | L | - | | | |
| | | | | E | | | 2.0 | | | Perchala BH 200 terminated at (|)m | | | | | | |
| | | | | | 1 | 5.5 | | | | Borenole BH 222 terminated at a | 2111 | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | L | 5.0 | 2. <u>5</u> | | | | | | | | | | - |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | 3. <u>0</u> | | | | | | | | | | |
| | | | | | 4 | 4.5 | - | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | 4 | 4.0 | ა. <u>ა</u> | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 4.0 | | | notos sousis tosta | iii | alappiñicati - | n oumhala - | | Annala | anavidanaila indan | |
| iethd S D | ю | â | auger | screwing | • | Sup M r | mud mud | N | nil | U ₅₀ undisturbed sample 50mm | n diameter s | oil descript | n symbols à ion fied classifie | tion | Consist VS S | very soft soft | |
| R / | | a f | oller/t vashh | ricone ore | | pen 1 2 | etration | I | | D disturbed sample N standard penetration text | (SPT) | system | | | F | firm stiff | |
| T A | | c F | able t and a | ool luger | | ۳ ٦ | | o rosista Inging to Ifusal | nce | N* SPT - sample recovered No SPT with solid cone | | moisture D dry | | | VSI H | very stilf hard | |
| 7 | | c t | liatub Jank I | e e Dit | | wate | er 10/1/98 | water | evel | V vane shear (kPa) P pressuremeter | N | VI moist N wet | | | Fb VL | friable very loose | |
| | | י ו | / bit 'C bit | | - | <u> </u> | on date | shown | | Bs bulk sample E environmental sample | | Np plastic N _t liquid l | : limit imit | | L MD | loose medium dense | |
| bit sh | own i | by si | ffix | | | | water in | iflow | | R refusal | | | | | D | dense | |



GEO 5.3 Issue 3 Rev.2

Form

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|---|--------------|----------|---|--|---|---|--|---|--------------------------|--|--|--|--------------|--|
| C |)(|) | | [(| ЭУ | đ | ç | jec | JIE | CUNICS | | Bore | nole No. | BH 224 |
| Ε | no | ic | n | e6 | erino | 8 L. | oa | - E | 3or | ehole | | Shee | t ct No: | 1 of 1 GEOTWARA21359AA |
| | ant | <u> </u> | | | SAN | | K MI | | AN | D CONSTRUCTION | | Date | started: | 10.6.2009 |
| Date | 511L. | _ł. | | | 0/11 | | | | | | | Date | completer | t: 10.6.2009 |
| Pra | icipa | aı. | | | 000 | 000 | ern | וחואו | ICTO | NAL SITE | | Loga | od hv | GDT |
| Pro | ject | : | | | PRC | | 5ED 175 - | | | | | Char | cuby. | Ant |
| Bor | eho | le L | -00 | atio | n: MAS | SON | | ROAL |), HE | Eastion: 382006 slope: -9 | 0° | Unec | RI | Surface: 7.0 |
| drill bole | mode dian | el ar | na n sr | noui | nung: i | Hand / 82 mm | Auger | | | Northing 6371656 bearing: | | | dati | um: m AHD |
| dri | illing | g in | for | ma | tion | | | mate | erial su | ubstance | | | 1 | |
| nethod | penetration | | support | water | notes samples, tests, etc | RI | depth | graphic log | classification symbol | material soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture | condition consistency/ | 200 x pocket | structure and additional observations |
| Ă | 12 | 3 | N | _ | | | meaco | •••• | SP | SAND: fine to medium grained, dark grey to black, | | L | | |
| | | | | | | 65 | - | | | trace of fines. | | | | - |
| | | | | erved | | | | | | Becomes pale yellow | | ME | | - |
| | | | | None Obs | E | 6.0 | 1.0 | | | Becomes dark orange brown, slightly indurated | | | | COFFEE ROCK |
| | | | | | | _5.5 | 1.5 | | | | | | | - |
| | | - | | | | 5.0 | 2.0 | | | Borehole BH 224 terminated at 2m | | D | | - |
| | | | | | | _4.5 | - - 2. <u>5</u> | | | | | | | |
| | | | | | | | - | | | | | | | |
| | | | | | | 4.0 | | | | | | | | |
| | | | | | | 3.5 | 3. <u>5</u> - | | | | | | | |
| | | | | | | 2.0 | 40 | | | | | | | _ |
| met AS AD RR W CT HA DT B V T *bit | hod | n by | aug aug rolk was cat har dial blan V b TC suffi | er si er d shbo le to d au ube nk bi it bit K | crewing* rilling* cone re ol iger t | SU SU M C pee 1 W w a W a | pport mud casing netration 2 3 4 1 10/1/94 • on date • water i water of | N no rosista anging to otusal 3 water 3 water a shown nflow putflow | nil nco level | notes, samples, tests class U _{s0} undisturbed sample 50mm diameter soit of base. U _{s0} undisturbed sample 63mm diameter base. D disturbed sample syste N standard penetration test (SPT) mois N* SPT - sample recovered mois V vane shear (kPa) M P pressuremeter W Bs bulk sample Wp E environmental sample Wt R refusal wt | d on uni don uni em sture dry moist wat plastic liquid l | i symbols on ied classif limit mit | cation | 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 |



E GEO 5 3 issue 3 Rev.2



| UU | | | ЗY | | Ļ | J00 | | | - | Boreho | ole No. | BH 227 |
|-------------------------|----------------------|-----------------------|---------------------------------|------------|---------------------|-------------------------|--------------------------|---|--------------------------|-------------------------------|---|---|
| Ena | in | ~ | rinc | | 00 | | 2~. | scholo | | Sheet | | 1 of 1 |
| спу | | C | | <u>j -</u> | .ug | •••• L | | | | Project | t No: | GEOTWARA21359 |
| Client: | | | SAN | NDV. | ік мі | NIN | G AN | DCONSTRUCTION | | Date s | tarted: | 10.6.2009 |
| Principal | : | | 000 | | 000 | MO | UOT | | | Date o | ompleted: | 10.6.2009 |
| Project: | | - 41 - | PRO |)PO | SED | | 0511 | | | Logged | d by: | (Ant- |
| sorenoie Irill model | and r | atio | n: MAS ating: | Hand | Auger | TUA | D, HI | Easting: 381891 slope: -90° | | Спеск | ed by: R L Si | |
| ole diame | eter: | | 1 | 82 mr | n | | | Northing 6371782 bearing: | | | datum: | m AHD |
| drilling c | infor | mat | tion | T | 1 | mat | erial s | ubstance | | Γ., | | |
| method | support | water | notes samples, tests, etc | RL | depth | graphic log | classification symbol | material soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | 200 A pocket | structure and additional observations |
| ¥ | N | | | | | •• •• | SP | SAND: fine to medium grained, grey, trace of fines. | | L | | |
| | | | | _7.0 | ~ | | | | | MD | | |
| | | | | | - | | | | | | | |
| | | | | | 0.5 | | | | | | | |
| | | | | _6.5 | | | | | | | | |
| | | | | | - | | | | | | | |
| | | | | | 1.0 | | | Becomes prage brown to prage | | | | |
| | | | | 6.0 | - | | | | | | | |
| | | erved | | | | | | | | | | |
| | | S Obse | | | 1. <u>5</u> | ••••• | | | | | | |
| | | None | | | - | | | | | | | |
| | | | | _5.5 | - | | | | | | | |
| | | | | | 20 | | | | | | | |
| | | | | | ~. <u>0</u> | | | | | | | |
| | | | | _5.0 | - | | | Becomes pale yellow to white | | U | | |
| | | | | | | | | | | | | |
| | | | | | 2.5 | | | | | | | |
| | | | | 4.5 | | | | | | | | |
| | | | | | _ | | | | | | | |
| | | | | | 3.0 | **, * <i>*</i> | | Borehole BH 227 terminated at 3m | | | | |
| | | | | 4.0 | - | | | | | | | |
| | | | | | - | | | | | | | |
| | | | | | 3.5 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | _3.5 | - | | | | | | | |
| | | | | | | | | | | | | |
| iethod S | | ersc | rewina* | su; M | 9port mud | N | nil | notes, samples, tests classifica U.o. undisturbed sample 50mm diameter soll desc | ation syr | nbois an | di la | consistency/density index VS verv soft |
| Ð R | aug rolle | er dri r/trico | lling* one | C per | casing setration | 14 | | U ₆₃ undisturbed sample 63mm diameter based on D disturbed sample system | unified o | classifical | ion | S soft F firm |
| / Т | was cabi | hbore e too | e N | | 234 n ra | o resistar anging lo | 100 | N standard penetralion test (SPT) N* SPT - sample recovered moisture | | | | St stilf VSt very stiff |
| A T | han diali blan | d aug ube k hit | jer I | wat | ter | atusal | ovo ¹ | NC SPT with solid cone D dry V vane shear (kPa) M mo P pressuremeter W we | / bist t | | | H hard Fb friable VL vervioose |
| | V bi TC I | l Dit | | . | nu/1/98 on date | shown | evel | Bs bulk sample Wp pla E environmental sample Wi, liqu | Istic limit Jid limit | | | L loose MD medium dense |
| oit shown by .q. | suffix AOT | | | | water in water o | tflow ⊔tflow | | R refusal | | | | D dense VD very dense |

