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Goodman International Ltd

Huntingwood West - Bungaribee Estate Huntingwood

Report on Geotechnical Assessment

October 2009

GHD GEOTECHNICS

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30 October 2009

Goodman International Ltd
Level 10, 60 Castlereagh Street
Sydney NSW 2000

Our ref: 21/17871/00/AZ035 Rev1.doc

Attn: Brendon Quinn

Dear Brendon,

Huntingwood West - Bungaribee Estate Huntingwood
Report on Geotechnical Assessment

This report presents the results of a geotechnical investigation undertaken by GHD Geotechnics at the above site. We understand that the site is to be developed for light industrial / commercial use.

The report contains the factual results of the field investigations and laboratory testing, together with comments and recommendations on earthworks, batter stability, foundation conditions, pavement subgrade and construction considerations.

The concurrent Contamination and Salinity Assessments are issued under separate cover.

The findings of the geotechnical assessment indicate that there do not appear to be any major underlying geotechnical issues that would prevent development of the site.

We trust this report is satisfactory for your current needs. Please contact either of the undersigned should you have any questions in regard to this report or require further assistance with this project.

Yours faithfully
GHD Geotechnics

pp

Roberta Lamont
Principal Geotechnical Engineer

Tony Colenbrander
Group Manager, Geotechnics and Dams

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Contents

Figures

Appendices

1. Introduction

1.1 General

This report presents the results of a geotechnical investigation undertaken by GHD Geotechnics (GHD) for the proposed Bungaribee Estate development.

The proposed development site is located in Huntingwood West, bounded to the north by the Great Western Highway, to the east by Brabham Drive, to the south by the M4 Motorway and to the west by Eastern Creek.

The investigation was undertaken in accordance with our proposal submitted to Goodman on 4 August 2008 (reference AY783).

We understand that the project will involve

- Earthworks on the Stage 1 (Southern) Site, expected to comprise up to 9 m in cut and 8 m in fill;
- Earthworks on the Stage 2 (Northern) Site, expected to comprise 3 m in cut and 3 m in fill;
- Formation of cut and embankment slopes;
- Construction platforms for future industrial development (ie footings, etc);
- An internal road network; and
- New intersections at the Great Western Highway and Brabham Road.

1.2 Scope of Work

The objectives of the geotechnical investigation were to:

- Assess subsurface conditions, including an assessment of moisture, groundwater and soil aggressivity;
- Discuss excavatability of subsurface materials;
- Assess the foundation conditions for the proposed pads and warehouse structures;
- Discuss footing options;
- Assess subgrade strength of subsurface materials;
- Provide general comments relating to stability of cut and embankment slopes; and
- Consider possible construction constraints.

1.3 Limitations

This report has been prepared for the use of Goodman International Ltd in relation to the proposed development of Bungaribee Estate – Huntingwood West, and takes account of information provided to us. Changes to project scope may require review and revision of the recommendations provided herein.

This report should be read in conjunction with the attached General Notes.

2. Site Setting

2.1 Description

The site is located on the southern side of the Great Western Highway, Huntingwood, and comprises 56 ha of land known as Huntingwood West – Bungaribee Industrial Estate (refer to Figure 1). The site can be sub-divided into two areas: Stage 1 (Southern Site and Estate Rd) and Stage 2 (Northern Site).

Topographically, the site comprises a gently undulating 'upland' region for the most part, with a narrow region along the western boundary, which is relatively flat where it joins the 'floodplain' of Eastern Creek.

Plate 1 – View from upland section of site to the flatter section in the west

Plate 2 – View of flatter, 'floodplain' area in western part of site

The site generally slopes and drains toward the west. Drainage lines were observed in the areas of the 'gullies' indicated by topographic information. The northeastern part of the site contains a drainage channel, which begins as a stormwater culvert from Brabham Drive and drains to the west. We understand that this drainage line then turns toward the north, which is supported by topographical survey information.

Plate 3 – View of reed-filled drainage channel on eastern boundary

The northeastern part of the site was observed to be marshy and contains standing water in places. Vehicular access to these areas, even with a backhoe, was not possible.

Plate 4 – View of marshy area in north east of site

Some paddocks showed minor excavations (furrow and/or drainage lines) and there were several small dams, used for livestock watering, located towards the centre of the site.

Plate 5 – View of farm dam in centre of site

Remnants of a former racing/training track are bisected by the western site boundary.

Fill and dumped material were found to exist in several localised areas throughout the site. Some of these materials were visually observed to comprise clay, gravels, and demolition rubble. There were also some tyres present. It should be noted that, during the period of the fieldworks, illegal dumping was observed being undertaken.

Plate 6 – Example of fill material

Vegetation generally comprises grass cover, with some sections containing medium-sized trees. There is a greater concentration of trees in the eastern portion of the site.

2.2 Regional Geology

Reference to the 1:100,000 scale Geological Series Sheet for Penrith (sheet 9030) indicates that most of the site is underlain by Bringelly Shale of the Wianamatta Group, which comprises

shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff. The western boundary of the site is underlain by quaternary alluvium comprising fine-grained sands, silts and clays (refer to Figure 2).

2.3 Soil Landscape

Reference to the 1:100,000 scale Soil Landscape Series Sheet for Penrith (sheet 9030) indicates that the site lies within the residual soil landscape of the Blacktown Formation (refer to Figure 3).

Landscapes comprise gently undulating rises on Wianamatta Group shales, with local relief to 30 m. Slopes are usually of <5% grade. The landscape comprises broad rounded crests and ridges with gently inclined slopes. Vegetation comprises cleared eucalypt woodland and tall open forest (dry sclerophyll forest).

Soils comprise shallow to moderately deep (<1m) hard-setting mottled texture contrast soils, red and brown podsolic soils on crests grading to yellow podsolic soils on lower slopes and in drainage lines.

Clay soils were observed to be exposed in a small cutting on the site and showed evidence of shrinkage cracking (refer to Plate 7).

Plate 7 – Cutting exposure of clay soils indicating shrinkage cracking

3. Site Investigation

3.1 Desktop Study

A desktop study was conducted, including the collation of relevant geotechnical and engineering geological information for the site obtained from published sources and previous investigations.

Information from published sources included aerial photographs and regional geology and soil landscape maps. This information has been detailed in Section 2 'Site Setting' and was used to plan the fieldwork.

The previous investigation reports that were provided to us are listed below:

- "Report on Phase 1 Environmental Site Assessment, Parcel 4 West Huntingwood, Western Sydney Parklands", prepared for Landcom, Douglas Partners, January 2006 (Ref 40465-2).
- "Report on Phase 2 Environmental Site Assessment, Land Capability Study - West Huntingwood", prepared for Landcom and Department of Planning, Douglas Partners, September 2006 (Ref 40465A), contained within the supporting documents to the Concept Plan.
- Working Paper – Huntingwood West Geotechnical, SKM, 13 April 2007.
- Environmental Assessment - Volume 2, Employment Lands (Huntingwood West) for Landcom, The Planning Group (NSW) Pty Ltd, 18 September 2006.

The previous reports by others were prepared for the purposes of due diligence and contamination assessment, so were of limited use for the current geotechnical investigation. They were, however, reviewed as part of the GHD Contamination Assessment (reported under separate cover).

The "Report on Phase 2 Environmental Site Assessment, Land Capability Study - West Huntingwood", prepared for Landcom and Department of Planning, Douglas Partners, September 2006 (Ref 40465A) provided a general indication of the subsurface profile as being stiff to very stiff residual clay, overlying, at an average depth of 2 m, low grading to medium strength shale. No free groundwater was observed in the test pits.

The test pit logs described the material type and colour encountered but did not contain any strength, plasticity or secondary constituent information. This supported the information on regional geology and soil landscapes reviewed as part of the desktop study.

3.2 Safety

In accordance with standard GHD procedure, a Job Safety and Environment Analysis (JSEA) was prepared for site work. A project safety briefing of all site personnel was completed prior to the commencement of the field investigations.

3.3 Site Walkover

A Principal Geotechnical Engineer of this firm conducted a walkover and mapping visit of the site, observing features such as watercourses, erosion, vegetation (possibly indicating changes

in nature of subsurface material), boggy ground, etc. The existing fill mounds were visually observed to determine if the material is uncontrolled (i.e. presence of waste products, large boulders, etc.).

The findings of the site walkover are included in Section 2 'Site Setting' and Section 4 'Results of Site Investigation'.

3.4 Services

Prior to the investigation, a Dial-Before-You-Dig services search was conducted, and underground service plans were obtained and reviewed. The test locations were set out using hand-held GPS, with reference to these plans, in areas well away from underground services. Each test location was then scanned by a services locator subcontractor to clear the area for underground services prior to the commencement of drilling or excavation.

3.5 Subsurface Investigation

The purpose of the subsurface investigation was to provide a broad coverage of geotechnical information. The specific locations of test sites were determined with this aim in mind and with consideration of accessible areas, following the site walkover.

3.5.1 Borehole Investigation

A total of 9 boreholes were drilled, as follows:

- Stage 1 (Southern):
  - 2 boreholes to 6 m depth (BH01, BH04);
  - 4 boreholes to 10 m depth (BH02, BH03, BH05, BH06) in areas of proposed deeper cut;
  - Standpipe piezometers were installed in three of the boreholes (BH01, BH04, BH06).
- Stage 2 (Northern):
  - 3 boreholes to 6 m depth (BH07, BH08, BH09);
  - Standpipe piezometers were installed in two of the boreholes (BH07, BH09).

Drilling was conducted using a truck-mounted Scout drilling rig. Boreholes were advanced using solid flight augers fitted with a V-bit to auger refusal, followed by continuous core sampling of bedrock to target depths in all boreholes.

Standard penetration tests (SPT's) were conducted at regular (typically 1.5 m) intervals during drilling in addition to the collection of disturbed auger samples for visual / tactile assessment.

Point-load testing of core samples was conducted at regular (typically 1m) intervals.

An experienced Geotechnical Engineer from GHD supervised the borehole drilling, logged the encountered profile, boxed and photographed recovered core, obtained representative samples and directed piezometer installation.

The borehole logs are included in Appendix A. These should be read in conjunction with the attached Standard Sheets that explain the terms, abbreviations and symbols used, together with the interpretation and limitations of the logging procedures.

3.5.2 Test Pit Investigation

A total of 13 test pits in Stage 1 and 14 test pits in Stage 2 were excavated. Two of the test pits proposed for the northeastern area of Stage 2 had to be abandoned due to the inability to access the area with a backhoe due to boggy conditions.

The test pits will be advanced using a rubber-tyred CAT 428C backhoe, fitted with a 600 mm wide toothed bucket, to depths of 1.8-2.6 m (where bucket refusal was obtained) or to maximum depths of 3.2 m. Following completion, the test pits were backfilled with excavated spoil and nominally compacted by traversing the backfilled test pit with the backhoe's pneumatic tyres and tamping with the backhoe bucket during backfilling.

Insitu Dynamic Cone Penetrometer (DCP) tests were also undertaken at some of the test pit locations to provide additional information of the strength/consistency of the subsurface materials.

All test pit excavations were supervised full-time by an experienced Geotechnical Engineer, who conducted representative sampling, logged the excavated test pit profiles and obtained representative disturbed and bulk samples.

The test pit logs are included in Appendix B. These should be read in conjunction with the attached Standard Sheets that explain the terms, abbreviations and symbols used, together with the interpretation and limitations of the logging procedures. The DCP test results are included in Appendix C.

3.6 Laboratory Testing

Samples of soil and rock collected in the field were submitted to our NATA-accredited laboratory for geotechnical classification, compaction and strength testing. Limited testing was also conducted on samples collected from the fill bund. The testing undertaken comprised:

- Field Moisture Content (FMC) to assess in-situ moisture content (40 tests);
- Atterberg Limit and Linear Shrinkage tests to assess soil plasticity and confirm the soil descriptions obtained in the field (20 tests);
- Particle Size Distribution (8 tests);
- Emerson Class Number tests to assess potential dispersive soil characteristics (20 tests);
- Compaction (8 tests) and California Bearing Ratio (CBR) for subgrade assessment (5 tests);
- Point load testing of rock core samples (21 tests).

The laboratory test reports are included in Appendix D and should be read in conjunction with the standard sheets, which explain the limitations of the testing undertaken.

4. Results of Investigation

As described in Section 2, the site can be topographically divided into an 'upland' region, for the most part, and a 'floodplain' region along the western boundary of the site. The results of the investigation are described separately herein for these two areas of the site. Discussion of groundwater encountered is also provided.

4.1 'Upland' Region Subsurface Conditions

This section refers to the subsurface conditions of the majority 'upland' region, represented by test locations (BH01-06 and BH08-09 and TP11-12, TP14-16, TP18-19, TP21-31 and TP33-38).

The following sections provide a summary description of the subsurface units encountered. Reference should be made to the individual borehole and test pit logs in conjunction with the standard sheets for detailed subsurface description. Refer to Figure 1 – Test Location Plan.

Groundwater conditions for the site (both 'upland' and 'floodplain' regions) are reported in Section 4.3 'Groundwater'.

4.1.1 Topsoil

Topsoil was present at the majority of test locations, generally extending to depths of 0.1-0.50 m. The topsoil comprised brown and dark brown, low plasticity, clayey sand, sandy clay, clay, silty sand and sandy silt with a trace of gravel and sand. The topsoil ranged from slightly moist to very moist.