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BOREHOLE BH

| ~ | . | ~ | £ | £ | | | | ~~ | ~ * ~ | obnion | | | | |
|--------------------|------------|-------------|------------------|----------------|---------------------------------|-----------|--------------------|----------------------|----------------------|--|---------------------------------|------------------|-----------------------------|---|
| C |)(| J | | | ey | S | Ç | Jeo | JIE | | | Boreho | ole No. | BH 229 |
| E | n | g | in | e | ering | j L | og | - E | Bor | ehole | | Sheet Proiect | t No: | 1 of 1 GEOTWARA21359AA |
| Cli | ent: | - | | | SAN | IDVI | KM | INING | G AN | D CONSTRUCTION | | Date s | tarted: | 10.6.2009 |
| Pri | ncir | oal: | | | | | | | | | | Date c | omplete | ed: 10.6.2009 |
| Pro | viec | +• | | | PRC | PO. | SED | ומאו | ISTR | IAI SITE | | Loaae | d bv: | GDT |
| Ro | roh | | 1.00 | natio | | 201 | | יייי | л <i>и</i> в | ATHEDRAAE | | Check | ad hv: | - Adat |
| drill | mod | Jel a | and | mou | ntina: | Hand | Auger | 10A | <i>, 11</i> | Easting: 381919 slope: | -90° | oncore | R. | L. Surface: 7.3 |
| hole | e dia | mei | ter: | | Ū | 82 mn | า | | | Northing 6371806 bearing: | | | da | tum: m AHD |
| dr | illin | g i | nfo | rma | tion | 1 | 1 | mate | erial si | ibstance | | 1 | | · |
| ethod | nonotratio | hailariarin | pport | ater | notes samples, tests, etc | | depth | aphic log | assification mbol | material soil type: plasticity or particle characteristics, | oisture ondition | Insistency/ | penetro benetro meter | structure and additional observations |
| Ĕ | 12 | 23 | N N | Ň | | RL | metres | 5 | ରି ଫି | colour, secondary and minor components. | E 8 | MD | 5888 | |
| Η | | | N | | | 7.0 | - | | 54 | some tree roots. | ,, 0 | 10105 | | |
| | | | | | | | | | | Becomes pale grey | M | - | | |
| | | | | | | | 0.5 | | | | | | | |
| | | | | | | 65 | - | | | | | | | |
| | | | | | | _0.0 | | | | | | | | - |
| | | | | | | | 1. <u>0</u> | | | | | | | |
| | | | | | | | | | | | | | | - |
| | | | | erved | | _6.0 | | | | Becomes orange brown, slightly indurated | | | | - |
| | | | | e Obs | | | 1.5 | | | | | | | |
| | | | | Non | | | - | | | | | | | - |
| | | | | | | _5.5 | - | | | | | | | - |
| | | | | | | | 20 | | | | | | | - |
| | | | | | | | | | | | | | | - |
| | | | | | | 50 | - | | | | | | | |
| | | | | | | _0.0 | _ | | | | | | | |
| | | | | | E | | 2. <u>5</u> | | | | | | | |
| | | | | | | | | · · · · · · · · | | | | 64D | | |
| | | | | | | 4.5 | - | | | | | 1010 | | - |
| | | | | | | | 3.0 | | | Roraholo RH 220 terminated at 2m | | | | |
| | | | | | | | _ | | | | | | | |
| | | | | | | _4.0 | - | | | | | | | - |
| | | | | | | | 3.5 | | | | | | | ** |
| | | | | | | | | | | | | | | |
| | | | | | | 25 | | | | | | | | - |
| | | | | | | _3.5 | - | | | | | | | - |
| met | hod | | | | | su | 4.0 port | L | | notes, samples, tests cla | ssification s | /mbols an | l ndf | consistency/density index |
| AS AD | | | au au | ger s ger d | crewing* rilling* | м С | mud casing | N | nil | U _{so} undisturbed sample 50mm diameter soi U _{so} undisturbed sample 63mm diameter bas | I description sed on unified | classifica | lion | VS very soft S soft |
| RR W | | | rol wa | er/tri shbo | cone re | per 12 | etratio | n no resista | nco | D disturbed sample sys N standard penetration test (SPT) | iem | | | - St stiff |
| UT HA | | | cal ha | nd au tubo | ol Iger | | | anging to refusal | | NC SPT with solid cone D V vane shear (kPa) M | dry moist | | | H hard Fb friable |
| B V | | | bia V P | nk bi nit | ł | . Wa | 10/1/94 on date | 8 water I e shown | evel | P pressuremeter W Bs bulk sample Wp | wet plastic lim | it | | VL very loose L loose |
| T *bit : e.n | show | n by | TC suff AD | bit ix T | | | water i water o | nflow | | E environmental sample W _{i.} R refusal | liquid limil | | | MD medium dense D dense VD very dense |



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E O T

| C | O | T | T(| ey | Ŵ | (| je | ote | ecnnics | • | Boreho | ole N | lo. | BH 234 | |
|---------------------------|-------------|---|--|--|-----------------------------|---|--------------------------------------|------------------------|---|---|------------------------------|----------|----------|---|-----|
| . | | | _ | | | | . 6 | | | | Sheet | | | 1 of 1 | |
| En | g | IN | e | ering | <u>j</u> r | <u>.og</u> | - | 30 | enole | | Projec | t No | | GEOTWARA2135 | 59A |
| Clien | t: | | | SAN | VDV | IK M | NIN | G ΑΛ | D CONSTRUCTION | | Date s | tarte | d: | 10.6.2009 | |
| Princi | ipal: | | | | | | | | | | Date c | omp | leted | i: 10.6.2009 | |
| Proje | ct: | | | PRC | OPO | SED | IND | USTI | RIAL SITE | | Logge | d by: | | GDT | |
| Boreh | lole | Loc | atic | on: MAS | SON | | ROA | D, HI | EATHERBRAE | | Check | ed b | y: | | |
| hole di | amel | ter: | nou | nung; | 82 mr | nuger | | | Northing 6371864 bearing: | 90 | | | K.L. | Surface: 7.3 | |
| drilli | ng i | nfo | ma | tion | | | mat | erial s | ubstance | i | -i | | | | |
| nethod | penetratior | upport | vater | notes samples, tests, etc | 0 | depth | Iraphic log | lassification ymbol | material | noisture condition | onsistency/ lensity index | a pocket | o enerro | structure and additional observations | |
| - 1 ≤ : | 23 | ∽ N | 5 | | RL | metres | 。 XXXX | SC SC | FILL: Clayey SAND. fine to medium grained, dark | M | L | ş ğ | ğ ğ | TOPSOIL FILL | |
| - | | | | | | | | | brown, low plasticity clay. | | D | | | | |
| | | | | | _7.0 | - | | SP | SAND: fine to medium grained, grey to pale grey, trace of fines. | | | | | | |
| | | | | | | 0.5 | | | | | | | | | |
| | | | | | | - | | | | | | | | | - |
| | | | | | 6.5 | | | | | | | | | | - |
| | | | | | | 10 | | | | | | | | | - |
| | | | p | | | - | | | | | | | | | |
| | | | serve | E | 60 | _ | | | | | | | | | - |
| | | | le Ob | | 0.0 | | | | Becomes orange brown. | | | | | | - |
| | | | ⁰ N | | | 1. <u>5</u> | | | | | | | | | |
| | | | | | | - | | | | | | | | | - |
| | | | | | _5.5 | - | | | | | | | | | - |
| | | | | | | 2. <u>0</u> | | | Recomes brown grov | | | | | | |
| | | | | | | - | | | Becomes blown grey | | | | | | - |
| | | | | | _5.0 | - | | | | | | | | | |
| | | | | | | 2.5 | | | | | | | | | - |
| | | | | | | | | | | | | | | | |
| | | | | | 4.5 | | | | Borehole BH 234 terminated at 2 75m | | | | ┝ | | |
| | | | | | | | | | were note of the commuted of 4.7 dth | | | | | | - |
| | | | | | | 3.0 | | | | | | | | | |
| | | | | | | | | | | | | | | | _ |
| | | | | | _4.0 | - | | | | | | | | | - |
| | | | | | | 3. <u>5</u> | | | | | | | | | |
| | | | | | | - | | | | | | | | | - |
| | | | | | _3.5 | - | | | | | | | | | |
| | | | | | | 4.0 | | | <u> </u> | | | | | | |
| ethod 3 2 7 7 | | aug aug rolle was cabl han | er sor er dri r/trico hbore e too d aug | rewing* Illing* one 3 I Jer | Sup M C pen 1 2 | pport mud casing etration 2 3 4 nc ration ration | N o resistan nging to fusal | nil ce | notes, samples, tests class U _{so} undisturbed sample 50mm diameter solid U _{so} undisturbed sample 63mm diameter baser D disturbed sample 63mm diameter system N standard penetration test (SPT) system N* SPT - sample recovered moist Nc SPT with solid cone D | ification syr escription I on unified on n ure dry | mbols and | d ion | | consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard | |
| r | | diate blan | ibə k bit | | wat | ter 10/1/98 | water le | ivel | V vane shear (kPa) M P pressuremeter W | moist wet | | | | Fb friable VL very loose | |
| it chair | <i>m</i> hu | V bil TC t | i Dit | | | on date | shown flow | | Bs bulk sample Wp E environmental sample Wi R refusal | plastic limit liquid limit | | | | L loose MD medium dense | |
| .g. | n oy: | AD1 | - | 1 | - | water or | utflow | | ix idiusai | | | | | VD verv dense | |