4.1.2 Fill

Fill was encountered at TP19, TP22, TP27, TP36, BH01, BH05 and BH08 to depths of 0.1-0.45 m. The fill was often located immediately below, or mixed with, topsoils and comprised brown, silty sand with gravel, sandy gravel, sandy clay or sand. Some fragments of tiles, ash, brick and concrete were noted. The fill was generally moist.

It is inferred that these relatively thin layers of fill occur in the vicinity of former development and in lower-lying areas of the upland region and are likely to be the results of localised levelling works to support the former development.

Some localised stockpiles of fill were also encountered in this region, as described in Section 2 'Site Setting'.

4.1.3 Alluvium/Colluvium

The alluvium/colluvium was quite widespread in this region and extended generally to depths of 0.35-1.0 m. However, colluvial materials were encountered to 1.4 m depth in TP22.

These materials generally comprised red brown, orange brown, light grey and brown, medium to high plasticity clay and sandy clay with a trace of sand and gravel. Some very high plasticity colluvial clays were identified from the laboratory testing. The laboratory testing for linear

shrinkage also indicated that the materials subjected to moisture content changes will be prone to shrink/swell movements.

Laboratory testing indicated that the alluvium/colluvium is moderately dispersive.

The materials ranged from soft to very stiff in consistency and were moist (generally 4% wet of optimum moisture content and plastic limit). This reflects prevailing wet conditions prior to, and during, the investigation.

Alluvial/colluvial materials were encountered in the majority of test locations and consist of materials similar to the residual soils and bedrock at the site, indicating short travel distance for these deposits. It is inferred that they have resulted from localised weathering and transport of residual soils and rock from other parts of the 'upland' region into drainage lines, or as slopewash, over time. The deeper profile of colluvial materials in TP22 is consistent with a deeper slopewash deposit at this junction between the 'upland' region and the 'floodplain'.

4.1.4 Residual

Residual soils were encountered at all test locations, extending to depths of auger refusal at 0.9-4.89 m. The residual soils typically comprise orange brown, red brown, light grey, light brown, medium to high plasticity clay and sandy clay with a trace of sand and gravel. There were some occurrences of clayey sands in a minority of test locations. Some very high plasticity residual clays were identified from the laboratory testing. The laboratory testing for linear shrinkage also indicated that the materials subjected to moisture content changes will be prone to shrink/swell movements.

Laboratory testing indicates that these materials vary in terms of dispersive potential, from moderately dispersive to non-dispersive due to the presence of gypsum and carbonate.

Soft residual soils were encountered in a limited number of test locations to depths of 0.2-1.0 m. The majority of residual soils were firm to depths of 0.6-3.0 m and stiff to very stiff thereafter.

The residual soils above the water table were generally moist and were approximately 3% wet of optimum moisture content and the plastic limit of the materials.

The soils contain ironstone gravel. A gradational transition into extremely to highly weathered bedrock was observed at some test locations.

4.1.5 Bedrock

The bedrock generally comprised shale and siltstone, although fine to medium grained sandstone was encountered at a number of locations, which is consistent with Bringelly Shale deposits.

The boreholes encountered grey, extremely to highly weathered, extremely low strength shale and siltstone/shale to 3.6-5.0 m depth. The test pits encountered the same type materials, however, backhoe refusal was encountered as shallow as at 2.0-3.1 m.

Underlying the extremely low strength rocks are grey and light brown, highly weathered, very low strength shale, shale/siltstone and siltstone/sandstone to depths of 4.6-9.3 m, overlying dark grey and grey, moderately to highly weathered, low strength shale and siltstone to depths of borehole termination at 6.0 m and 10.0-10.1 m, respectively.

Sandstone was encountered at the following locations:

- TP24 - light grey, extremely to highly weathered, extremely to very low strength sandstone at 1.3 m depth to test pit completion at 2.2 m.
- BH01 - light brown, extremely weathered, extremely low strength, fine to medium grained sandstone from 4.9-5.0 m depth, over light brown, highly weathered, very low to low strength sandstone to borehole termination at 6.0 m depth.
- BH06 - a 900 mm thick band of brown and grey fine grained, highly to moderately weathered, low to medium strength sandstone was encountered at 6.2 m depth.

4.1.6 Laboratory Testing

Results of the geotechnical laboratory testing for materials within the 'upland' region of the site are summarised in Table 1.

Table 1 Summary of geotechnical laboratory testing for "upland" region.

Test Location	Depth (m)	Sample Type	FMC (%)	PL (%)	LL (%)	PI	LS (%)	PSD	ECN	OMC (%)	MDD (t/m^3)	CBR (%)
Fill materials												
TP22	0.25-0.4	D	9.3					30/22/48				
TP27	0.2-0.4	D	8.6									
Alluvial/Colluvial soils												
TP11	0.4-0.6	D	26	22	67	45	16.5		2(m)			
TP14	0.5-0.7	D	25.2	23	68	45	17.0		2(m)			
TP15	0.3-0.5	D	20.8					78/17/5				
TP15	0.6-0.8	D	22.6	20	58	38	16.0					
TP21	0.3-0.5	D	25.1	20	64	44	16.5		2(m)			
TP22	0.9-1.1	D	30.9	23	91	68	22.0		2(m)			
TP23	0.3.0.5	B	21.3									
TP24	0.6-0.7	B	24.8	19	75	56	17.5					
TP27	0.6-0.8	D	27.5									
TP33	0.2-0.4	D	20.3									
TP33	0.5-0.6	D	13.7					46/3/51				
TP34	0.3-0.5	D	25.3	18	61	43	16.5		2(m)			
TP35	0.3-0.45	D	19.1									

Test Location	Depth (m)	Sample Type	FMC (%)	PL (%)	LL (%)	PI	LS (%)	PSD	ECN	OMC (%)	MDD (t/m^3)	CBR (%)
TP35	0.5-0.7	D	22.5									
TP37	0.5-0.7	B	25.1							20.5	1.68	
TP38	0.5-08	B	26.9							24.3	1.57	2.0
Residual soils												
BH01	0.5	SPT							2(s)			
BH06	0.5								4			
BH09	1.5	SPT							2(s)			
TP11	1.1-1.3	B	19.7									
TP12	0.8-0.9	B	18.9							16.6	1.85	4.5
TP12	1.9-2.0	B	22.7	16	53	37	16.0		2(m)			
TP15	1.4-1.6	B	23.1							18.8	1.70	
TP16	0.8-1.0	B	21.4	19	53	34	16.0					
TP18	0.6-0.7	B	21.2	16	50	34	16.5		3(m)	16.8	1.73	
TP23	2.4-2.6	B	15.1	24	58	34	13.5					
TP24	1.0-1.2	D	16.2	16	50	34	15.5		3(m)			
TP25	2.0-2.2	B	18.8					65/25/10				
TP26	0.5-0.6	B	24.5							20.2	1.71	2.0
TP26	1.0-1.2	D	25.5	21	75	54	17.5		2(s)			
TP28	0.5-0.7	D	25.7	18	59	41	18		3(m)			

Test Location	Depth (m)	Sample Type	FMC (%)	PL (%)	LL (%)	PI	LS (%)	PSD	ECN	OMC (%)	MDD (t/m^3)	CBR (%)
TP29	0.4-0.6	D	18.6	23	66	43	16.0		3(s)			
TP29	0.7-0.9	D	19.7	20	58	38	15.0		2(m)			
TP34	0.6-0.7	D	25.6	19	70	51	15.0		2(m)			
TP36	0.5-0.6	D	17.5									
TP37	1.0-1.2	D	19.0	14	42	28	14.5					
TP38	1.4-1.5	B	15.6	12	44	32	11.5		2(m)			
Bedrock												
TP19	1.8-1.9	B	8.1							12.8	1.92	8.0
TP36	1.5-1.6	D	11.4									

Legend:

FMC – Field Moisture Content

PL – Plastic Limit

LL – Liquid Limit

PI – Plastic Index

LS – Linear Shrinkage

PSD – Particle Size Distribution (% clay & silt / % sand / % gravel)

ECN – Emerson Class Number

OMC – Optimum Moisture Content

MDD – Maximum Dry Density

CBR – California Bearing Ratio

4.2 'Floodplain' Region Subsurface Conditions

This section refers to the subsurface conditions of the 'floodplain' region, represented by test locations (BH07 and TP10, TP17, TP20, TP32).

The following provides a summary description of the subsurface units encountered. Reference should be made to the individual borehole and test pit logs in conjunction with the standard sheets for detailed subsurface description. Refer to Figure 1 – Test Location Plan.

Groundwater conditions for the site (both 'upland' and 'floodplain' regions) are reported in Section 4.3 'Groundwater'.

4.2.1 Topsoil

Topsoil was present at all test locations, generally extending to depths of 0.15-0.4 m. The topsoil comprised dark brown, generally silty sand but included sandy silt, sandy clay and clayey sand. The topsoil was generally moist.

4.2.2 Alluvium

The alluvial materials were quite variable and comprised light brown, grey mottled and light brown, low to high plasticity clay and medium dense clayey sand, with a trace of sand and gravel. The materials extended to depths of 0.8-2.6 m and generally overlie residual soils. The firm alluvial clays were encountered to depths of 0.8-1.5 m, with stiff to very stiff clays thereafter.

The materials above the water table were generally moist. The alluvial materials have been found to be moderately to completely dispersive.

It is inferred that these materials occur within the western, flatter, Eastern Creek 'floodplain' region of the site.

4.2.3 Residual

Residual soils were encountered at most test locations, extending to depths of 1.7-4.17 m. The residual soils typically comprise brown, red brown, light brown, grey mottled, stiff to hard, low to high plasticity, sandy clay or clay and medium dense to dense clayey sand. The residual soils above the water table were generally moist.

The soils contain ironstone bands and gravel. A gradational transition into extremely weathered bedrock was observed at some test locations.

4.2.4 Bedrock

The bedrock comprised grey and brown, extremely to highly weathered, very low strength sandstone. The sandstone was encountered to depths of test pit termination at depths of 1.8-2.2 m and to BH07 termination at 6.0 m.

4.2.5 Laboratory Testing

Results of the geotechnical laboratory testing for materials within the 'floodplain' region of the site are summarised in Table 2.

Table 2 Summary of geotechnical laboratory testing for "floodplain" region.

Test Location	Depth (m)	Sample Type	FMC (%)	PL (%)	LL (%)	PI	LS (%)	PSD	ECN	OMC (%)	MDD (t/m^3)	CBR (%)
Alluvial soils												
BH07	0.5	SPT							1			
TP13	0.4-0.5	D	22.5									
TP17	0.5-0.7	D	17.7					97/3/0				
TP20	0.4-0.5	B	21.2									
TP20	0.6-0.8	D	23.4	18	60	42	19		2(m)			
TP32	0.5-0.7	B	9.6							17.4	1.73	1.5
Residual soils												
TP13	1.5-1.7	D	13.4									
TP32	1.5-1.7	B	17.6					77/23/0				

Legend:

FMC – Field Moisture Content
PL – Plastic Limit
LL – Liquid Limit
PI – Plastic Index
LS – Linear Shrinkage
PSD – Particle Size Distribution (% clay & silt / % sand / % gravel)
ECN – Emerson Class Number
OMC – Optimum Moisture Content
MDD – Maximum Dry Density
CBR – California Bearing Ratio

4.3 Groundwater

No groundwater seepage was observed during auger drilling or excavation of test pits in the 'upland' region. In addition, the standpipe piezometers installed at BH04, BH06 and BH09 were observed to be dry when measured for groundwater depth during the drilling investigation period.

The piezometer at BH06 was sampled as part of the Salinity Assessment. The water level measurement, taken in November 2008, was 3.2 m depth.

Groundwater seepage was observed in TP17 at 1.8 m depth and TP32 at 2.0 m depth.

The piezometers installed at BH01 and BH07 were measured for groundwater depth during the drilling investigation period. Groundwater was encountered at depths of 4.0 m and 4.3 m, respectively.

5. Engineering Discussion

5.1 General

The proposed development requires cut to fill earthworks for the development of foundation pads. We understand at this stage, that there may be 9 m of cut and 8 m of fill for Stage 1 (Southern). There may be 3 m of cut and 3 m of fill for Stage 2 (Northern). We note that the proposed earthworks levels are preliminary.

There will also be a new internal road network (refer Figure 1 – Test Location Plan) and new intersections at the Great Western Highway and Brabham Road.

5.2 Earthworks

5.2.1 Site Preparation

The topsoil materials present on site are organic and were moist at the time of the investigation. They are unsuitable as foundation materials and should be removed from fill areas. Topsoil is also unsuitable for reuse as general fill. The topsoil should be separately stockpiled for later use for landscaping purposes, subject to remediation (if required) and landscaping assessment.

The northeastern part of the site, in the vicinity of proposed test pits TP30 and TP31, was unable to be accessed due to boggy ground conditions at the time of investigation. There are also a number of farm dams/channels in the centre of the site that contain water, vegetation and (potentially) saturated soft soils. Organic and soft soils are unsuitable as foundation materials and should be removed from fill areas. Organic materials are also unsuitable for reuse as general fill. Saturated, soft soils may be suitable for reuse as fill, subject to being allowed to dry out.