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| æ | ~ ⁄ | - | £ | . | ~~~ | | ×. | | oto | chnics | | | | | | |
|---|-----------|------|---|--|--|------------------------------------|--|--|----------------------|--|---|---------------------------|---------|---|--|-------------------|
| |)(| J | | | ey | Ŵ | Ç | Jei | Ole | | | Boreho | le No. | | BH 235 | — |
| E | ing | ji | in | e | ering | g L | .og | - | Зоі | ehole | | Sheet Project | No: | | 1 of 1 GEOTWARA21359/ | 4 <i>A</i> |
| Cli | ent: | | | | SA | = NDV | IK M | ININ | G AN | D CONSTRUCTION | | Date st | tarted: | | 10.6.2009 | |
| Pri | ncipa | al: | | | | | | | | | | Date co | omplete | ed: | 10.6.2009 | |
| Pro | oject: | | | | PR | OPO | SED | IND | USTF | NAL SITE | | Logged | f by: | | GDT | |
| Во | reho | le | Lo | catio | on: MA | SON | ITE | ROA | D, HE | ATHERBRAE | | Checke | ed by: | | (-tit | |
| dril | mode | el a | and | mou | nting: | Hand | Auger | - | | Easting: 382001 slope: | -90° | | R. | .L. Sur | face: 7.7 | ٦ |
| hol | e dian | net | er: | | | 82 mr | n | . | | Northing 6371831 bearing: | | | da | atum: | m AHD | _ |
| ar | 1111ng | 3 11 | nto | rma | tion | 1 | T | mat | erial s | Ibstance | | ~ * | τģ | | | |
| hethod | penetrati | | upport | ater | samples tests, etc | | depth | raphic log | assificatio ymbol | material soil type: plasticity or particle characteristi | oisture ondition | onsistency ensity inde | a pocke | | structure and additional observations | |
| Υ | 12 | 3 | σ N | 3 | | RL | metres | | ठळ SC | FILL: SAND, fine to medium grained, dark brow | .s. ⊵o wn M | | 2885 | \$ 10 | SOIL FILL | _ |
| Ĩ | | | | | | _7.5 | - | | SP | with some fines. SAND: fine to medium grained, grey black, with trace of fines. | h | | | | | |
| | | | | | | | 0. <u>5</u> | | | Becoming grey | | | | | | _ |
| | | | | | | _7.0 | - | | | | | | | | | |
| | | | | *** | F | | 1. <u>0</u> | | | | | | | | | |
| | | | | Observe | | 6.5 | - | · · · · · | | Becoming orange brown. | | | | | | |
| | | | | None (| | | 1. <u>5</u> | | | | | | | | | |
| | | | | | | 6.0 | - | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | |
| | | | | | | 6.6 | - 2.0 | | | | | | | | | |
| | | | | | | 5.5 | - | | | | | | | | | |
| | | | | | | | 2. <u>5</u> | | | | | | | | - | |
| | | | | | | 5.0 | | | | Borehole BH 235 terminated at 2.75m | | | | | | |
| | | | | | | | 3.0 | | | | | | | | | - |
| | | | | | | 45 | - | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | - |
| | | | | | | | 3. <u>5</u> | | | | | | | | - | _ |
| | | | | | | _4.0 | 1 | | | | | | | | | _ |
| | | | | | | | 4.0 | | | | | | | | | - |
| met AS AD RR W CT HA DT B V T | hod | | aug aug roll was cab har diat bla V b TC | jer so jer di er/tric shboi ile to ile to il | orewing* illing* cone re ger | sur M C per 1 2 Wal | aport mud casing netration 2 3 4 r r r ter 10/1/98 on date | N no resista anging to efusat 3 water 1 3 water 1 | nil nce evel | notes, samples, tests 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 E environmental sample | classification sy soil description based on unified system moisture D dry M moist W wet W wet Wp plastic limi W _t liquid limit | mbols and classificati | d on | C V S F S V H F V L N | onsistency/density index S very soft firm t stiff St very stiff hard b friable L very loose loose bD medium dense | |
| *bit : e o | shown | by : | suffi AD | x T | | | water ii water d | nflow | | R refusal | | | | | dense D verv dense | |

BOREHOLE B

| | | | £ | £ | | | | | -t- | obbios | | | | | | |
|---------------------|-------|----------|--------------------|-----------------------------|------------------------|-----------------------|---------------------|--------------------------|--------------|--|------------------------------|----------------------|---------------------------|------------------|---------------------------------------|----------|
| (|)(| C | | | ey | 1 | Ĺ | Jee | JIE | CHINCS | | { | Boreho | le No. | BH 236 | |
| E | n | g | in | e | ering | { L | .og | - | 3or | ehole | | S | Sheet Proiect | No: | 1 of 1 GEOTWARA21359A | A |
| Cli | ent: | <u> </u> | | | SAN | , IDV | IK M | INING | G AN | D CONSTRUCTION | | | Date st | arted: | 10.6.2009 | <u> </u> |
| Pri | ncip | bal | : | | | | | | | | | [| Date co | mplete | ed: 10.6.2009 | |
| Pro | ojec | :t: | | | PRC | PO | SED | IND | USTR | RIAL SITE | | ι | .ogged | by: | GDT | |
| Во | reh | ole | Lo | catio | on: MAS | SON | ITE | ROA | D, HE | EATHERBRAE | | (| Checke | d by: | | |
| drill | moo | del | and | mou | nting: | Hand | Auger | | | Easting: 381917 slope: | -90° | | | R.I | L. Surface: 7.0 | ٦ |
| hole | e dia | me | ter: | | +: | 82 mr | n | Í | | Northing 6371846 bearing | 1: | | | da | atum: m AHD | |
| ur | | | | | notes | | 1 | mao | eria: S | | | | X | πģ. | _ | - |
| lethod | +0400 | penetrat | upport | ater | samples, tests, etc | | depth | raphic log | lassificatio | material soil type: plasticity or particle characteris | stics, | noisture ondition | onsistency ensity inde | k pocke meter | structure and additional observations | |
| ν V | 12 | 23 | Ø N | 3 | | RL | metres | 0) - (- (- (| SP | colour, secondary and minor compone SAND: fine to medium grained, dark brown to | ents. o black | ε ο M | MD | 5884 5884 | TOPSOIL | |
| Ĩ | | | | | | | | | | wit some fines and roots. | | | D | | | |
| | | | | | | | | | SP | SAND: fine to medium grained, pale grey, tra fines. | ice of | | | | | - |
| | | | | | | _6.5 | 0.5 | | | | | | | | - | |
| | | | | | | | - | | | | | | | | | |
| | | | | | | | - | | | | | | | | | |
| | | | | | | _6.0 | 1.0 | | | Becomes orange brown to brown, slightly ind | surated. | | | | - | _ |
| | | | | | | | - | | | | | | | | | |
| | | | | erved | | | - | | | Becomes orange | | | MD | | | - |
| | | | | e Obs | | _5.5 | 1.5 | ., . | | | | | | | | _ |
| | | | | Non | | | | | | | | | | | | - |
| | | | | | | | | · · · · · | | | | | | | | |
| | | | | | | 50 | 20 | ••••• | | | | | U | | | - |
| | | | | | | _0.0 | - | | | | | | | | - | |
| | | | | | | | - | | | Becomes pale yellow | | | | | | _ |
| | | | | | | | | · · · · · | | | | | | | | _ |
| | | | | | | _4.5 | 2. <u>5</u> | | | | | | | | | - |
| | | | | | | | 1 | | | | | | | | | |
| | | | | | | | | | | | | | | | | - |
| | | | | | | 4.0 | 3.0 | | | Borebole BH 236 terminated at 3m | | | | ++++ | | _ |
| | | | | | | | - | | | Direntile Diri 200 tentilitated at om | | ĺ | | | | - |
| | | | | | | | - | | | | | | | | | _ |
| | | | | | | 3.5 | 3.5 | | | | | | | | | - |
| | | | | | | | - | | | | | | | | | |
| | | | | | | | - | | | | | | | | - | |
| | | | | | | | | | | | | | | | | - |
| meth | lođ | 1 | | 197.0 | revico* | 3,0 sur | 0port | <u> </u> | oil | notes, samples, tests | classifica soil descr | tion sym | bols and | 1 | consistency/density index | 1 |
| AD RR | | | aui aui roli | jer di Jer di er/trid | illing* one | C | casing setration | ייז ר | | U ₆₀ undisturbed sample 63mm diameter D disturbed sample | based on system | unified cl | assificati | n | S soft F firm | |
| W CT | | | wa cat | shbo le to | re pl | | 234 | no resistan angina to | 100 | N standard penetration test (SPT) | moisture | | | | St sliff VSt very sliff | |
| HA DT | | | hai dia | nd au Iube | ger | <u>tailiti</u> wat | ter | ofusal | | Nc SPT with solid cone V vane shear (kPa) | D dry M moi | st | | | H hard Fb friable | |
| B V T | | | bla V t | nk bi it bit | | <u> </u> | 10/1/98 on date | 8 water li a shown | evel | Pressuremeter Bs bulk sample E environmental sample | Wp pla: Wp bla: W Bout | stic limit | | | L loose MD medium dense | |
| , *bit s e.g. | how | n by | suff AD | x T | | | water in water c | nflow outflow | | R refusal | (| | | | D dense VD very dense | |



BEO 5.3 Issue 3 Rev.2

| | * | - | ſ | £ | 25115 VA # | | | | ~ +~ | obnice | | | | | | | |
|----------------|-----------|-----------|-----------------|------------------------------|---------------------------------|------------|---------------------|-------------------------|------------------------|--|----------------------|------------------|-----------------------------|---------|--------|---------------------------------------|-----|
| (|)(| U | | | ey | Ţ | ç | Jei | JIE | | | | Boreho | le No. | | BH 238 | |
| E | n | a | in | e | erino | a L | .oq | - | Bor | ehole | | : | Sheet Project | No: | | 1 of 1 GFOTWARA21359 | 944 |
| Cli | ent: | <u> </u> | | | SAI | | K M | ININ | G AN | D CONSTRUCTION | | | Date st | arted: | | 10.6.2009 | |
| Pri | ncir | bal: | | | | | | | | | | I | Date co | mplete | ed: | 10.6.2009 | |
| Pro | niec | t: | | | PR | OPO | SED | IND | USTR | YAL SITE | | I | _oaaed | bv: | | GDT | |
| Во | reho | ole | 1.0 | catio | on: MA | SON | | ROA | D. HE | ATHERBRAE | | (| Checke | d by: | | (-tut- | |
| drill | mod | iel a | and | mou | nting: | Hand | Auger | | | Easting: 381921 slope | э: -90° | | | R. | L. Su | rface: 7.0 | |
| hole | e dia | me | ter: | | - | 82 mn | 1 | + | | Northing 6371884 bear | ing: | | | da | atum: | m AHD | |
| dr | illin | ig i S | nfo | rma | tion | 1 | 1 | mat | erial s | ubstance | T | | ~ * | , ė | | | |
| nethod | popotrot: | henaliar | upport | vater | notes samples, tests, etc | | depth | jraphíc log | lassificatio symbol | material soil type: plasticity or particle charact | eristics, | noisture | consistency fensity inde | a pocke | 2 | structure and additional observations | |
| u Å | 12 | 23 | N N | > | | KL. | metres | | SC SC | Clayey SAND: fine to medium grained, da | rk brown, | M | D | 2885 | | PSOIL | |
| Т | | | | | | | | | | low plasticity clay, some roots. | | | | | | | |
| | | | | | | | | | SP | SAND: fine to medium grained, pale brow | n, trace of | | | | | | _ |
| | | | | | | _6.5 | 0. <u>5</u> | | | nens, | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | beva | | | | | | | | | | | | | _ |
| | | | | Obse | | 6.0 | 1.0 | | | | | | MD | | | | - |
| | | | | None | E | | - | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | _ | | | | | | | | | | _ |
| | | | | | | _5.5 | 1. <u>5</u> | | | | | | | | | | |
| | | | | | | | | ••••• | | | | | | | | | _ |
| | | | | | | | - | | | Beomes pale yellow | | | | | | | |
| | | | | | | 5.0 | 2.0 | | | Parchala BH 320 terminated at 2m | | | | | | | |
| | | | | | | | | | | Dorenole Dri 256 terminateu at zm | | | | | | | - |
| | | | | | | | - | | | | | | | | | | _ |
| | | | | | | 4.5 | 25 | | | | | | | | | | |
| | | | | | | _4.0 | 2. <u>9</u> | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | 1 |
| | | | | | | 4.0 | 3. <u>0</u> | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | | - | | | | | | | | | | |
| | | | | | | _3.5 | | | | | | | | | | | _ |
| | | | | | | | _ | | | | | | | | | | - |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| meti | hod | | | | Vourino* | 3.0 sup | 4.0 port | | nil | notes, samples, tests | classificat | ion syn ntion | nbols and | | | consistency/density index | |
| AD RR | | | au au rol | ger di ger di ier/trir | newing illing* :one | C | casing | 21 1 | 100 | U ₆₀ undisturbed sample Somm diameter D disturbed sample | based on u system | inified c | lassificatio | n | S F | S soft | |
| W CT | | | wa cal | shbo de to | re Di | 1 2 | 3 4 | io resista angino lo | 100 | N standard penetration test (SPT) N* SPT - sample recovered | moisture | | | | | 6t stiff /St very stiff | |
| HA DT | | | ha dia | nd au tube | ger | wat | er i | elusal | | Nc SPT with solid cone V vane shear (kPa) | D dry M mois | st | | | | t hard Fb friable | |
| B V Y | | | bla V t | nk bil sit | | _ | 10/1/98 on date | 3 water k shown | evel | P pressuremeter Bs bulk sample | W wet Wp plas | tic limit | | | | /L very loose . loose | |
| *bit s e.g. | how | n by | suff AC | ix IT | | | water ir water o | nflow Autflow | | R refusal | **("400 | - minit | | | | D dense /D very dense | |

BOREHOLE BH 200-238.GPJ COFFEY.GDT 23.6.10

| 23.6 |
|----------|
| GDT |
| COFFEY. |
| GPJ |
| 200-238. |
| ШH |
| OREHOLE |
| ă |

| | ar | Irilling information material substance | | | | | | | | | | | | | | | | |
|-----------|-----------------------------------|---|------------|-----------------------------------|---|--|-----------------------------|-----------------------------------|-----------------|--------------------------|--|--|----------------------------------|-------------------------------|-------------|--------------|---|---|
| | method | nenatration | herication | support | water | notes samples, tests, etc | RI | depth | graphic tog | classification symbol | material soil type: plasticity or particle characteristic colour, secondary and minor components | cs, s. | moisture condition | consistency/ density index | 00 H pocket | 00 by perfer | stri addition | ucture and al observations |
| | ¥H | 12 | 3 | N | | | - 1 | menes | | CL | Sandy CLAY: low plasticity, dark brown, fine to medium grained sand, some roots. | | M | D | 28 | × T | | |
| | | | | | | | | - | | | SAND: fine to medium grained, pale yellow, trac fines. | ce of | | | | | | |
| | | | | | one Observed | | | 0. <u>5</u> | | | Becomes orange | | | | | | | |
| | | | | | No | E | | 2.0 | | | Becomes pale yellow | | | VD | | | | |
| ŀ | ř | | | | | | | | | | Borehole BH 239 terminated at 3m | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 3. <u>5</u> 4.0 | | | | | | | | | | |
| 3 Rev.2 | meti AS AD RR W CT | ıođ | | aug aug rolle was cab | er sc er dr er/tric hbor le toc | rewing* Iling* one e | Sup M C pen 1 2 | port mud casing etration | N o resistan | nil .ce | notes, samples, tests undisturbed sample 50mm diameter U _{to} undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered | classificat soil descri based on u system moisture | tion sym iption unified cl | ibols and assificati | i on | | consistency/ VS S F St VSt | lensity index very soft soft firm stiff very stiff |
| 5.3 Issue | HA DT B | | | han diat blar V H | d aug ube ik bit | ger | wat | er 10/1/98 | water le | vel | Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs huik cample | D dry M moi: W wet | st stic limit | | | | H Fb VL | hard friable very loose loose |
| Form GEO | T *bit s e.g. | howr | ı by : | TC Suffic AD | hit K | | × × | water in water o | flow | | E environmental sample R refusal | W _t liquí | id limit | | | | MD D VD | medium dense dense very dense |

| | | | | | | Site Numbe | r |
|---|--|---|--|--|--|------------|----------------------|
| | ff~ | n San | otech | inics | | | RH 203 |
| | пеу | S S S S S S S S S S S S S S S S S S S | | | НЕ БАВТН | | |
| | 50 0 * | 571 | | ANAGING | | Job No | GEOTWARA21359AA |
| | Double | e Ring In | filtromet | er Test | | Sheet | 1 of 2 |
| Client | SANDVIK | MINING AN | D CONSTRU | | | Office | WARA |
| Dringing | | | | | | - Date | 15/06/09 |
| Рппсіраї | | | | | | | |
| Project | INFILTRA | TION TEST | NG | | | - Ву | |
| Location | MASONIT | E ROAD, HE | ATHERBRA | \E | | _ Checked | · ()2///1 |
| | | | | | | | |
| Test Fluid Inner Ring Outer Rin Water Hea | l g Radius g Radius ad | Water 0.150 0.300 0.200 | m m m | | | | |
| Depth to S Water Date | Static | 2.500 10/06/2009 | m Time | 9AM | | | |
| Area of In Area of A | ner Ring nnulus | 0.071 0.212 | sq.m sq.m | | | | |
| Reading No. | Time Elapsed (mins) | Time Interval (mins) | Volume of Water Added | Infiltration Rate (m/day) | Infiltration Rate (m/sec) | | Comments |
| 0 | 2 | 2 | <u>(Litres)</u> Q | 01.7 | | | |
| 1 | 4 | £ | South and the second state of the | 1 21.7 | I 1.1E-03 | | |
| 2 | 000000000000000000000000000000000000000 | 2 | 9 | 91.7 | 1.1E-03 1.1E-03 | | |
| | 6 | 2 | 9 9 | 91.7 91.7 91.7 | 1.1E-03 1.1E-03 1.1E-03 | | |
| 3 | 6 8 | 2 2 2 | 9 9 9 | 91.7 91.7 91.7 91.7 | 1.1E-03 1.1E-03 1.1E-03 1.1E-03 | | |
| 3 | 6 8 10 | 2 2 2 2 2 | 9 9 9 8.75 | 91.7 91.7 91.7 91.7 89.1 | 1.1E-03 1.1E-03 1.1E-03 1.1E-03 1.0E-03 | | |
| 3 4 5 | 6 8 10 12 | 2 2 2 2 2 2 | 9 9 9 8.75 8.75 | 91.7 91.7 91.7 89.1 89.1 | 1.1E-03 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 | | |
| 3 4 5 6 | 6 8 10 12 14 | 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 | 91.7 91.7 91.7 91.7 89.1 89.1 86.6 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 | | |
| 3 4 5 6 7 | 6 8 10 12 14 16 | 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.75 | 91.7 91.7 91.7 91.7 89.1 89.1 86.6 89.1 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 | | |
| 3 4 5 6 7 8 | 6 8 10 12 14 16 18 | 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.75 8.5 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 | | |
| 3 4 5 6 7 8 9 | 6 8 10 12 14 16 18 20 | 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.75 8.5 8.5 8.5 8.5 8.25 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 89.1 86.6 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 | | |
| 3 4 5 6 7 8 9 10 | 6 8 10 12 14 16 18 20 22 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.5 8.5 8.25 8.25 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 89.1 86.6 84.0 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 | | |
| 3 4 5 6 7 8 9 10 11 | 6 8 10 12 14 16 18 20 22 22 24 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 | 91.7 91.7 91.7 91.7 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 | | |
| 3 4 5 6 7 8 9 10 11 12 | 6 8 10 12 14 16 18 20 22 22 24 24 26 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 | | |
| 3 4 5 6 7 8 9 10 11 11 12 13 | 6 8 10 12 14 16 18 20 22 24 24 26 28 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 89.1 86.6 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ \end{array} $ | 6 8 10 12 14 16 18 20 22 24 24 26 28 30 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 81.5 81.5 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ \hline 5 \end{array} $ | 6 8 10 12 14 16 18 20 22 24 24 26 28 30 30 32 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 81.5 81.5 81.5 81.5 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 1$ | 6 8 10 12 14 16 18 20 22 24 24 26 28 30 32 32 34 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8.25 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 84.0 84.5 81.5 81.5 81.5 78.9 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ (10 \\ (10 \\ 17 \\ (10 \\ (10 \\ 17 \\ (10 \\ (10 \\ 17 \\ (10 \\ (10 \\ (10 \\ 17 \\ (10 \\ (10 \\ $ | 6 8 10 12 14 16 18 20 22 24 24 26 28 30 32 32 34 34 36 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8.25 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 84.0 84.0 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 9.1E-04 9.1E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 10 $ | 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 81.5 81.5 81.5 78.9 78.9 76.4 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 8.8E-04 8.8E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 00 $ | 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 91.7 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 84.5 81.5 81.5 81.5 78.9 78.9 76.4 76.4 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 8.8E-04 8.8E-04 8.8E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 24 \\ \end{array} $ | 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 91.7 89.1 89.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 84.5 81.5 81.5 78.9 78.9 76.4 76.4 76.4 73.8 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 8.8E-04 8.8E-04 8.8E-04 8.5E-04 | | |
| $ \begin{array}{r} 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 21 \\ 32 \\ \end{array} $ | 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 9 9 8.75 8.75 8.5 8.5 8.5 8.25 8.25 8.25 8.25 8.25 8 | 91.7 91.7 91.7 91.7 89.1 80.1 86.6 89.1 86.6 84.0 84.0 84.0 84.0 84.0 84.0 84.0 84.5 81.5 81.5 78.9 78.9 76.4 76.4 76.4 73.8 71.3 | 1.1E-03 1.1E-03 1.1E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 1.0E-03 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.7E-04 9.4E-04 9.4E-04 9.4E-04 9.1E-04 8.8E-04 8.8E-04 8.8E-04 8.3E-04 8.3E-04 | | |