The uncontrolled fill materials and uncontrolled fill stockpiles present on site generally comprise clay, gravels, sands, demolition rubble and foreign objects (ie. tyres). Fill materials are unsuitable as foundation materials and should be removed from fill areas. The uncontrolled fill materials may be suitable for reuse as fill, subject to separate stockpiling, removal of foreign objects, remediation (if required) and assessment for suitability.

Given the high plasticity of the in-situ materials, site accessibility for earthmoving plant and other vehicles may be limited following rainfall periods. Adequate earthworks protection, including temporary drainage measures, should be provided during construction.

5.2.2 Excavatability of Cut Materials

Cut materials will be sourced form the 'upland' regions of Stage 1 and Stage 2.

In the 'upland' region of Stage 1, cut excavations are likely to encounter limited alluvium/colluvium, residual soils and extremely weathered (Class V) rock to an average depth of around 3 m. Underlying these materials is generally very low strength (Class IV) shale and siltstone, overlying low strength (Class III) shale and siltstone. The Class III shale and siltstone were encountered at an average depth of about 6.5 m.

In the 'upland' region of Stage 2, cut excavations are likely to encounter limited alluvium/colluvium, residual soils and extremely weathered (Class V) rock to an average depth of around 3 m, which is the proposed cut depth.

It is considered that the excavation of colluvial, residual and alluvial soils and extremely weathered rock can be accomplished using conventional earthmoving equipment without difficulty. Highly to moderately weathered rock materials are considered rippable using conventional earthmoving equipment fitted with ripping tynes to the currently proposed excavation levels. Deeper excavation of the moderately weathered Class III rock material (ie, below an average 6.5 m depth) may require the use of rock breakers (hydraulic hammers), though the laminated nature of these materials is often suitable for ripping.

5.2.3 Fill Material Suitability

It is envisaged that fill materials will include soils of colluvial, residual and shale/siltstone bedrock origin. The shale/siltstone bedrock will likely vary in terms of strength and weathering, according to the depth of cut from which it is obtained.

General requirements of suitable materials for use during construction are that they are free from unsuitable or organic materials and the anticipated cut materials meet these requirements.

Laboratory test results indicate that the soils within the site possess CBR strengths of 2.0% to 4.5%, with samples sourced from the weathered bedrock having a CBR strength of 8%. However, shale breaks down over time so this high CBR value should not be adopted for pavement design purposes. The soils are highly reactive, as demonstrated by the swelling behaviour during soaking in preparation of CBR testing and the results of Atterberg limits testing. Thus, the fill material for the site will be moisture sensitive. That is, it will be prone to swelling on wetting up and shrinkage on drying. From the limited compaction testing undertaken, the naturally occurring materials were approximately 3% wet of optimum moisture content.

Given the reactive / dispersive nature and low CBR strength of the fill materials proposed, lime modification of the upper zone of formation is recommended in addition to applying moisture controls of between -3% to +1% of OMC and compaction controls of 98% to 102% of standard compaction. Lime stabilisation will reduce dispersive erosion, increase soil strength and reduce its moisture sensitivity. Whilst no trials of lime modification have been undertaken, a dosage rate of 2% lime by dry mass for the upper 300 mm of formation is considered appropriate, based on experience.

In particular, we understand that future minor cut to fill earthworks may occur across the site to achieve building levels. Any future excavation through the lime-modified zone should be followed by reapplication of lime in areas where the modified thickness has been significantly reduced.

As an alternative to lime modification, the high plasticity cohesive soils could be placed in embankment 'zones' where they are protected from changes in moisture content by covering with lower plasticity materials (ie. high plasticity soils at the base and shales at the top). Such zoning should consider requirements for self-filtering of the materials to control migration of fines.

5.2.4 Materials Management

Whilst the developer will likely prefer to excavate from cut directly to fill placement, there may be requirements to separately stockpile materials in order to construct 'zoned' fill embankments using high plasticity materials and low plasticity (ie. shale) materials.

Prior to stockpiling, excavated materials should be re-worked, sorted and/or mixed into a uniform material. Stockpiles should be managed so that the material they contain is uniform throughout. Temporary drainage, erosion control and stormwater protection should be applied to stockpile sites in order to maintain the uniformity of stockpiled materials.

Our observations in October 2008 of the uncontrolled fill material stockpiles suggest that the materials vary locally; hence, further inspection (preferably observation during excavation works) is warranted to assess the nature and condition of these materials.

We are aware that ongoing dumping of uncontrolled fill stockpiles continued after the site investigations. These stockpiles have not been investigated. These materials are not considered suitable for reuse in the works, subject to further inspections / testing, if required.

5.2.5 Dispersivity and Erosion

Laboratory testing indicates that soils at this site are moderately to highly dispersive with Emerson Class Numbers generally of 2. Dispersive soils are particularly susceptible to sheet and gully erosion when there is limited vegetation cover.

Adequate protection of cut batters should be provided by methods such as hydromulching, grassing, or revegetating as soon as possible following excavation to reduce erosion. Where a flatter cut batter of 3H:1V can be accommodated for cut slopes, this would improve revegetation.

All cut batters should be provided with cut-off or dish drains located behind the crest to minimise run off of water over the face of the batter.

Drainage lines and channels should also incorporate appropriate erosion protection measures, including lime stabilisation to reduce the potential for dispersion erosion. This stabilisation rate should be 2% lime by dry mass as per that specified for fill modification.

5.2.6 Groundwater

In the 'floodplain' region, groundwater was measured in piezometers at depths of 4.0 m and 4.3 m. A perched groundwater table may be inferred from the groundwater seepage observed in TP17 at 1.8 m depth and TP32 at 2.0 m depth. It should be noted that there had been rainfall during the investigation and that conditions may be drier during construction.

In the 'upland' region, piezometers installed to depths of 10 m recorded no groundwater.

It is, therefore, anticipated that excavations will be able to be undertaken in dry conditions, with any runoff able to be controlled by pumping from sumps. It should be noted, however, that groundwater levels are subject to weather and rainfall conditions, and may fluctuate over time.

5.2.7 Settlement

Firm alluvial clays were encountered to depths of 0.8-1.5 m in the 'floodplain' region of the site. This region is likely to accept the greatest amount of engineered fill and it is anticipated that there will be some settlement due to consolidation of the firm clays under the fill loads.

Whilst the amount of settlement is likely to only be of the order of tens of millimetres and much of this settlement may take place during construction of the engineered fill, some settlement will take place over a number of years. Detailed design should consider the characteristics of the firm alluvial clays, the amount of potential settlement from fill loads and the ability of proposed development to withstand any remnant (post completion of fill placement) differential settlements.

5.3 Cut and Embankment Slopes

5.3.1 Soils

Cut and fill batter slopes in soil materials would be expected to satisfy slope stability criteria at gradients no steeper than 2.5H:1V. However, due to the highly reactive and dispersive nature of the soils on site, batter slopes of 3H:1V or flatter are recommended. Where flatter batter slopes are possible this will improve the ability of the batter to resist surface erosion and shrink / swell effects and allow vegetation growth to protect the earthworks. Where soils are lime modified, steeper batter slopes could be considered.

5.3.2 Rock

Whilst cut batters located in bedrock material will satisfy stability requirements at slopes of 1H:1V with localised shotcreting or bolting within fractured or jointed areas, cut batter slopes in rock steeper than 2H:1V should be subject to geotechnical inspection to confirm stabilisation requirements. Where rock slopes cannot be flattened, ongoing slope maintenance may be required.

All batter slopes should include appropriate crest drainage to minimise surface water erosion and instability on the batter face. It is also critical that vegetation is established on all batter slopes to reduce the effect of surface water flow and protect the batter from moisture variation effects.

5.4 Footings

As discussed earlier, there may be 9 m of cut grading to 8 m of fill for Stage 1 (Southern) and 3 m of cut grading to 3 m of fill for Stage 2 (Northern). Therefore, the formation level will vary from cut at the eastern side to fill at the western side of the site.

For footings located on stiff to very stiff residual soil, an allowable bearing capacity of 150 kPa can be assumed. For footings on Class IV or better shale/siltstone or sandstone, an allowable bearing capacity of 1000 kPa can be assumed. Higher bearing capacities may be determined during detailed design by consideration of the relative level of higher strength rock present at some locations.

Much of the final developed site will be located on engineered fill. Provided the fill is suitable general fill and is placed in accordance with a suitable specification, allowable bearing capacities of 25 kPa for floor loadings and 100 kPa for pad footings should be achieved.

Given the variation between the conditions in cut areas and those for engineered fill, allowable bearing pressures and likely settlement will vary across the site. These should be assessed on a case by case basis.

5.5 Pavement Subgrade

Results from compaction and CBR testing (Appendix D) indicate that site soils in areas of likely pavement subgrade will achieve a CBR value between 2.0% and 4.5%. It is therefore recommended that a CBR of 2% be used for pavement design purposes. However, the recommended lime modification of the upper zone of formation will improve the pavement subgrade CBR. A design subgrade of 3% may be assumed for pavements constructed on at least 150 mm of lime-stabilised soil as recommended herein.

References

1. Soil Conservation Service of NSW, *Soil Landscape Series Sheet 9030, Penrith*.
2. Geological Survey of NSW, Department of Minerals and Energy, *Geological Series Sheet 9030, Penrith*, Edition 1, 1991.
3. P.J.N. Pells, G. Mostyn and B.F. Walker, *Foundations on Sandstone and Shale in the Sydney Region*, Australian Geomechanics, December 1998, pp 17-29.

Standard Sheets

General Notes

Glossary of Symbols

Soil Description

Rock Description

Core Log Sheet Notes

DCP Testing

Laboratory Testing

Reactive Soils

GENERAL NOTES

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The report contains the results of a geotechnical investigation conducted for a specific purpose and client. The results should not be used by other parties, or for other purposes, as they may contain neither adequate nor appropriate information. In particular, the investigation does not cover contamination issues unless specifically required to do so by the client.

TEST HOLE LOGGING

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information. Moreover, the location of test holes should be considered approximate, unless noted otherwise (refer report). Reference should also be made to the relevant standard sheets for the explanation of logging procedures (Soil and Rock Descriptions, Core Log Sheet Notes etc.).

GROUNDWATER

Unless otherwise indicated, the water levels presented on the test hole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeabilities (i.e. depending on response time of the measuring instrument). Further, variations of this level could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities. Confirmation of groundwater levels, phreatic surfaces or piezometric pressures can only be made by appropriate instrumentation techniques and monitoring programmes.

INTERPRETATION OF RESULTS

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data, often with only approximate locations (e.g. GPS). Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

CHANGE IN CONDITIONS

Local variations or anomalies in the generalised ground conditions do occur in the natural environment, particularly between discrete test hole locations. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural forces.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to this firm for appropriate assessment and comment.

GEOTECHNICAL VERIFICATION

Verification of the geotechnical assumptions and/or model is an integral part of the design process - investigation, construction verification, and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels, is required. There may be a requirement to extend foundation depths, to modify a foundation system and/or to conduct monitoring as a result of this natural variability. Allowance for verification by appropriate geotechnical personnel must be recognised and programmed for construction.

FOUNDATIONS

Where referred to in the report, the soil or rock quality, or the recommended depth of any foundation (piles, caissons, footings etc.) is an engineering estimate. The estimate is influenced, and perhaps limited, by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The material quality and/or foundation depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications should provide for variations in the final depth, depending upon the ground conditions at each point of support, and allow for geotechnical verification.

CLIMATE CHANGE

GHD Geotechnics acknowledges the occurrence of ongoing climate change. Cognisance is given to climate change issues as may be applicable to specific geotechnical investigations and assessments.

REPRODUCTION OF REPORTS

Where it is desired to reproduce the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions must include at least all of the relevant test hole and test data, together with the appropriate Standard Description sheets and remarks made in the written report of a factual or descriptive nature.

Ref: DS5.5.1 Issue 1.6 Date: 28/07/2009

GLOSSARY OF SYMBOLS

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This standard sheet should be read in conjunction with all test hole log sheets and any idealised geological sections prepared for the investigation report.

GENERAL

Symbol	Description	Symbol	Description
D	Disturbed Sample	PZ	Piezometer Installation
U	Undisturbed Sampled (suffixed by sample size or tube diameter in mm if applicable)	R	Rising Head Permeability Test
		F	Falling Head Permeability Test
C	Core Sample (suffixed by diameter in mm)	PBT	Plate Bearing Test
SV	Shear Vane Test (suffixed by value in kPa)	▸—	Water Inflow (make)
SPT	Standard Penetration Test (with blows per 0.15m)	—◂	Water Outflow (loss)
N	SPT Value	▽	Temporary Water Level
HB	SPT hammer bouncing	▼	Final Water Level
PM	Pressuremeter Test	●	Point Load Test (axial)
PP	Pocket Penetrometer (suffixed by value in kPa)	○	Point Load Test (diametric)
PK	Packer Test	IMP	Impression Device Test

SOIL SYMBOLS

Main Components

SAND, CLAY, SILT, GRAVEL, FILL, TOPSOIL

Minor Components

sandy, clayey, silty, gravelly, vegetation, roots

Note: Natural soils are generally a combination of constituents, e.g. sandy CLAY

ROCK SYMBOLS

Sedimentary

SANDSTONE, SHALE, CLAYSTONE, CONGLOMERATE, SILTSTONE, COAL

Igneous

GRANITIC ROCK, IGNEOUS DYKE, BASALTIC ROCK

Note: Additional rock symbols may be allocated for a particular project.