| [| | | | | | Site Number | | |
|------------|---|--|-----------------|--------------|--------------|--------------|---------------|-------|
| cot | ffey | ge | otechr | nics | | | BH 203 | |
| | 14 6 9 | SPEC | ALISISIVIA | ANAGING IM | ECANID | Job No | GEOTWARA21359 | AA |
| | Double | Ring Inf | iltromet | er Test | | Sheet | 2 of | 2 |
| Client | SANDVIK | MINING ANI | CONSTRU | JCTION | | Office | WARA | |
| Dringingt | | | | | | - Date | 15/06/09 | |
| - ппсіраі | | TION TEOTI | 10 | | | - Du | CDT | |
| Project | INFILIRA | HON TESTI | NG | | | | | |
| Location | MASONIT | E ROAD, HE | ATHERBRA | 4E | | Checked - | <u> </u> | |
| Tost Eluid | 1 | Water | | | | | | |
| Inner Rind | ' a Radius | 0.150 | - m | | | | | |
| Outer Rin | g Radius | 0.300 | m | | | | | |
| Water Hea | ad | 0.200 | m | | | | | |
| Depth to S | Static | a an | * | | | | | |
| Water | | 2,500 | m | 0.4HZ | | | | |
| Date | | 10/06/2009 | lime | <u>9AM</u> | - | | | |
| Aros of In | nor Dina | 0.071 | sa m | | | | | |
| Area of Ar | nei King nnulus | 0.071 | _sq.m | | | | | |
| / | | | | | | | | |
| | | | Volume | | | | | |
| Pooding | Time | Time | of | Infiltration | Infiltration | | _ | |
| No | Elapsed | Interval | Water | Rate | Rate | | Comments | |
| 110. | (mins) | (mins) | Added | (m/day) | (m/sec) | | | |
| | | | <u>(Litres)</u> | 71.2 | 8 3 5 04 | | | |
| 1 | 50 | 2 | 675 | 68.8 | 8.0F-04 | | | |
| 2 | 54 | 2 | 6.75 | 68.8 | 8.0E-04 | | | ····· |
| 3 | 56 | 2 | 6.25 | 63.7 | 7.4E-04 | | | |
| 4 | 58 | 2 | 6.25 | 63.7 | 7.4E-04 | | | |
| 5 | 60 | 2 | 5.75 | 58.6 | 6.8E-04 | | | |
| 6 | 62 | 2 | 5.5 | 56.0 | 6.5E-04 | | | |
| 7 | 64 | 2 | 5.5 | 56.0 | 6.5E-04 | | | |
| 8 | 66 | 2 | 5.25 | 53.5 | 6.2E-04 | | | |
| 9 | 68 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 10 | 70 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 11 | 12 | 2 | <u> </u> | 50.9 | 5.90-04 | | | |
| 12 | 14 | <u>4</u> | <u>с</u> а | 50.9 | 5.9E-04 | | | |
| 13 | 78 | 2 | 5 | 50.9 | 5.9F-04 | | | |
| 15 | 80 | 2 | 5 | 50.9 | 5,9E-04 | | | |
| 16 | 82 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 17 | 84 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 18 | 86 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 19 | 88 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 20 | 90 | 2 | 5 | 50.9 | 5.9E-04 | | | |
| 21 | 0.0000000000000000000000000000000000000 | [| | | | | | |
| | | J | | | | | | ••• |
| 22 | | | | | | | | |

| 1 | | | | | | Site Numb | рег |
|--|--|---|---|---|--|-------------|-----------------|
| CO | ffey | ge | | | ЧЕ БАВТН | | BH 234 |
| | 50 2 7 | 351 | | ANAGING | | Job No | GEOTWARA21359AA |
| | Double | Ring In | filtromete | er Test | | Sheet | 1 of 2 |
| Client | SANDVIK | MINING AN | D CONSTRU | ICTION | | Office | WARA |
| District | | | | | | - Date | 15/06/09 |
| Principal | | TION TEOT | | | | - - - | CDT |
| Project | | HON TEST | NG | | | | |
| Location | MASONIT | E ROAD, HE | ATHERBRA | \E | | - Checked | <u> </u> |
| Test Fluic Inner Ring Outer Rin Water Hea | f g Radius g Radius ad | Water 0.150 0.300 0.200 | m m Im | | | | |
| Depth to Water Date | Static | | m <i>Time</i> | | 44 - 44 - 44 - 44 - 44 - 44 - 44 - 44 | | |
| Area of In Area of A | ner Ring nnulus | 0.071 0.212 | sq.m sq.m | | | | |
| Reading No. | Time Elapsed (mins) | Time Interval (mins) | Volume of Water Added | Infiltration Rate (m/day) | Infiltration Rate (m/sec) | | Comments |
| | | | 1 // (Proc) | | | 1 | |
| I () | 2 | 2 | 6 | 61.1 | 7.1E-04 | | |
| 0 | 2 | 2 | 6 | 61.1 61.1 | 7.1E-04 7.1E-04 | | |
| 0 | 2 4 6 | 2 2 2 | 6 6 5.75 | 61.1 61.1 58.6 | 7.1E-04 7.1E-04 6.8E-04 | | |
| 0 1 2 3 | 2 4 6 8 | 2 2 2 2 | 6 6 5.75 5.5 | 61.1 61.1 58.6 56.0 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{array} $ | 2 4 6 8 10 | 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 | 61.1 61.1 58.6 56.0 58.6 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5 \end{array} $ | 2 4 6 8 10 12 | 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.75 5.5 | 61.1 61.1 58.6 56.0 58.6 56.0 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.5E-04 | | |
| 0 1 2 3 4 5 6 | 2 4 6 8 10 12 14 | 2 2 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.75 5.5 5.5 5.75 | 61.1 58.6 56.0 58.6 56.0 58.6 56.0 58.6 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.5E-04 6.8E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ \end{array} $ | 2 4 6 8 10 12 14 16 | 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.5 5.75 5.75 5.75 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 58.6 | 7.1E-04 7.1E-04 6.8E-04 6.3E-04 6.3E-04 6.3E-04 6.8E-04 6.8E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ \end{array} $ | 2 4 6 8 10 12 14 16 18 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 5.75 5.5 5.75 5.5 5.75 5.75 5.75 5.75 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 58.6 58.6 56.0 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ \end{array} $ | 2 4 6 8 10 12 14 16 18 20 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 5.75 5.5 5.75 5.5 5.75 5.75 5.75 5.75 | 61.1 61.1 58.6 56.0 58.6 58.6 58.6 58.6 58.6 58.6 56.0 56.0 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.5E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ \end{array} $ | 2 4 6 8 10 12 14 14 16 18 20 22 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 5.75 5.5 5.75 5.75 5.75 5.75 5.75 5.75 5.5 5. | 61.1 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 58.6 58.6 56.0 56.0 56.0 56.0 56.0 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.5E-04 6.8E-04 6.8E-04 6.5E-04 6.5E-04 6.5E-04 6.5E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ -$ | 2 4 6 8 10 12 14 16 18 20 22 22 22 24 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.75 5.75 5.75 5.75 5. | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 56.0 56.0 56.0 53.5 53.5 53.5 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.5E-04 6.2E-04 6.2E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 5 \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 24 24 26 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.5 5.75 5.75 5.5 5.5 5.5 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 56.0 56.0 56.0 53.5 53.5 50.9 50.9 | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 6.2E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 24 26 28 28 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 6 6 5.75 5.5 5.75 5.5 5.75 5.75 5.75 5.5 5. | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 56.0 56.0 53.5 53.5 50.9 50.9 50.9 50.9 | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 4 7 \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 22 24 26 28 30 30 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 12.07 6 6 5.75 5.5 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.5 5.75 5.5 5.75 5.5 5.75 5.5 5.25 5.25 5.25 5 5 5 5 | $\begin{array}{c} 61.1 \\ 58.6 \\ 56.0 \\ 58.6 \\ 56.0 \\ 58.6 \\ 56.0 \\ 58.6 \\ 58.6 \\ 56.0 \\ 53.5 \\ 53.5 \\ 53.5 \\ 50.9 \\ 50$ | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.5E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 42\\ 15\\ 12 \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 24 26 28 30 30 32 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 1 1 6 6 5 7 5 5 5 7 5 5 5 7 5 5 5 7 5 5 5 7 5 5 5 7 5 5 7 5 5 7 5 5 7 5 5 5 7 5 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 58.6 56.0 56.0 53.5 53.5 50.9 5 | 7.1E-04 7.1E-04 6.8E-04 6.3E-04 6.3E-04 6.3E-04 6.3E-04 6.3E-04 6.3E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 47\\ \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 24 26 28 30 32 34 22 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 1 1 6 6 5 7 5 5 5 7 5 5 5 7 5 5 5 7 5 5 5 7 5 5 7 5 5 7 5 5 7 5 5 7 5 | $\begin{array}{c} 61.1 \\ 61.1 \\ 58.6 \\ 56.0 \\ 58.6 \\ 56.0 \\ 58.6 \\ 58.6 \\ 58.6 \\ 56.0 \\ 53.5 \\ 53.5 \\ 50.9 \\ 50$ | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 18\\ 18\\ 18\\ 18\\ 18\\ 18\\ 18\\ 18\\ 18$ | 2 4 6 8 10 12 14 16 18 20 22 22 24 24 26 28 30 32 34 34 36 28 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | ILINES 6 6 5.75 5.5 5.75 5.5 5.75 5.5 5.75 5.5 5.5 5.5 <td>$\begin{array}{c} 61.1 \\ 61.1 \\ 58.6 \\ 56.0 \\ 58.6 \\ 56.0 \\ 58.6 \\ 58.6 \\ 56.0 \\ 56.0 \\ 53.5 \\ 53.5 \\ 50.9 \\ 50$</td> <td>7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04</td> <td></td> <td></td> | $\begin{array}{c} 61.1 \\ 61.1 \\ 58.6 \\ 56.0 \\ 58.6 \\ 56.0 \\ 58.6 \\ 58.6 \\ 56.0 \\ 56.0 \\ 53.5 \\ 53.5 \\ 50.9 \\ 50$ | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 10 \\ 10 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$ | 2 4 6 8 10 12 14 16 18 20 22 24 24 26 28 30 32 34 36 38 40 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | ILINES 6 6 5.75 5.5 5.75 5.5 5.75 5.75 5.75 5.75 5.75 5.5 5.75 5.5 <td>61.1 58.6 56.0 58.6 58.6 58.6 58.6 58.0 58.0 56.0 53.5 53.5 50.9 5</td> <td>7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04</td> <td></td> <td></td> | 61.1 58.6 56.0 58.6 58.6 58.6 58.6 58.0 58.0 56.0 53.5 53.5 50.9 5 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.5E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 22 24 24 26 28 30 32 34 36 38 40 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | Image: constraint of the second sec | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 56.0 56.0 53.5 53.5 50.9 5 | 7.1E-04 7.1E-04 6.8E-04 6.5E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 21 \\ \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 24 26 28 30 32 34 36 38 40 40 42 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | ILITES 6 6 5.75 5.5 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.75 5.5 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 56.0 56.0 53.5 53.5 50.9 5 | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |
| $ \begin{array}{r} 0\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 21\\ 22\\ 22 \end{array} $ | 2 4 6 8 10 12 14 16 18 20 22 24 26 22 24 26 28 30 32 34 36 38 40 42 44 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | ILINES 6 6 5.75 5.5 5.75 | 61.1 58.6 56.0 58.6 56.0 58.6 58.6 56.0 56.0 53.5 53.5 50.9 5 | 7.1E-04 7.1E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.8E-04 6.2E-04 6.2E-04 6.2E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 5.9E-04 | | |