NATURAL FRACTURES (Coding)

Fracture Type

JT	Joint
BP	Bedding Plane
Cb	Cross Bed
SS	Sheared Surface
SM	Seam
CS	Crushed Seam
FZ	Fragmented Zone
SZ	Shear Zone
VN	Vein

Orientation

For vertical non-oriented core ... "Dip" angle (eg. 5°) measured relative to horizontal
For inclined non-oriented core ... "Angle" measured relative to core axis.
For inclined oriented core ... "Dip" angle and "Dip Direction" angle (eg. 45°/225° mag.)

VT	Vertical
HZ or 0°	Horizontal
d	degrees

Infilling or Coating

CN	Clean
X	Carbonaceous
CLAY	Clay
KT	Chlorite
CA	Calcite
FE	Iron Oxide
MI	Micaceous
Mn	Manganese
Py	Pyrite
QZ	Quartz
VE	Veneer

Shape

PLN	Planar
CU	Curved
UN	Undulating
ST	Stepped
IR	Irregular

Roughness

POL	Polished
SLK	Slickensided
SO	Smooth
RF	Rough
VR	Very Rough

Others

DIS	Discontinuous
OP	Open
CI	Closed
TI	Tight

Ref: DS6.5.1 Issue 1.6 Date: 20/11/2008

SOIL DESCRIPTION

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This procedure involves the description of a soil in terms of its visual and tactile properties, and relates to both laboratory samples and field exposures as applicable. A detailed soil profile description, in association with local geology and experience, will facilitate the initial (and often complete) site assessment for engineering purposes.

The method involves an evaluation of each of the items listed below and is in general agreement with both Australian Standard AS 1726 (the Site Investigation Code) and ASTM D2487 and D2488.

MOISTURE

The moisture condition of the soil is most applicable for cohesive soils as a precursor to the assessment of consistency and workability. The moisture condition is described as:-

Dry (dusty, dry to the touch) ***Slightly Moist*** ***Moist*** (damp, no visible water) ***Very Moist*** or ***Wet*** (visible free water, saturated condition)

In addition, the presence of any seepage or free water is noted on the testhole logs.

COLOUR

Colour is important for correlation of data between testholes and during subsequent excavation operations. The prominent colour is noted, followed by (spotted, mottled, streaked etc.) then secondary colours as applicable. Colour is usually described at as-received moisture condition, though both wet and dry colours may also be appropriate.

CONSISTENCY / DENSITY INDEX

This assessment is based on the effort required to penetrate and/or mould the soil, and is an indicator of shear strength.

Granular soils are generally described in terms of density index as listed in AS 1726. These soils are inherently difficult to assess and normally a penetration test procedure (SPT, DCP or CPT) is used in conjunction with published correlations. Alternatively, in-situ density tests can be conducted in association with minimum and maximum densities performed in the laboratory.

Term	Symbol	Density Index (%)
Very Loose	VL	< 15
Loose	L	15 - 35
Medium Dense	MD	35 - 65
Dense	D	65 - 85
Very Dense	VD	>85

Cohesive soils can be assessed by direct measurement (shear vane, CPT etc), or estimated approximately by tactile means and/or the aid of a geological pick as given on the following table. It is emphasised that a "design shear strength" must take cognisance of the mode of testing and the in-situ moisture content with the possible variations of moisture with time.

Term	Symbol	Tactile Properties	Undrained Strength S_u (kPa)
Very Soft	VS	Extrudes between fingers when squeezed in hand	<12
Soft	S	Easily penetrated by thumb about 30-40 mm. Pick head can be pushed in up to shaft.	12-25
Firm	F	Penetrated by thumb 20-30mm with moderate effort. Sharp end of pick pushed in 30-40mm.	25-50
Stiff	St	Indented by thumb about 5mm with moderate effort. Pick pushed in up to 10mm.	50-100
Very Stiff	VSt	Readily indented by thumb nail. Slight indentation produced by pushing pick into soil.	100-200
Hard	H	Difficult to indent with thumb nail. Requires power tools for excavation.	>200

STRUCTURE/OTHER FEATURES

The soil structure is generally applicable to cohesive soils and mainly refers to the presence or absence of joints and layering. Typical terms use are intact (no joints), fissured (closed joints), shattered (open joints), slickensided (polished joints indicative of movement), and stratified/laminated. In addition, the presence of other features (ferricrete nodules, timber inclusions) should also be noted as applicable.

For granular soils, an assessment of grading (well, uniform or poor), particle size (fine, medium etc.) and angularity and shape may also be given.

SOIL TYPE

The soil is described in terms of its estimated grain size composition and the tactile behaviour (plasticity of any fines (less than *0.06 mm)). This system does not differentiate on grading below 0.06 mm, in accordance with the Unified Soil Classification (USC) procedure.

However, in some situations a soil can exhibit different characteristics between the undisturbed and disturbed/remolded condition (eg. 'sand' sized particles which break down a clay). The Soil Type generally relates to the latter state but the former condition should be noted where applicable.

Furthermore, as most natural soils frequently are combinations of various constituents, the primary soil is described and modified by minor components. In brief, the system is as follows:-

Coarse Grained Soils		Fine Grained Soils	
% Fines	Modifier	% Coarse	Modifier
<5	omit, or use "trace"	<15	omit, or use "trace"
5-12	describe as "with clay/silt" as applicable	15-30	described as "with sand/gravel" as applicable
>12	prefix soil as "silty/clayey" as applicable	>30	prefix soil as "sandy/gravelly" as applicable

(*The 200# sieve (0.075 mm) is commonly used in practice to differentiate between fine and coarse grained soils).

Note: For soils containing both sand and gravel the minor coarse fraction is omitted if less than 15%, or described as "with sand/gravel" as applicable when greater than 15%.

The appropriate USC symbol may also be given after the soil type description in accordance with ASTM D2487 and D2488.

ORIGIN

An attempt is made, where possible, to assess origin (transported, residual, pedogenic, or fill etc.) since this assists in the judgement of probable engineering behaviour. This assessment is generally restricted to field logging activities. An interpretation of landform is a useful guide to the origin of transported soils (e.g. colluvium, talus, slide debris, slope wash, alluvium, lacustrine, estuarine, aeolian and littoral deposits) while local geology and remnant fabric will assist identification of residual soils.

Ref: DS6.5.1.1 Issue 1.6 Date: 19/11/2008

ROCK DESCRIPTION

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This method is based on Australian Standard AS 1726 and is orientated to the field logging of diamond drill core, but may be used for the profiling of natural exposures and cuttings, as applicable. The procedure involves a visual and tactile assessment of the rock mass and the nature of defects within it in order to facilitate a prediction of engineering behaviour.

DESCRIPTION: Rock Type is described on the basis of origin (sedimentary, metamorphic and igneous) with the common types listed below:-

Sedimentary				Metamorphic	Igneous			
Clastic	Non clastic (chemical)	Non clastic (organic)	Pyroclastic			Acid	Intermediate	Basic
Conglomerate Sandstone Siltstone Shale Claystone	Limestone Chert Gypsum Salt	Coal Some Limestone	Tuff Agglomerate Volcanic Breccia	Slate Phyllite Schist Quartzite Gneiss	Extrusive	Rhyolite	Trachyte / Andesite	Basalt
					Intrusive (medium grained)	Quartz Porphyry	Porphyry / Porphyrite	Dolerite
					(coarse grained)	Granite	Syenite / Diorite	Gabbro

Colour is given to assist in rock identification and the interpolation of field data. Colour is usually described at as-received moisture condition, though both wet and dry colours may also be appropriate.

Texture refers to the degree of crystallinity and granularity (grain size) and the fabric relationship between the constituents of a rock. Often only grain size is given for simplified descriptions of certain sedimentary rocks.

Structure and texture are commonly used synonymously in describing rocks since there is no clear delineation between terms. In general, structure refers to large-scale features recognisable in the field (banding, lineation, massive, porphyritic, schistose etc.). For sedimentary rocks in particular, the thickness of sedimentary layering (bedding) is described as:-

Thinly laminated	<6mm	very thinly bedded	20-60mm	medium bedded	0.2-0.6m	very thickly bedded	>2m
Laminated	6-20mm	thinly bedded	60-200mm	thickly bedded	0.6-2m		

In addition, mineral composition, hardness, alteration, cementation is given as applicable.

WEATHERING: The assignment of weathering is somewhat subjective. Weathering assists identification and does not imply engineering behaviour. No distinction is drawn between chemical weathering and alteration for most engineering purposes. These procedures are collectively described as "weathering" using the following terms which do not describe the related strength change. This system is general, and in this format may not apply to all rock types. Carbonate rocks generally do not conform to this classification.

Term	Symbol	Definition
Completely Weathered	CW	Residual soil with rock fabric not visible.
Extremely Weathered	EW	The rock exhibits soil-like properties though the texture of the original rock is still evident.
Highly Weathered	HW	Limonite staining or colour change affects the whole of the rock mass and other signs of chemical or physical decomposition are evident.
Moderately Weathered	MW	Staining extends throughout the whole of the rock mass and the original colour is no longer recognisable.
Slightly Weathered	SW	Partial staining or discolouration of the rock mass, usually by limonite, has taken place.
Fresh	Fr	Rock mass unaffected by weathering.

ESTIMATED STRENGTH: This refers to the strength of the rock substance and not that of the rock mass. The strength of the rock substance is estimated by the Point Load Strength Index $I_S(50)$ and refers to the strength measured in the direction normal to the bedding for sedimentary rocks. A field guide is given below:-

Term	Symbol	$I_S(50)$ MPa	Field Guide (The core refers to a 150mm long x 50mm dia. sample)
Extremely Low	EL	<0.03	Remoulded by hand to a material with soil properties.
Very Low	VL	0.03-0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low	L	0.1-0.3	The core may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium	M	0.3-1.0	The core may be broken by hand with considerable difficulty. Readily scored with knife.
High	H	1-3	The core cannot be broken by unaided hands, can be slightly scratched or scored with knife.
Very High	VH	3-10	The core may be broken readily with hand held hammer. Cannot be scratched with knife.
Extremely High	EH	>10	The core is difficult to break with hand held hammer. Rings when struck with a hammer.

DEFECTS: This important feature can control the overall engineering behaviour of a rock mass. All types of natural fractures across which the core is discontinuous are noted. These fractures include bedding plane partings, joints and other defects but exclude artificial fractures such as drilling breaks. The nature of the defects (joints, bedding partings, seams, zones and veins) is also noted with description, orientation, infilling or coating, shape, roughness, thickness, etc. given generally in accordance with AS 1726. The spacing of natural fractures excludes bedding partings unless there is evidence that they were separated prior to drilling. This notwithstanding, bedding partings maybe considered as planes of weakness in an engineering assessment.

Ref: DS6.5.2.1 Issue 1.6 Date: 04/06/2008

CORE LOG SHEET NOTES

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The intention of Core log Sheets is to present factual information measured from the core or as recorded in the field. Some interpretative information is inevitable in the location of core loss, description of weathering and identification of drilling induced fractures. This should be noted in the use of Core Log Sheets and remembered in their utilisation.

DRILLING AND CASING

The types of drilling used to advance the drill hole are recorded for relevant intervals. The types of drilling may include: NMLC coring, NQTT (NQ triple tube wire line), HW, HX, NW and NX casing, wash boring (tri-cone roller bit, TC drag bit, TC blade bit), or auger drilling (V-bit, TC drag bit).

The relevant progress is shown by abbreviated dates in the column.

WATER

Water lost or water made during drilling is recorded and subsequent readings of water levels in the borehole or piezometers are recorded here with dates of observation.

DRILL DEPTH AND CORE LOSS

Drilling intervals are shown by depth increments and horizontal marker lines. Core loss is measured as a percentage of the drill run. If the location of the core loss is known or strongly suspected, it is shown in a region of the column bounded by dashed horizontal lines. If unknown, core loss is assigned to the bottom of a coring run.

SAMPLES AND FIELD TESTS

The location of samples taken for testing or the location of field tests are indicated by the appropriate symbol from the GLOSSARY OF SYMBOLS Standard Sheet (or as applicable for the project) and are shown at the relevant location or over the relevant depth interval.

DEPTH (RL)

Changes in rock types or the locations of piezometer tips, samples, test intervals or other depths are shown as appropriate in terms of depth from the hole collar or in terms of RL.

For inclined holes the depths shown on the log refer to the drilled length along the borehole. The RL, where used, is the only transformed reference to true vertical depth.

STRATA

Rock types are presented graphically using the symbols shown on the GLOSSARY OF SYMBOLS Standard Sheet or as assigned for the project.

DESCRIPTION

The rock type is described in accordance with the ROCK DESCRIPTION Standard Sheet.

WEATHERING

Weathering is described, by code letters, in accordance with the ROCK DESCRIPTION Standard Sheet. A weathering term or range of terms is usually assigned to various strata.

It is noted, however, that the assignment of a term of weathering is subjective and is normally used for identification and does not imply engineering behaviour (such behaviour being controlled principally by rock substances strength and defect frequency - collectively, rock mass strength). Consequently, boundaries are often not shown and weathering may even not be reported where potentially misleading.

ESTIMATED STRENGTH

The strength of the rock substance is estimated by a combination of Point Load testing and tactile appraisal in accordance with the ROCK DESCRIPTION Standard Sheet. The estimated strength is presented in a histogram form. Both axial and diametric point load test results can be presented using the symbols on the GLOSSARY OF SYMBOLS Standard Sheet and the variation between axial and diametric values is indicative of anisotropy or fissility of the rock unit.

NATURAL FRACTURES

The identification of natural fractures requires an endeavour to exclude drilling induced breaks in the core and, as such, can be somewhat subjective. Natural fractures exist prior to coring the rock, whereas artificial fractures occur either during coring, during placing core in the core boxes, or during examination or transportation, or core after being boxed.

The log of Natural Fractures is presented as a combination of Fracture Spacing, Visual and Description columns. Coding is presented on the GLOSSARY OF SYMBOLS Standard Sheet.

ROCK QUALITY DESIGNATION (RQD) INDEX OPTION

The Core Log Sheet has an optional field column to record the RQD index. For certain projects, such as tunnelling or underground mining investigations, rock mass ratings or classifications can be required as part of the design process. The Rock Quality Designation (RQD) Index forms a component of these rock mass ratings and provides a quantitative estimate of rock mass quality from rock core logs. The core must be a minimum of 54.7mm diameter (although NMLC-sized core is probably OK) for derivation of an RQD index.

The RQD index is expressed as a percentage of intact rock core (excludes extremely weathered rock/residual soil) greater than 100 mm in length over the total selected core length. The total selected core length should be based on identifiable engineering geological domain characteristics. Should this not be practicable, RQD can be measured on a per run basis.

Ref: DS6.2.1 Issue 1.5 Date: 04/06/2008

DYNAMIC CONE PENETROMETER (DCP) TESTING

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SCOPE

The Dynamic Cone Penetrometer (DCP) test comprises the measurement of the soil resistance to a steel rod driven into the ground by a dropped weight.

The DCP test is a simple manual test used in both sandy and clayey soils. The test is a measure of the shear strength of the soil at relatively shallow depth.

EQUIPMENT AND METHOD

A general description of the dynamic penetrometer apparatus used by our firm is presented in Australian Standard AS 1289.6.3.2. The equipment utilises a 9kg sliding weight with a drop height of 510mm. It is fitted with a conical tip. The equipment can be adjusted for a fall of 600mm and use of a blunt tip in accordance with AS 1289.6.3.3.

The test data are generally recorded as the number of blows (n) per 50mm of penetration. The test data are processed by our in-house computer software. For specific applications (such as pavement investigations), the data may be collected in the reverse form, i.e. as mm per blow. The results are presented either in tabular or graphic form for reporting purposes.

INTERPRETATION

The interpretation of the DCP results is generally based on the assumption that the measured resistance is a function of soil strength. A profile of soil strength (cohesive soils) or density index (cohesionless soils) can thus be established. The test often can be used to qualitatively indicate the presence of soft or loose zones within a soil profile.

The energy of the system per unit area is similar to that of an SPT approach. Thus, the common relationships of SPT and other parameters (say Dutch cone) can be utilised as a means of estimating soil properties, after appropriate site specific correlation. The interpretations from the test are approximate only, and this is particularly pertinent to sand profiles where the magnitude of confinement stress is important in the assessment of the results.

Interpretation of the DCP penetration rate at depth (up to 5m) must be conducted with due regard to side friction effects. In particular, care must be exercised with soft clay profiles where shaft resistance may have a significant unconservative impact upon the results.

In-situ California Bearing Ratio (CBR) values of clay soil subgrades are sometimes interpreted directly from DCP test results for use in road pavement design. In this case, the correlation between DCP and CBR based on that published in AUSTROADS Pavement Design Manual (1992) may be applied. This correlation should be verified by site specific laboratory testing, where appropriate. In addition, the effects of moisture content variations (in-situ verses design conditions) must be considered, as clearly the DCP test only reflects the shear strength of the soil at the time of testing.

Ref: DS5.4.3 Issue 1.3 Date: 04/06/2008

LABORATORY TESTING

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GENERAL

Samples extracted during the fieldwork stage of a site investigation may be "disturbed" or "undisturbed" (as generally indicated on the trial hole logs) depending upon the nature and purpose of the sample as well as the method of extraction, transportation, extrusion and testing. This aspect should be taken into account when assessing test results, which must of necessity reflect the effects of such disturbance.

All soil properties (as measured by laboratory testing) exhibit inherent variability and thus a certain statistical number of tests is required in order to predict an average property with any degree of confidence. The site variability of soil strata, future changes in moisture and other conditions and the discrete sampling positions must also be considered when assessing the representative nature of the laboratory programme.

Certain laboratory test results provide interpreted soil properties as derived by conventional mathematical procedures. The applicability of such properties to engineering design must be assessed with due regard to the site, sample condition, procedure and project in hand.

TESTING

Laboratory testing is normally carried out in accordance with Australian Standard AS 1289 as amended, or RTA Standards when specified. The routine Australian Standard tests are as follows:-

Moisture Content	AS1289 2.1.1	
Liquid Limit	AS1289 3.1.1)	
Plastic Limit	AS1289 3.2.1)	collectively known as Atterberg Limits
Plasticity Index	AS1289 3.3.1)	
Linear Shrinkage	AS1289 3.4.1	
Particle Density	AS1289 3.5.1	
Particle Size Distribution	AS1289 3.6.1, 3.6.2 and 3.6.3	
Emerson Class Number	AS1289 3.8.1)	
Percent Dispersion	AS1289 3.8.2)	collectively, Dispersive Classification
Pinhole Dispersion Classification	AS1289 3.8.3)	
Hole Erosion (HE)	GHD Method	
No Erosion Filter (NEF)	GHD Method	
Organic Matter	AS1289 4.1.1	
Sulphate Content	AS1289 4.2.1	
pH Value	AS1289 4.3.1	
Resistivity	AS1289 4.4.1	
Standard Compaction	AS1289 5.1.1	
Modified Compaction	AS1289 5.2.1	
Dry Density Ratio	AS1289 5.4.1	
Minimum Density	AS1289 5.5.1	
Density Index	AS1289 5.6.1	
California Bearing Ratio	AS1289 6.1.1 and 6.1.2	
Shear Box	AS1289 6.2.2	
Undrained Triaxial Shear	AS1289 6.4.1 and 6.4.2	
One Dimensional Consolidation	AS1289 6.6.1	
Permeability Testing	AS1289 6.7.1, 6.7.2 and 6.7.3	

Where tests are used which are not covered by appropriate standard procedures, details are given in the report.

LABORATORY

Our laboratory is NATA accredited to AS ISO / IEC17025 for the listed tests.

The oedometer, triaxial and shear box equipment are fully automated for continuous operation using computer controlled data acquisition, processing and plotting systems.

Ref: DS5.5.2 Issue 1.6 Date: 04/06/2008

REACTIVE SOILS

SITE MANAGEMENT PRECAUTIONS

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These precautions are considered supplementary to any structural and/or foundation design measures for the subject building, and are intended for distribution to the prospective building owner / occupier.

Reactive clays are prone to heave/shrink movements with changes in soil moisture content due to natural or artificial means. The basic design philosophy employed for the building is to provide a foundation/superstructure adequate to accommodate ground movements due to extreme seasonal moisture changes only. The possibility of other abnormal and/or localised moisture changes (the cause of most building distress) has been assumed to be controlled by the following site management procedures.

In particular, leaking plumbing or blocked drains should be repaired promptly and site grading maintained to prevent ponding near foundations. Garden watering, particularly by fixed systems, should be controlled carefully to avoid gross over-watering. On the other hand, proper garden maintenance should produce year round uniform moisture conditions.

Trees and shrubs can cause a substantial drying of the clay soil profile and associated shrinking of reactive clays. This effect is most likely to result in damage when added to the drying from a drought or a long dry spell. The problem can be avoided by planting trees at substantial distances from the building. The distance depends upon the species, soil conditions, and site classification.

Problems during droughts can be minimised by extensive pruning (thus reducing water demand) and/or providing trees with adequate water. This watering can be achieved by boreholes or trenches dug well into the clay between the tree and the footing. To avoid settlement problems, the holes or trenches should not be too close to the footing and should be filled with compacted screenings. The installation of root barriers is another option. Frequent moderate watering during dry periods also should assist in minimising the extraction of excessive moisture from beneath the foundation of the building by trees and other vegetation as well as the environmental effects.

This action should also be immediately undertaken by the owner / occupier if brickwork cracking due to tree drying is noticed. Most reactive clay failures can be avoided or the effects minimised by controlling the combined drying effects of trees and drought.

The owner / occupier should also appreciate that on reactive clays it is virtually impossible to design an economic foundation system which will totally prevent movement. Some minor aesthetic cracking, while undesirable, will occur in a significant proportion of houses. In addition, some minor problems should be expected with jamming of windows and doors, especially during the settling-in period or following a major drought, and such repairs should be regarded as part of normal building maintenance. Even significant masonry cracking with widths over 5mm usually has little influence on the function of the wall and presents an aesthetic problem. Just as it is difficult to design an immovable footing system, it is almost impossible to provide remedial measures that will prevent further movements if distress does occur. Consequently, extreme remedial measures should not be undertaken for minor problems.

Advice on these matters is addressed in Australian Standard AS2870 "Residential slabs and footings – Construction". In particular the designer, owner and occupier are referred to Appendix B "Performance Criteria and Foundation Maintenance" in AS2870.

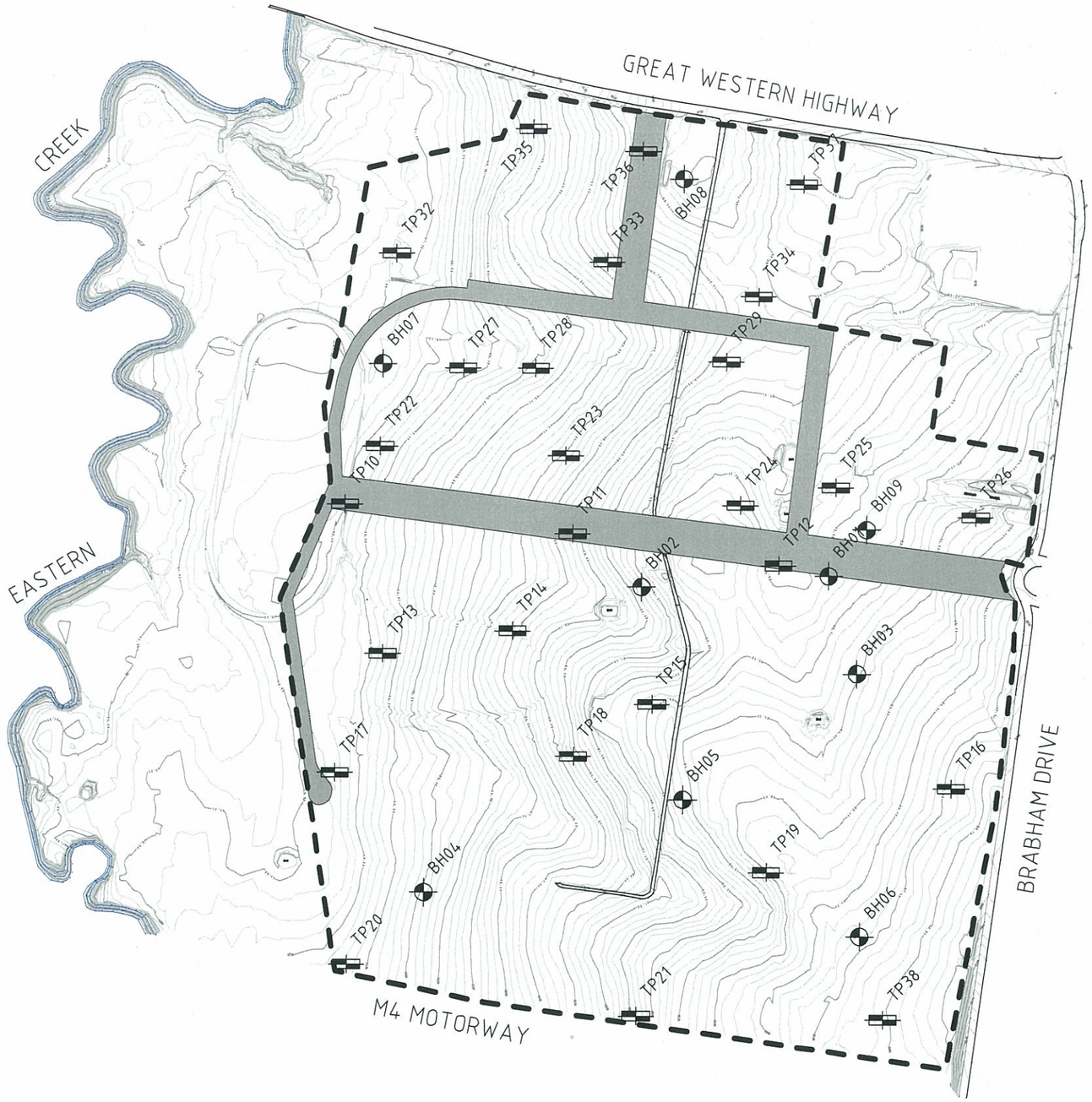
Ref: DS5.4.1 Issue 1.1 Date: 20/11/2008

Figures

Figure 1 – Test Location Plan

Figure 2 – Geology Plan

Figure 3 – Soils Plan



LEGEND

BH01 — BOREHOLE

TP10 — TEST PIT

SITE BOUNDARY

PROPOSED FIXED ROAD NETWORK

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

NOTE: CONTOUR INTERVAL 0.25m

REFERENCE: BASE SURVEY PROVIDED BY GOODMAN PROPERTY SERVICE PTY LTD

GHD CLIENTS | PEOPLE | PERFORMANCE

GHD GEOTECHNICS

Goodman International Ltd
Bungaribee Industrial Estate - Huntingwood
Geotechnical Investigation
Test Location Plan
scale | 1:5000 for A3 date | November 2008

job no. | 21-17871-00
rev no. | A

Figure 1

57-63 Herbert St Artarmon NSW 2064 Australia, Locked Bag 2727 St Leonards NSW 1590 T 61 2 9462 4700 F 61 2 9462 4710 E atnmail@ghd.com.au W www.ghd.com.au/ghdgeotechnics