| | | | | | | Site Number | |
|------------|----------------------------|--|-------------------------|--------------|--------------|-------------|--|
| | FF~~ | S a | entec | hnics | | | RH 23/ |
| CO | пеу | SF | PECIALISTS | MANAGING | THE EARTH | | DITZJA |
| | | | | | | JOD NO | GEOTWARA21359AA |
| | Double | Ring I | nfiltrom | eter Test | | Sheet | 2 of 2 |
| Client | SANDVIK | MINING A | ND CONS | RUCTION | | Office | WARA |
| Principal | | | | | | Date | 15/06/09 |
| Dreiset | | | TING | | | By | GDT |
| Plojeci | | | UCATUCO | | | Checked | -Ait- |
| Location | MASONIT | E ROAD, | HEATHER | BRAE | | - | |
| | | | | | | | |
| Toot Eluin | , | \Mater | | | | | |
| Inner Rind | , n Radius | 0.150 | m | | | | |
| Outer Rin | a Radius | 0.300 | m | | | | |
| Water Hea | ad | 0.200 | m | | | | |
| | | | • | | | | |
| Depth to S | Static | and a subject of the state of the state of the state | : | | | | |
| Water | | | m | | 8 | | |
| Date | | | Time | | - | | |
| | D ¹ | 0.074 | | | | | |
| Area of In | ner Ring | 0.071 | sq.m | | | | |
| Area of A | nnuius | 0.212 | sq.m | | | | |
| | | | Volume | 1 | | | |
| | Time | Time | of | Infiltration | Infiltration | | |
| Reading | Elapsed | Interval | Water | Rate | Rate | | Comments |
| NO. | (mins) | (mins) | Added | (m/day) | (m/sec) | | |
| | | | (Litres) | | | | |
| 0 | 50 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 1 | 52 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 2 | 54 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 3 | 50 | 2 | <u> </u> | 50.9 | 5.92-04 | | |
| 4 5 | 00 | 2 | 3 5 | 50.9 | 5.9E-04 | | ······· |
| 6 | 62 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 7 | 64 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 8 | 66 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 9 | 68 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 10 | 70 | 2 | 5 | 50.9 | 5.9E-04 | | |
| 11 | | | | <u> </u> | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | ······································ |
| 10 | | | | | | | |
| 17 | | | | | | | ······ |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | annan sinainai | | | | |
| 8 | SQR128323332,QNS20,QN28333 | ł | 2020/2020/000000000/202 | | | | |
| 22 | | | | | | | |

Dynamic Cone Penetrometer Test Results

| Client: | SANDVIK MINING AND CONSTRUCTION |
|----------------|---------------------------------|
| Principal: | |
| Project: | PROPOSED INDUSTURIAL BUILDING |
| Location: | 431 MASONITE ROAD, HEATHERBRAE |
| | |
| Job No: | GEOTWARA21359AA |
| Date of Issue: | 25/06/2009 |

| Test proced | ure: | | | | Test date: Date of Actual Test | | | | | |
|-------------|--------|-----|-----------|-----|--------------------------------|-----|----------|------------|--|--|
| Depth below | | Tes | t Numbers | | | | Readings | s recorded | in blows per 150mm | |
| surface | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | Test location/Remarks | |
| 150 | 0 | 0 | | 1 | 1 | | | 0 | | |
| 300 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | | |
| 450 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 0 | | |
| 600 | 0 | 2 | 4 | 1 | 2 | 2 | 3 | 1 | | |
| 750 | 1 | 2 | 2 | 8 | 2 | 3 | 3 | 1 | | |
| 900 | 1 | 2 | 2 | 2 | 3 | 4 | 3 | 2 | - | |
| 1050 | 1 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | _ | |
| 1200 | 1 | 8 | 1 | 5 | 4 | 3 | 3 | 2 | - 1 | |
| 1350 | 1 | 5 | 4 | 6 | 4 | 4 | 3 | 1 | - 1 | |
| 1500 | 2 | 6 | 1 | 6 | 4 | 4 | 4 | 3 | - 1 | |
| 1650 | 1 | 5 | 9 | 8 | 3 | 4 | 5 | 3 | - | |
| 1800 | 3 | 5 | 9 | 8 | 2 | 6 | 5 | 3 | - | |
| 1950 | 2 | 5 | 12 | 10 | 5 | 8 | 5 | 5 | - | |
| 2100 | 3 | 10 | 20 | 12 | 5 | 13 | 5 | 1 | - | |
| 2250 | 3 | 8 | 21 | 1/ | 8 | 11 | 8 12 | 6 | - | |
| 2400 | 4 | 7 | 21 11 | 14 | 9 | 11 | 12 | 7 0 | - | |
| 2550 | 5 0 | 7 | 12 | 10 | 10 | 11 | 14 | 0 | - 1 | |
| 2700 | 0 | 9 | 10 | 10 | 10 | 13 | 14 | 9 | - 1 | |
| 3000 | 10 | 12 | 17 | 19 | 1/ | 13 | 10 | 9 10 | - 1 | |
| 3150 | 12 | 12 | 17 | 20 | 14 | 12 | 13 | 10 | - | |
| 3300 | | | | | | | | | - | |
| 3450 | | | | | | | | | - | |
| 3600 | | | | | | | | | 1 | |
| 3750 | | | | | | | | | 1 | |
| 3900 | | | | | | | | | 1 | |
| 4050 | | | | | | | | | 1 | |
| 4200 | | | | | | | | | 1 | |
| 4350 | | | | | | | | | | |
| 4500 | | | | | | | | | | |
| 4650 | | | | | | | | | | |
| 4800 | | | | | | | | | e e | |
| 4950 | | | | | | | | | | |
| 5100 | | | | | | | | | | |
| 5250 | | | | | | | | | | |
| Remarks | | | | | | | | | General Information AS 1289 6.3.2 Drop height 510mm ± 5 Cone tip Blunt tip AS 1289 6.3.3 Drop height 600mm ± 5 | |
| | | | | | | | | | | |

Dynamic Cone Penetrometer Test Results

| Client: | SANDVIK MINING AND CONSTRUCTION |
|----------------|---------------------------------|
| Principal: | |
| Project: | PROPOSED INDUSTURIAL BUILDING |
| Location: | 431 MASONITE ROAD, HEATHERBRAE |
| | |
| Job No: | GEOTWARA21359AA |
| Date of Issue: | 25/06/2009 |

| Test proced | ure: | | | | Test date: Date of Actual Test | | | | | |
|-------------|--------|--------|-----------|--------|--------------------------------|--------|----------|----------|--|--|
| Depth below | | Test | t Numbers | | | | Readings | recorded | in blows per 150mm | |
| surface | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | Test location/Remarks | |
| 150 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | | |
| 300 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | | |
| 450 | 2 | 1 | 1 | 2 | 1 | 0 | 2 | 2 | | |
| 600 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | - | |
| 750 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | | |
| 900 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | - | |
| 1050 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | - | |
| 1200 | 2 | 2 | 3 | 2 | 4 | 3 | 3 | 5 | - | |
| 1350 | 3 | 3 | 3 | 2 | 5 | 3 | 3 | 5 | - | |
| 1500 | 3 | 4 | 3 | 3 | 5 | 5 | 5 | 4 | 4 1 | |
| 1650 | 8 | 3 | <u> </u> | 3 | 5 F | 6 | 5 | 4 | 4 1 | |
| 1800 | 3 | 4 | 4 | 4 | 5 | 6 | 6 | 4 | 4 1 | |
| 1950 | 5 5 | 4 | 4 | 4 | 0 | / | / | 6 | 4 | |
| 2100 | 3 6 | 5 5 | 4 | 5 6 | 1 | 9 | 9 | 0 | | |
| 2250 | 0 | 2 8 | 6 | 0 | 9 | 0 8 | 10 | 11 | | |
| 2400 | 7 | 11 | 6 | 6 | 0 | 12 | 12 | 11 | - 1 | |
| 2330 | 7 Q | 12 | 6 | 0 0 | 10 | 14 | 12 | 12 | 4 1 | |
| 2850 | 10 | 12 | 7 | 0 9 | 15 | 14 | 15 | 14 | - 1 | |
| 3000 | 12 | 15 | 7 | 9 | 17 | 14 | 16 | 14 | - | |
| 3150 | 12 | | ' | 0 | 17 | 10 | 10 | | 4 1 | |
| 3300 | | | | | | | | | 4 1 | |
| 3450 | | | | | | | | | 4 1 | |
| 3600 | | | | | | | | | 4 1 | |
| 3750 | | | | | | | | | - | |
| 3900 | | | | | | | | | 1 | |
| 4050 | | | | | | | | | 1 | |
| 4200 | | | | | | | | | 1 | |
| 4350 | | | | | | | | | | |
| 4500 | | | | | | | | | | |
| 4650 | | | | | | | | | | |
| 4800 | | | | | | | | | | |
| 4950 | | | | | | | | | | |
| 5100 | | | | | | | | | | |
| 5250 | | | | | | | | | | |
| Remarks | | | | | | | | | General Information AS 1289 6.3.2 Drop height 510mm ± 5 Cone tip Blunt tip AS 1289 6.3.3 | |
| | | | | | | | | | Drop height 600mm ± 5 | |

Dynamic Cone Penetrometer Test Results

| Client: | SANDVIK MINING AND CONSTRUCTION |
|----------------|---------------------------------|
| Principal: | |
| Project: | PROPOSED INDUSTURIAL BUILDING |
| Location: | 431 MASONITE ROAD, HEATHERBRAE |
| | |
| Job No: | GEOTWARA21359AA |
| Date of Issue: | 25/06/2009 |

| Test proced | ure: | | | | Test | date: | Date of A | ctual Tes | st |
|-------------|------|-----|-----------|-----|------|--------|-----------|------------|--|
| Depth below | | Tes | t Numbers | | | | Readings | s recorded | in blows per 150mm |
| surface | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | Test location/Remarks |
| 150 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |
| 300 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | |
| 450 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | |
| 600 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 750 | 2 | 1 | 2 | 3 | 2 | 3 | 2 | 1 | 12,185 |
| 900 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 3 | |
| 1050 | 3 | 4 | 2 | 3 | 3 | 3 | 3 | 5 | - |
| 1200 | 4 | 3 | 3 | 5 | 4 | 6 | 6 | 4 | 4 |
| 1350 | 4 | 3 | 4 | 6 | 4 | / | 6 | 4 | 4 |
| 1500 | 6 | 2 | 5 | 9 | 5 | 5 | 5 | 3 | 4 |
| 1650 | 5 | 2 | 5 | (| 5 | 5 | 4 | 4 | - |
| 1800 | 4 | 3 | 6 | 8 | 5 | 4 | 4 | 3 | - |
| 1950 | 1 | 3 | / | 8 | 6 | 4 | 2 | 5 | - |
| 2100 | 6 | 3 | / | 10 | 8 | 6 | 2 | 6 | - |
| 2250 | 8 | 4 | 9 | 10 | 8 | 6 | 3 | 8 | - |
| 2400 | 9 | 3 | 9 | 14 | 10 | 5 | 4 | 12 | - |
| 2550 | 9 | 4 | 10 | 14 | 14 | 5 7 | 5 7 | 13 | - |
| 2700 | 14 | 4 | 10 | 14 | 14 | / 0 | 7 | 14 | - |
| 2000 | 14 | 5 | 12 | 10 | 10 | 0 | 12 | 14 | - 1 |
| 3150 | 10 | 6 | 13 | | | 9 | 12 | 10 | - 1 |
| 3300 | | 0 | | | | | | | - 1 |
| 3450 | | | | | | | | | - |
| 3600 | | | | | | | | | - |
| 3750 | | | | | | | | | - |
| 3900 | | | | | | | | | - |
| 4050 | | | | | | | | | - |
| 4200 | | | | | | | | | 1 |
| 4350 | | | | | | | | | - |
| 4500 | | | | | | | | | |
| 4650 | | | | | | | | | |
| 4800 | | | | | | | | | |
| 4950 | | | | | | | | | |
| 5100 | | | | | | | | | |
| 5250 | | | | | | | | | |
| Remarks | | | | | | | | | General Information |
| | | | | | | | | | AS 1289 6.3.2 Drop height 510mm ± 5 Cone tip Blunt tip AS 1289 6.3.3 |
| | | | | | | | | | Drop height 600mm ± 5 |

Dynamic Cone Penetrometer Test Results

| Client: | SANDVIK MINING AND CONSTRUCTION |
|----------------|---------------------------------|
| Principal: | |
| Project: | PROPOSED INDUSTURIAL BUILDING |
| Location: | 431 MASONITE ROAD, HEATHERBRAE |
| | |
| Job No: | GEOTWARA21359AA |
| Date of Issue: | 25/06/2009 |

| Test procedu | ure: | | | | Test | date: | Date of A | ctual Tes | st |
|--------------|------|------|---------|-----|------|-------|-----------|------------|-----------------------|
| Depth below | | Test | Numbers | | | | Readings | s recorded | in blows per 150mm |
| surface | 225 | 226 | 227 | 228 | 229 | 231 | 232 | 233 | Test location/Remarks |
| 150 | | | 1 | 3 | 1 | 0 | 4 | 5 | |
| 300 | 1 | | 2 | 4 | 4 | 0 | 6 | 8 | I AD |
| 450 | 2 | | 3 | 5 | 4 | 0 | 13 | 10 | |
| 600 | 2 | 2 | 2 | 4 | 4 | 5 | 17 | 11 | |
| 750 | 2 | 1 | 2 | 4 | 4 | 7 | 14 | 12 | +2,118 |
| 900 | 1 | 2 | 3 | 4 | 3 | 9 | 15 | 10 | |
| 1050 | 1 | 2 | 4 | 5 | 4 | 11 | 12 | 9 | c |
| 1200 | 1 | 2 | 5 | 3 | 3 | 10 | 7 | 7 | |
| 1350 | 2 | 2 | 4 | 4 | 3 | 10 | 8 | 6 | |
| 1500 | 3 | 6 | 5 | 5 | 3 | 8 | 10 | 6 | |
| 1650 | 3 | 6 | 4 | 4 | 4 | 8 | 9 | 8 | |
| 1800 | 3 | 8 | 5 | 3 | 3 | 9 | 10 | 10 | |
| 1950 | 3 | 7 | 5 | 5 | 5 | 7 | 11 | 10 | |
| 2100 | 3 | 8 | 5 | 5 | 5 | 8 | 14 | 13 | |
| 2250 | 4 | 8 | 8 | 5 | 5 | 9 | 15 | 11 | |
| 2400 | 8 | 10 | 8 | 6 | 9 | 8 | 16 | 13 | |
| 2550 | 8 | 9 | 8 | 7 | 8 | 7 | 18 | 13 | |
| 2700 | 10 | 11 | 11 | 8 | 9 | 10 | 17 | 14 | |
| 2850 | 17 | 14 | 13 | 9 | 8 | 10 | 18 | 16 | |
| 3000 | 20 | 16 | 15 | 9 | 7 | 11 | 20 | 19 | |
| 3150 | | | | | | 16 | | | _ |
| 3300 | | | | | | | | | _ |
| 3450 | | | | | | | | | - |
| 3600 | | | | | | | | | _ |
| 3750 | | | | | | | | | - |
| 3900 | | | | | | | | | - |
| 4050 | | | | | | | | | - |
| 4200 | | | | | | | | | _ |
| 4350 | | | | | | | | | - |
| 4500 | | | | | | | | | |
| 4650 | | | | | | | | | |
| 4800 | | | | | | | | | |
| 4950 | | | | | | | | | |
| 5100 | | | | | | | | | |
| Demorte | | | | | | | | | General Information |
| Remarks | | | | | | | | | AS 1289 6.3.2 |
| | | | | | | | | | Drop height 510mm ± 5 |
| | | | | | | | | | AS 1289 6.3.3 |