Plot Date: 11 December, 2008 - 11:56 AM Cad File No: 21-17871-FIG-001.dwg

1:7,000 (at A3)

0 75 150 300 Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

N

LEGEND

Site Boundary

GEOLOGY

Ashfield Shale

Undifferentiated Alluvial Deposits

Locality Map

SYDNEY

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Geotechnical Investigation

Job Number	21-17871-00
Revision	A
Date	9 December 2008

Geology Map

Figure 2

G:\21\17871\CADD\GIS\MapDocuments\Z003_BungarribeeIndustrialEstate_Geology.mxd

57-63 Herbert Street Artarmon NSW 2064 **T** 61 2 9462 4700 **F** 61 2 9462 4710 **E** artmail@ghd.com.au **W** www.ghd.com.au

Data Sources: NSW Department of Primary Industries 100K Geology 2005 NSW Department of Lands DCDB 2008 Created by: rcjohnson, hwarr

1:7,000 (at A3)

0 75 150 300 Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

N

LEGEND

Site Boundary

Soil Landscape

Blacktown Unit

South Creek Unit

Locality Map

SYDNEY

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Revision	A
Date	9 December 2008

Soil Landscape Map

Figure 3

G:\21\17871\CADD\GIS\MapDocuments\Z004_BungarribeeIndustrialEstate_SoilLandscapes.mxd

57-63 Herbert Street Artarmon NSW 2064 **T** 61 2 9462 4700 **F** 61 2 9462 4710 **E** artmail@ghd.com.au **W** www.ghd.com.au

Data Sources: NSW Department of Environment and Climate Change Penrith 1: 100K Soil Landscapes 1990 NSW Department of Lands DCDB 2008 Created by: rcjohnson, hwarr

Appendix A

Borehole Logs and Core Photographs

BOREHOLE LOG SHEET

GEO_BOREHOLE 21787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH01**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 1 OF 3**
Location :	HUNTINGWOOD		
Position :	302695.2 E 6258422.7 N MGA94 / 56 **Surface RL:** 50.2m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RML
Date Started :	15/10/08 **Date Completed :** 15/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
					0.15			Clayey SAND, brown, fine grained (topsoil).	M		
							CL - Cl	CLAY, light orange brown, low to medium plasticity, trace fine grained sand (residual).	M	F	
1				SPT 3/4/4 N=8							
					1.50		SC	Clayey SAND, red brown, fine grained (residual).	M	L	
2	V-bit auger	Nil		SPT 3/4/5 N=9							
					3.00		SC	Clayey SAND, orange brown with light grey mottles, fine grained, trace ironstone gravel (residual).	M-VM	MD	
3				SPT 3/6/10 N=16				3.4m, extremely weathered sandstone.			
					4.00		CH	Sandy CLAY, light grey with bands of orange brown 5-10mm thick, medium to high plasticity, fine grained sand (residual).	M-VM	St	
4	HQ Coring		▼	SPT 4/5/5 N=10					W		Increased drill resistance
					4.89			Start of coring at 4.89 metres. For Cored interval, see Core Log Sheet.			
5											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH01**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 2 OF 3**
Location :	HUNTINGWOOD		
Position :	302695.2 E 6258422.7 N MGA94 / 56 **Surface RL:** 50.2m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RNL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES			
Progress													
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 | VL 0.1 | L 0.3 | M 1 | H 3 | VH 10 | EH	Spacing (mm) 20 | 40 | 100 | 300 | 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2													
3													
4								Start of coring at 4.89 metres. For Non Cored interval, see Borehole Log Sheet.					
						4.89		SANDSTONE, light brown, fine to med grained.	EW				4.98, BP, HZ, CLAY, PLN, RF
5													

See standard sheets for details of abbreviations & basis of descriptions

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CORE LOG SHEET

GEO_COREHOLE 21178710O.GPJ GHD GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH01**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 3 OF 3**
Location :	HUNTINGWOOD		
Position :	302695.2 E 6258422.7 N MGA94 / 56 **Surface RL:** 50.2m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** [illegible]
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL					NATURAL FRACTURES			
Progress														
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
6	NMLC coring		6.00	(0)		6.00		SANDSTONE, as previous.	HW				5.00, BP, HZ, CN, PLN, RF 5.09-5.11, SM, HZ, CLAY 5.22-5.23, SM, HZ, CLAY 5.44-5.48, FZ 5.57, SM, 15°, CLAY 5.8-5.83, FZ 5.86, JT, 70°, CLAY, CU, RF 5.88, JT, 70°, FE, CU, SO 5.96, JT, 30°, FE, PLN, SO
								End of borehole at 6.0 metres.					
7													
8													
9													
10													

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00


CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNGARIBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ1 , 4.89 m TO 6.0 m
JOB No 21/17871/00 DATE 15/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - GOODMAN - BUNGARIBEE ESTATE - START CORE (BHØ1) AT 4.89m 15/10/08
5
BOREHOLE BHØ1 TERMINATED AT 6.0m 15/10/08

BOREHOLE LOG SHEET

GEO_BOREHOLE 21178710O.GPJ GHD_GEO_TEMPLATE.GDT 5/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH02**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 3**	
Position :	302508.0 E 6258411.0 N MGA94 / 56 **Surface RL:** 50.5m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RML
Date Started :	14/10/08 **Date Completed :** 14/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
					0.10			Silty SAND, brown, fine to medium grained, with fine to medium gravel (fill).			
							CH	CLAY, grey with red brown mottling, medium to high plasticity, trace fine grained sand/silt, rootlets (residual).	M	F	
1	V-bit + Solid Flight Auger			SPT 3/3/4 N=7							
								1.5m, increasing ironstone, some remnant rock structure.		St	
2				SPT 4/6/9 N=15	2.10			SHALE, grey with red brown and brown bands, indistinct bedding extremely weathered, extremely low strength.			Increased drilling resistance
3					3.00			Start of coring at 3 metres. For Cored interval, see Core Log Sheet.			Near V-bit refusal
4											
5											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_CORE_ONLY 211787100.GPJ GHD_GEO_TEMPLATE.GDT 8/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH02**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 3**	
Position :	302508.0 E 6258411.0 N MGA94 / 56 **Surface RL:** 50.5m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RML
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	14/10/08 **Date Completed :** 14/10/08 **Logged by :** CS	**Date Logged :** 14/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES		
Progress												
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2													
3						3.00		SHALE, grey with brown bands, indistinctly bedded. (Very stiff to hard clay bands extremely weathered zones of fragmented material).	HW-EW				3.09, BP/SM, HZ, CLAY, PLN, SO 3.20, BP, HZ, CLAY, CU, SO
4	NMLC coring		3.84	(0)					HW				3.42-3.53, FZ 3.56, JT, 70°, CLAY, PLN, SO 3.64, SM, CLAY, 10mm 3.70-3.77, FZ 4.11, SM, X, 2mm 4.26, BP, 5°, CLAY, PLN, UN, SO
5				(0)									4.94, JT, VT, CN, PLN, SO, OP

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_CORE_ONLY 21178700.GPJ GHD_GEO_TEMPLATE.GDT 8/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH02**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 3**	
Position :	302508.0 E 6258411.0 N MGA94 / 56 **Surface RL:** 50.5m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMC
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	14/10/08 **Date Completed :** 14/10/08 **Logged by :** CS	**Date Logged :** 14/10/08	

DRILLING | **MATERIAL** | **NATURAL FRACTURES**

Progress: SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description (ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin))	Weathering	Estimated Strength $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	Spacing (mm) (20, 40, 100, 300, 1000)	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
6	NMLC coring		5.04	(0)				SHALE, as previous.					5.04-5.10, FZ 5.23, BP, 35°, CLAY, PLN, SO, OP 5.32-5.40, FZ (EW zone) 5.50-5.65, FZ (EW zone) 5.73, JT, 65°, CN, PLN, SO, TI 6.18, BP, 10°, CN, PLN, SO 6.35, JT, 60°, CLAY, PLN, SO, OP 6.67, BP, HZ, CLAY+FE, PLN/ST, RF 6.68-6.78, JT, 75°, CN, PLN/CU, SO 6.84, BP/JT, 45°, CLAY+FE, IR, RF, OP 7.0-7.06, JT, 60°, CLAY, PLN, SO, OP 7.10, JT, 60°, CLAY, PLN, SO 7.24, JT, 70°, CLAY, PLN, SO 7.45, JT, 75°, CLAY, PLN, SO 7.61, BP.SM, 10°, IR/UN, CLAY
7			7.49	(0)					HW				
8			8.43	(9)				From approx 8.0m, bedding from horizontal to 20° bedding, very thinly bedded to thinly bedded.					8.41-8.58, EW zone 8.48, BP, 10°, CLAY, PLN, SO 8.85-8.91, FZ (EW zone) 9.20, BP/JT, HZ/VT, CN, ST, SO 9.30, BP, HZ, CN, PLN, SO 9.41, BP/JT, VT/HZ, CN, ST, SO 9.51, BP, HZ, CN, PLN, SO
9						9.86							
10			10.00			10.00		CORE LOSS 140mm thick (left down hole). End of borehole at 10.0 metres.					

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

BOREHOLE LOG SHEET

GEO_BOREHOLE 21178/100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH03**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 1 OF 2**
Location :	HUNTINGWOOD		
Position :	302724.0 E 6258325.0 N MGA94 / 56 **Surface RL:** 53.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Date Started :	16/10/08 **Date Completed :** 16/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
					0.20			Silty SAND, dark brown, fine to medium grained (topsoil).	M		
					0.50		CL-CI	CLAY, brown, low to medium plasticity, trace fine grained sand (alluvium).	M	S-F	
				SPT 2/2/2 N=4			CH	CLAY, grey and red brown mottled, high plasticity, trace fine grained sand (residual).	M	S-F	
1								At 1.0m, becoming brown and grey mottled, with ironstone gravel, with fine grained sand.		F-St	
				SPT 4/5/6 N=11							
2								At 2.0m, increasing gravel with depth.			
	V-bit auger	Nil									
3								At 3.0m, with sandy (fine grained), some remnant rock structure (extremely weathered siltstone/sandstone). No ironstone gravel.		St-VSt	
				SPT 5/6/11 N=17							3.6, increased drilling resistance
4											
				SPT 7/12/15 N=27	4.30			SILTSTONE/SANDSTONE, grey and brown bands, fine grained, highly to extremely weathered, very low strength.			
5					5.00			Start of coring at 5 metres. For Cored interval, see Core Log Sheet.			4.85, increased drilling resistance Near V-Bit refusal at

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CORE LOG SHEET

GEO_COREHOLE 21178710O.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH03**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 2**	
Position :	302724.0 E 6258325.0 N MGA94 / 56 **Surface RL:** 53.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWW
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	16/10/08 **Date Completed :** 16/10/08 **Logged by :** CS	**Date Logged :** 16/10/08	

DRILLING

Progress

SCALE (m) | Drilling & Casing | Water | Drill Depth (m) | (Core Loss / Run %) | SAMPLES & TESTS

MATERIAL

Depth / (RL) metres | Graphic Log

Description

ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)

Start of coring at 5 metres.
For Non Cored interval, see Borehole Log Sheet.

NATURAL FRACTURES

Weathering | **Estimated Strength $Is_{(50)}$ MPa** (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH) | **Spacing (mm)** (20, 40, 100, 300, 1000) | Visual

Additional Data

(joints, partings, seams, zones and veins)
Fracture type, orientation, infilling or coating, shape, roughness, other.