Dynamic Cone Penetrometer Test Results

| Client: | SANDVIK MINING AND CONSTRUCTION |
|----------------|---------------------------------|
| Principal: | |
| Project: | PROPOSED INDUSTURIAL BUILDING |
| Location: | 431 MASONITE ROAD, HEATHERBRAE |
| | |
| Job No: | GEOTWARA21359AA |
| Date of Issue: | 25/06/2009 |

| Test proced | ure: | | | | Test | date: | Date of Actual Test |
|-------------|------|------|---------|-----|------|-------|--|
| Depth below | | Test | Numbers | | | | Readings recorded in blows per 150mm |
| surface | 234 | 235 | 236 | 237 | 238 | 239 | Test location/Remarks |
| 150 | 1 | 8 | 2 | 1 | 5 | 4 | |
| 300 | 1 | 16 | 3 | 1 | 4 | 4 | |
| 450 | 5 | 18 | 4 | 1 | 5 | 5 | |
| 600 | 8 | 24 | 5 | 2 | 4 | 9 | |
| 750 | 10 | 22 | 5 | 2 | 5 | 9 | |
| 900 | 9 | 22 | 5 | 2 | 5 | 9 | |
| 1050 | 8 | 16 | 6 | 1 | 5 | 9 | |
| 1200 | 1 | 16 | 6 | 2 | 3 | 6 | |
| 1350 | 6 | 16 | 5 | 3 | 4 | 9 | |
| 1500 | / | 16 | 6 | 3 | 5 | 11 | |
| 1650 | / | 17 | 4 | 4 | 4 | 13 | |
| 1800 | / | 18 | 5 | 3 | 4 | 10 | |
| 1950 | 9 | 19 | 6 | 3 | 5 | 11 | |
| 2100 | 9 | 25 | 10 | 5 | 6 | 12 | |
| 2250 | 10 | | 12 | 6 | 5 | 12 | |
| 2400 | 13 | | 11 | 0 | 8 | 12 | |
| 2550 | 13 | | 13 | 8 | / | 13 | |
| 2700 | 12 | | 12 | 9 | 8 | 16 | |
| 2850 | 15 | | 12 | 10 | 9 | 24 | |
| 3000 | 15 | | 17 | 10 | 12 | | |
| 3150 | | | | | | | |
| 3300 | | | | | | | |
| 3450 | | | | | | | |
| 3600 | | | | | | | |
| 3750 | | | | | | | |
| 3900 | | | | | | | |
| 4050 | | | | | | | |
| 4200 | | | | | | | |
| 4350 | | | | | | | |
| 4500 | | | | | | | |
| 4050 | | | | | | | |
| 4800 | | | | | | | |
| 4950 | | | | | | | |
| 5250 | | | | | | | |
| Bemerke | | | | | | | General Information |
| Reliidiks | | | | | | | AS 1289 6.3.2 Drop height 510mm ± 5 Cone tip AS 1289 6.3.3 Drop height 600mm ± 5 |
| | | | | | | | |
Appendix B

Results of Laboratory Tests

Form Number:Warabrook 149;Issue 2.0 job no: INFOWAR000362AA Additional comments sheet 1 of 3 d. No Reaction c. Vigorous effervescent reaction PH Change (ie PHr-PHrox) oxidation in 30% hydrogen peroxide) Colour 1.50 1.63 1.52 1.44 1.43 1.83 1.70 1.24 1.00 1.39 23/06/09 24 June 2009 change during reaction 19.2°C Newcastle N 2 R N Ī Z Ī Ī RFK b. Slight to moderate effervescence hydrogen peroxide temperature prior to use: Newcastle Odour Z 2 Z 2 2 Ī 2 Z R date of calibration: test location: **Coffey information** SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS checked by: Effervescence (see note below) tested by: office: date: m 00 00 4 00 4 00 4 4 4 pH meter used/serial no: HORIBA D-24 GEOTWARA21359AA – Proposed Industrial Site 20.04 21.2 21.0 (°C) 21.2 21.3 21.4 20.4 21.1 21.1 21.1 4.48 4.05 4.41 4.37 4.43 4.41 4.72 4.57 4.90 4.97 a. No visible effervescence Hd Xor acid sulfate soil screening test Sandvik Mining and Construction time (mins) 10 10 10 10 10 10 10 10 10 2 Coffey Geotechnics Pty Ltd PH in 1:5 distilled water 6.33 6.18 5.76 6.35 6.09 6.26 5.29 5.41 5.91 6.41 Heatherbrae, NSW RL soil description **Clayey SAND** Silty SAND SAND SAND SAND SAND SAND SAND SAND SAND 4.71 1. Observed Reaction: 2. Strong Odour: hydrogen peroxide pH prior to use: date samples recovered: BH200 2.9-3.0 BH201 1.9-2.0 BH204 1.5-1.6 BH205 0.9-1.0 BH205 1.9-2.0 BH232 1.3 - 1.4 BH238 1.0-1.1 BH239 2.0 - 2.1 BH220 2.6-2.7 BH203 1.0-1.1 depth (m) principal: sample project: location: NOTES: client:

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|--------------------|--------------|------------|----------------------------|---------------------------------|----------------|-----------|----------|-----------------------------------|------------|--|-----------------------------|----------------------------|---|
| 5 | | Ň | SPECIALI | STS IN S(| CIENTI | FIC TE | STING | SOLUTIONS | | | | sheet 2 of 3 | |
| acid | sulfa | ate s | soil scree | sning | tes | ÷ | | office: | lewcastle | | | | |
| client: | | Coffe | y Geotechnics | s Pty Lto | F | | | date: | 24 JI | une 2009 | | | |
| principal: | | Sand | vik Mining and | d Consti | ructio | 6 | | test location: | New | castle | | | |
| project: | | GE01 | WARA21359AA | A – Propo | n pased in | dustri | al Site | tested by: | RFK | - | | | |
| location: | | Heath | herbrae, NSW | | | | | checked by: | T | AT A | | | |
| date sam | ples recove | sred: | Hq | meter used | /serial no | Р. | RIBA D- | 24 date of calibr | ation: | 23/06/09 | | | |
| hydroger | h peroxide p | H prior to |) use: 4.71 | | | hydroge | n peroxi | de temperature pri | or to use: | 19.2°C | | | |
| | | | | Å | | | | | oxidation | PHFOX in 30% hydroi | gen peroxide) | | - |
| sample location | depth (m) | (mAHD) | soil description | pH in 1:5 distilled water | time (mins) | pH Fox | (°C) | Effervescence (see note below) | Odour | Colour change during reaction | PH Change (ie PHr-PHFox) | Additional comments | |
| BH212 | 2.0-2.1 | | SAND | 5.09 | 10 | 3.98 | 18.9 | A | Nil | IIN | 1.11 | | |
| BH234 | 1.1 - 1.3 | | SAND | 5.96 | 10 | 4.61 | 18.1 | A | IIN | IIN | 1.35 | | |
| BH210 | 1.9-2.0 | | SAND | 5.42 | 10 | 4.64 | 18.3 | A | IIN | IIN | 0.46 | | - |
| BH237 | 2.1 - 2.2 | | SAND | 5.99 | 10 | 4.85 | 18.2 | A | IIN | Nil | 1.14 | | |
| BH237 | 1.5-1.6 | | Silty SAND | 5.12 | 10 | 4.30 | 18.6 | 8 | III | IIN | 0.82 | | - |
| BH214 | 2.5 - 2.6 | | SAND | 5.48 | 10 | 4.71 | 18.5 | A | IIN | III | 0.77 | | - |
| BH229 | 2.0-2.5 | | SAND | 6.19 | 10 | 4.73 | 18.7 | A | IIN | III | 1.46 | | - |
| BH222 | 1.9-2.0 | | SAND | 5.37 | 10 | 4.47 | 18.9 | A | IIN | Nil | 06.0 | | - |
| BH209 | 2.5 - 2.6 | | SAND | 6.20 | 10 | 4.62 | 18.8 | A | Nil | III | 1.58 | | - |
| BH224 | 1.0-1.1 | | Silty SAND | 5.90 | 10 | 4.60 | 19.0 | A | Nil | Nil | 1.30 | | |
| BH216 | 1.0-1.1 | | SAND | 6.00 | 10 | 4.57 | 19.2 | ¥ | IIN | III | 1.43 | | - |
| NOTES: | -101 | . Observ | red Reaction: a. Odour: | . No visible | efferves | sence | b. Slig | ght to moderate effe | ervescence | c. Vigoroi | us effervescent react | ion d. No Reaction | - |
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Form Number:Warabrook 149; Issue 2.0 job no: INFOWAR000362AA Additional comments sheet 3 of 3 d. No Reaction c. Vigorous effervescent reaction
 PMFox

 (oxidation in 30% hydrogen peroxide)

 Colour
 Colour

 Change
 PH Change

 Adving
 (ie PH-PH-ox)
1.48 23/06/09 24 June 2009 19.2°C Newcastle Ī RFK b. Slight to moderate effervescence hydrogen peroxide temperature prior to use: Newcastle R date of calibration: test location: **coffey Precidentian** SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS checked by: Effervescence (see note below) tested by: office: date: • pH meter used/serial no: HORIBA D-24 GEOTWARA21359AA – Proposed Industrial Site (°C) 19.0 4.77 a. No visible effervescence Hd acid sulfate soil screening test Sandvik Mining and Construction time (mins) 10 Coffey Geotechnics Pty Ltd RL soil description pH in 1:5 (mAHD) water water 6.25 Heatherbrae, NSW Clayey SAND 1. Observed Reaction: 2. Strong Odour: 4.71 hydrogen peroxide pH prior to use: date samples recovered: BH202 0.9-1.0 depth (m) principal: sample location: project: NOTES: client:

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