Depth / (RL)	Description	Drill Depth (m)	(Core Loss / Run %)	Weathering	Additional Data
5.00	SHALE, dark grey/black, indistinct bedding some bands of silty material.				5.0, near v-bit refual
					5.16, BP/SM, HZ, CLAY 1mm
					5.17, BP, 10°, CLAY, PLN, SO, TI
			(0)		
					5.47-5.58, JT, 75°, PLN, healed
					5.60, JT, 55°, CLAY, PLN/UN, RF
					5.62, BP, 10°, CLAY, PLN/ST, RF
					5.76, BP, 5°, X+CLAY, PLN/ST, SO
		5.93			5.80, BP, 5°, CLAY, UN/CU, SO
6				HW-EW	5.95-6.07, JT, sub VT, FE, DIS healed/intact
					6.10-6.53, JT, 85°, PLN/CU, FE, DIS healed/intact
			(0)		
		6.90			
7					6.92, JT/BP, 0°-80°, ST, RF
					7.07, JT, 70°, CN, PLN, RF, OP
					7.08, BP, sub HZ, CN, PLN, SO, TI
					7.37, JT, 80°, CN, ST/IR, RF, OP
			(0)		7.60, BP, sub HZ, PLN, SO, TI
				MW-HW	
8					8.05, BP, 20°, CLAY, PLN, SO
					8.23, BP, HZ, CN, UN/PLN, RF
		8.43			
	8.50-8.65, siltstone laminations.				
					8.68, BP, 5°, CN, UN, RF, OP
				HW-EW	
9					8.95-8.98, SM, CLAY
					8.98, FZ/SM, CLAY
			(0)		
				HW-MW	
10		10.00			9.94&9.97, BP's,HZ,5°,CLAY,UN/IR,SO,(EW zone)
10.00	End of borehole at 10.0 metres.				

NMLC coring + HQ casing to 4.86m

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CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNCARBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BH03 5.0 m TO 10.0 m
JOB No 21/17871/00 DATE 16/10/08
GHD
GHD GEOTECHNICS
5
6
7
8
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BOREHOLE LOG SHEET

GEO_BOREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH04**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 3**	
Position :	302292.0 E 6258106.0 N MGA94 / 56 **Surface RL:** 45.1m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Date Started :	15/10/08 **Date Completed :** 15/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
					0.10			CLAY, dark brown, low plasticity, with fine grained sand (topsoil).	M		
							CI-CH	CLAY, red brown, medium to high plasticity, with fine to medium ironstone gravel (alluvium).	M	F-St	
					0.50		CL	Sandy CLAY, light brown, low plasticity, fine grained sand, some black laminations and red brown ironstone (residual).	M	F-St	
				SPT 3/3/4 N=7							
1								At 1.0m, becoming grey and light brown mottled with depth.			
							CI-CH	From 1.5m, some bands with remnant rock structure. No sand - clay, medium to high plasticity.		St	
				SPT 3/4/5 N=9							
2	V-bit auger										
					3.00			SHALE, grey with black carbonaceous bands laminated, extremely weathered, extremely low strength (very stiff to hard clay).			
3				SPT 4/9/11 N=20							
								At 4.0m, sandstone and carbonaceous laminations, becoming highly weathered, very low to low strength.			
4				SPT 7/15/21 N=36	4.50						
								Start of coring at 4.5 metres. For Cored interval, see Core Log Sheet.			
5											

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CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH04**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 3**	
Position :	302292.0 E 6258106.0 N MGA94 / 56 **Surface RL:** 45.1m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :**
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL					NATURAL FRACTURES		
Progress								Description		Estimated Strength $Is_{(50)}$ MPa	Spacing (mm)		Additional Data
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	20 40 100 300 1000	Visual	(joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2													
3													
4								Start of coring at 4.5 metres. For Non Cored interval, see Borehole Log Sheet.					
						4.50		SHALE, grey, indistinctly bedded, highly friable rock, occasional brown iron staining.	EW				4.71, BP, 20°, CLAY+X, PLN, SO
5		<10% loss							HW				

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CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH04**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 3**	
Position :	302292.0 E 6258106.0 N MGA94 / 56 **Surface RL:** 45.1m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES			
Progress													
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 / VL 0.1 / L 0.3 / M 1 / H 3 / VH 10 / EH	Spacing (mm) 20 / 40 / 100 / 300 / 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
6	NMLC coring + HQ casing	<10% loss	6.00	(0)		6.00		SHALE, as previous.	HW				5.31, BP, 30°, CLAY, CU, RF 5.86, BP, 25°, CN, PLN, RF, TI
								End of borehole at 6.0 metres.					
7													
8													
9													
10													

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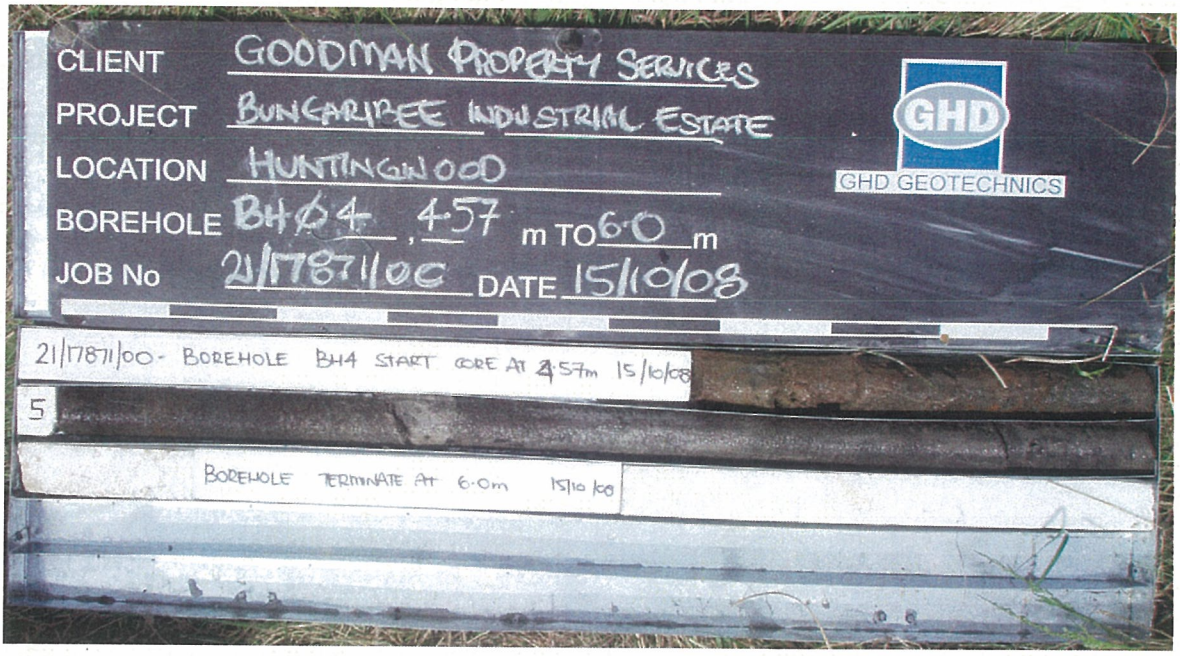
Job No. 21-17871-00


CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNGARIBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BH04 4.57 m TO 6.0 m
JOB No 21/17871/0C DATE 15/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - BOREHOLE BH4 START CORE AT 4.57m 15/10/08
5
BOREHOLE TERMINATE AT 6.0m 15/10/08

BOREHOLE LOG SHEET

GEO_BOREHOLE 21178?100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH05**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 1 OF 4**
Location :	HUNTINGWOOD		
Position :	302550.0 E 6258199.0 N MGA94 / 56 **Surface RL:** 53.7m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMC
Date Started :	13/10/08 **Date Completed :** 13/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
					0.10		CH	SAND, dark grey, fine to medium grained, fragments of tiles, ash, concrete (fill).			
								CLAY, red brown, high plasticity (residual).	M	F-St	
								From 0.5m, grey and brown mottled.			
				SPT 2/3/7 N=10	0.90						
1	V-bit + Solid Flight Auger	Nil						SILTSTONE/SHALE, brown, horizontally bedded, iron oxide and manganese oxide stained joints, highly weathered, very low strength.			
				SPT 22/15/21 N=36							
2					2.60						
								Start of coring at 2.6 metres. For Cored interval, see Core Log Sheet.			
3											
4											
5											

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CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH05**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 4**	
Position :	302550.0 E 6258199.0 N MGA94 / 56 **Surface RL:** 53.7m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMW
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	13/10/08 **Date Completed :** 13/10/08 **Logged by :** CS	**Date Logged :** 13/10/08	

DRILLING | **MATERIAL** | **NATURAL FRACTURES**

Progress: SCALE (m)	Progress: Drilling & Casing	Progress: Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description (ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin))	Weathering	Estimated Strength $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	Spacing (mm) (20, 40, 100, 300, 1000)	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2								Start of coring at 2.6 metres. For Non Cored interval, see Borehole Log Sheet.					
						2.60		SHALE, dark grey, thinly to moderately bedded, generally horizontal.	HW				3.14, BP, 20°, FE, CU, SO, TI
3	NMLC coring			(24)		3.28		CORE LOSS 220mm thick.					
			3.50			3.50		SHALE, as above.					3.54, JT, 60°, CN, PLN, SO, OP
4									HW				3.81, BP, sub HZ, CN, PLN, SO, TI 4.00, BP, HZ, CN, PLN, SO, TI 4.23, BP, 10°, FE, PLN, ST, SO, TI 4.26, BP, 15°, CN, PLN, SO, TI 4.29, BP, sub HZ, CN, PLN, SO, TI 4.45, BP, 10°, FE, UN/IR, SO, TI 4.56, BP, 5°, CN, PLN, VR, TI
				(3)									
5													4.87, BP, 50°, FE, IR, SO, TI

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CORE LOG SHEET

GEO_CORE_ONLY 21178700.GPJ GHD_GEO_TEMPLATE.GDT 8/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH05**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 4**	
Position :	302550.0 E 6258199.0 N MGA94 / 56 **Surface RL:** 53.7m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** PNL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	13/10/08 **Date Completed :** 13/10/08 **Logged by :** CS	**Date Logged :** 13/10/08	

DRILLING

Progress

SCALE (m) | Drilling & Casing | Water | Drill Depth (m) | (Core Loss / Run %) | SAMPLES & TESTS

MATERIAL

Depth / (RL) metres | Graphic Log | **Description** (ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)) | Weathering | **Estimated Strength $Is_{(50)}$ MPa** (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)

NATURAL FRACTURES

Spacing (mm) (20, 40, 100, 300, 1000) | Visual | **Additional Data** (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.

Depth / (RL)	Description	Weathering	Drill Depth (m)	(Core Loss / Run %)	Additional Data
5.02	CORE LOSS 60mm thick.				
5.08	SHALE, as above.	MW			
5.40					5.33, BP, HZ, CN, PLN, SO, TI
	SILTSTONE, dark grey and grey laminations, very thinly bedded to laminated, some sandy bands and shaley bands.		5.60		5.47, BP, sub HZ, FE, PLN, SO, TI
					5.76, BP, HZ, CLAY, UN, SO, OP
					5.93, BP, 5°-10°, CLAY, IR/UN, RF
					6.08, BP, 5-10°, CLAY, IR/UN, RF
					6.24, BP, 5°, CN, PLN, SO, TI
		MW			6.91, BP, 10 CLAY, PLN, SO, TI 6.93, JT's, Cb, VT, PLN, CN, SO 6.96, SM, CLAY, 35mm
				(0)	
					8.14,-8.21, EW zone
			8.60		8.48-8.51, EW zone
		MW-HW			9.08, BP, 5°, CN, PLN, SO, OP
				(0)	

NMLC coring

10

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 21178700.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH05**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 4 OF 4**	
Position :	302550.0 E 6258199.0 N MGA94 / 56 **Surface RL:** 53.7m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	13/10/08 **Date Completed :** 13/10/08 **Logged by :** CS	**Date Logged :** 13/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES		
Progress												
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
			10.06			10.06		SILTSTONE, as previous. End of borehole at 10.06 metres.					
11													
12													
13													
14													
15													

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


CLIENT GOODMAN PROPERTY
PROJECT BUNGARIBEE ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ5 , 2·58 m TO 7·0 m
JOB No 21/17871/00 DATE 13/10/08
GHD GEOTECHNICS
GOODMAN- BUNGARIBEE ESTATE - BHØ5 - START CORE AT 2.58m
CORE LOSS - 220mm 3.28 - 3.50m
CORE LOSS
CLIENT GOODMAN PROPERTY
PROJECT BUNGARIBEE ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ5 , 7·0 m TO 10·06 m
JOB No 21/17871/00 DATE 13/10/08
GHD GEOTECHNICS
8·02
BOREHOLE BH5 TERMINATED AT 10·06 m - 13/10/08

BOREHOLE LOG SHEET

GEO_BOREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH06**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 2**	
Position :	302728.2 E 6258063.3 N MGA94 / 56 **Surface RL:** 56.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMC
Date Started :	16/10/08 **Date Completed :** 16/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
							ML	Sandy SILT, dark brown, low plasticity, fine grained sand, numerous grass roots (topsoil).	M		
					0.50		CI-CH	CLAY, grey brown, medium to high plasticity, trace fine grained sand, remnant rootlets/roots (residual).	M	S-F	
				SPT 1/2/3 N=5							
1								At 1m, grades to light brown with grey mottles, with lightly cemented ironstone bands.		F-St	
				SPT 3/4/6 N=10							
2											
	V-bit + Solid Flight Auger	Nil									
3								At 3m, Ironstone bands 50mm thick at 150-200mm spacing. Very stiff clay, some remnant rock structure.	VM	VSt	
				SPT 5/7/10 N=17							
					3.80			SILTSTONE/SHALE, light brown, horizontally bedded, highly to extremely weathered, extremely low to very low strength.			Greater drilling resistance from approx 3.8m
4				SPT 15 for 70mm HB N=ref							
					5.00			Start of coring at 5 metres. For Cored interval, see Core Log Sheet.			
5											

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00

CORE LOG SHEET

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH06**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		SHEET 2 OF 2
Location :	HUNTINGWOOD		
Position :	302728.2 E 6258063.3 N MGA94 / 56 **Surface RL:** 56.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMW
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	16/10/08 **Date Completed :** 16/10/08 **Logged by :** CS	**Date Logged :** 13/10/08	

DRILLING

Progress

SCALE (m) | Drilling & Casing | Water | Drill Depth (m) | (Core Loss / Run %) | SAMPLES & TESTS

MATERIAL

Depth / (RL) metres | Graphic Log | **Description** (ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)) | Weathering | **Estimated Strength $Is_{(50)}$ MPa** (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)

NATURAL FRACTURES

Spacing (mm) (20, 40, 100, 300, 1000) | Visual | **Additional Data** (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.

Depth / (RL)	Description	Weathering	Drill Depth (m)	(Core Loss / Run %)	Additional Data
5.00	SHALE, grey and light brown bands, horizontal to 10°, bedding with bands up to 150mm of siltstone, thinly bedded.	HW-EW		(0)	5.49, BP, HZ, CLAY, UN, SO, OP 5.55, BP, 20°, CLAY, PLN, SO, OP 5.75, BP, 10°, CLAY, PLN, SO. OP
6.20	SANDSTONE, brown and grey brown, fine grained, thinly to very thinly bedded, with siltstone laminations up to 2mm thick at variable spacing. From 6.6m, becoming grey.	HW MW	6.09		6.12, BP, 10°, CLAY, PLN, SO 6.20, BP, 5°, FE, CU, SO 6.38, BP, 5°, FE, PLN, RF, TI 6.46-6.49, FZ 6.56, BP, 15°, CLAY, PLN, SO healed 6.66, BP, sub HZ, FE, PLN/CU, RF 6.82, BP, sub HZ, FE, PLN/CU, RF 6.91, BP, sub HZ, FE, PLN/CU, RF
7.10	SILTSTONE/SHALE, dark grey/grey, indistinctly bedded, highly friable rock.	HW		(0)	7.24, BP/ST, 45°, FZ (drill induced) 7.55, JT, 75°, CLAY, PLN, RF, OP 7.80, JT, 60°, CLAY, PLN, RF, OP 7.80-8.00, FZ (drill induced)
	From approx 8.50m, evident laminated structure, alternating SILTSTONE/SHALE laminates.	MW	8.46		8.24, JT, 70°, CLAY, ST/PLN, RF 8.73-8.75, BP, HZ, CN, PLN, SO
9.81		EW MW		(12)	
10.00	CORE LOSS 190mm thick. End of borehole at 10.0 metres.		10.00		

NMLC coring

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


CLIENT GOODMAN PROPERTY
PROJECT BUNGARIBEE ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ6 , 5·0 m TO 10·0 m
JOB No 21/17871/00 DATE 13/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - GOODMAN PROPERTY SERVICES - BUNGARIBEE ESTATE - BHØ6 START @ 5·0m
5
6
7
8
9
CORE LOSS 190mm 8·91 - 10·00m
BOREHOLE BHØ6 TERMINATED AT 10·0m 13/10/08

BOREHOLE LOG SHEET

GEO_BOREHOLE 21178710O.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH07**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 3**	
Position :	302248.0 E 6258633.0 N MGA94 / 56 **Surface RL:** 41.3m approx AHD **Angle from Horiz. :** 90°		**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest **Driller :** T Higgs		**Checked :** [illegible]
Date Started :	16/10/08 **Date Completed :** 16/10/08 **Logged by :** CS		**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
							SC/ CL	Clayey SAND/sandy CLAY, dark brown, fine to medium grained, low plasticity (topsoil).	M		
					0.30		CL-Cl	CLAY, brown, low to medium plasticity, trace fine grained sand/silt.	M	F	
1	V-bit auger			SPT 2/3/5 N=8							
								At 1.5m, becoming brown and grey mottled, with red-brown ironstone gravel.		St	
2				SPT 3/5/6 N=11							
3								At 3.0m, increasing ironstone gravel to bands approx 150mm thick.		VSt	
				SPT 5/10/10 N=20							
4			▼	SPT 18	4.17						
				HB N=ref				Start of coring at 4.17 metres. For Cored interval, see Core Log Sheet.			
5											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 3/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH07**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 3**	
Position :	302248.0 E 6258633.0 N MGA94 / 56 **Surface RL:** 41.3m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :**
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	16/10/08 **Date Completed :** 16/10/08 **Logged by :** CS	**Date Logged :** 16/10/08	

DRILLING						MATERIAL					NATURAL FRACTURES		
Progress													
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2													
3													
4						4.17		Start of coring at 4.17 metres. For Non Cored interval, see Borehole Log Sheet.					
5	NMLC coring + HQ casing		5.00	(14)		4.90		SANDSTONE, brown, fine grained, moderate to thickly bedded, with carbonaceous laminations <1mm thick at variable spacing. CORE LOSS 120mm thick.	HW				4.22, BP, sub HZ, FE, PLN, RF 4.24, JT, VT, CN, PLN, RF, OP 4.27, BP, 5°, FE, CU/UN, RF/VR 4.43, BP 10°, FE+CLAY, PLN/CU, RF, OP 4.74, BP, sub HZ, X, PLN, RF, TI

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CORE LOG SHEET

GEO_COREHOLE 21178700.GPJ GHD_GEO_TEMPLATE.GDT 3/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH07**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 3**	
Position :	302248.0 E 6258633.0 N MGA94 / 56 **Surface RL:** 41.3m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	16/10/08 **Date Completed :** 16/10/08 **Logged by :** CS	**Date Logged :** 16/10/08	

DRILLING						MATERIAL					NATURAL FRACTURES		
Progress													
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
	NMLC coring + HQ casing			(0)		5.02		SANDSTONE, as previous.	MW				5.21&5.22, BP's, sub HZ, FE, PLN, VR, OP 5.22-5.24, SM, CLAY 5.29, JT, 80°, CN, ST/PLN, VR, OP 5.50, BP, 5°, FE+X, PLN, SO, TI 5.66, BP, sub HZ, X, PLN, RF, TI
								From 5.73m, becoming grey with bands of brown.	MW-SW				5.82, BP, 15°, FE+X, PLN, RF, TI
			6.00			6.00		End of borehole at 6.0 metres.					
6													
7													
8													
9													
10													

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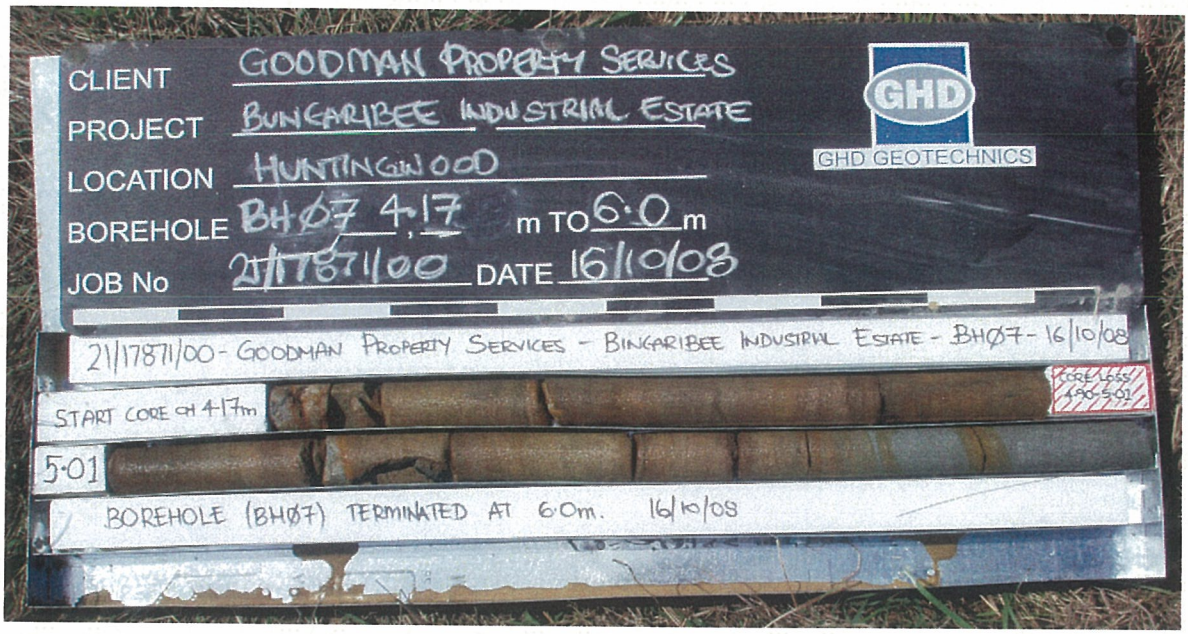
Job No. 21-17871-00


CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNGARIBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ7 4.17 m TO 6.0 m
JOB No 21/17871/00 DATE 16/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - GOODMAN PROPERTY SERVICES - BINGARIBEE INDUSTRIAL ESTATE - BHØ7 - 16/10/08
START CORE @ 4.17m
CORE LOSS
5.01
BOREHOLE (BHØ7) TERMINATED AT 6.0m. 16/10/08

BOREHOLE LOG SHEET

GEO_BOREHOLE 21178710O.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH08**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 3**	
Position :	302547.5 E 6258817.6 N MGA94 / 56 **Surface RL:** 50.8m approx AHD **Angle from Horiz. :** 90°		**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest **Driller :** T Higgs		**Checked :** RWC
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS		**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
							SC/ CL	Sandy CLAY/Clayey SAND, dark brown, fine grained sand, low plasticity (topsoil/fill).	M		
					0.30		CI-CH	CLAY, red brown, brown and grey mottled, medium to high plasticity, trace fine grained sand and rootlets (residual).	M	F	
				SPT 2/4/4 N=8							
1								From 0.9m, no red brown mottling.			Increased drilling resistance from 1.0m
	V-bit + Solid Flight Auger	Nil						1.5m, becoming grey with orange / red brown ironstone bands, some remnant rock structure.	M	St	
				SPT 6/4/5 N=9							
2											
					2.80			SHALE, dark grey, with black laminations, horizontally bedded, highly weathered to extremely weathered, very low to extremely low strength.			2.8m, Increased drilling resistance
3		HQ Casing		SPT 21/ 20 for 120mm HB N=ref	3.60						
								Start of coring at 3.6 metres. For Cored interval, see Core Log Sheet.			
4											
5											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 21178700.GPJ GHD_GEO_TEMPLATE.GDT 3/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH08**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		**SHEET 2 OF 3**
Location :	HUNTINGWOOD		
Position :	302547.5 E 6258817.6 N MGA94 / 56 **Surface RL:** 50.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWC
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES		
Progress												
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1													
2													
3								Start of coring at 3.6 metres. For Non Cored interval, see Borehole Log Sheet.					
						3.60		SHALE, grey brown, with brown iron stained bands, generally horizontally bedded, medium bedded, highly friable rock.	HW-EW				3.69, FZ, FE 3.80-3.82, FZ/BP's, 5-10°, FE+CLAY, UN, SO 3.94, BP/SM, HZ, CLAY, PLN, SO, OP
4	NMLC coring + HQ casing	<10% Loss		(0)									4.18, SM, 5mm CLAY 4.25, BP, ~HZ, CLAY, FRAG, IR, RF, OP 4.31, BP, HZ, CN, PLN, SO
								4.70-4.80m, siltstone/silty sandstone band from 4.80, with siltstone and fine sandstone laminations.	MW				4.69, BP, 20°, CN, PLN, SO, TI
5			4.99										

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 21178710O.GPJ GHD_GEO_TEMPLATE.GDT 3/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH08**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 3**	
Position :	302547.5 E 6258817.6 N MGA94 / 56 **Surface RL:** 50.8m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RMC
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	15/10/08 **Date Completed :** 15/10/08 **Logged by :** CS	**Date Logged :** 15/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES		
Progress												
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
6	NMLC coring + HQ casing	<10% Loss	6.00	(0)		6.00		As previous. From 5.33m, Shale, dark grey, indistinct bedding. Occasional siltstone/sandstone laminations.	MW				5.29, BP, HZ, FE, PLN, RF 5.83, BP, HZ, CN, PLN/UN, RF
								End of borehole at 6.0 metres.					
7													
8													
9													
10													

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNGARIBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BHØ8 , 3·60 m TO 6·0 m
JOB No 21/17871/00 DATE 15/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - START CORE AT 3·60m 15/10/08
4
5
END OF BOREHOLE BHØ8 AT 6·0m (15/10/08) BUNGARIBEE INDUSTRIAL ESTATE

BOREHOLE LOG SHEET

GEO_BOREHOLE_21178710O.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH09**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 1 OF 3**	
Position :	302733.0 E 6258469.0 N MGA94 / 56 **Surface RL:** 50.3m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Date Started :	17/10/08 **Date Completed :** 17/10/08	**Logged by :** CS	**Date :** 5/12/08

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
								Clayey SAND/Sandy CLAY, fine grained low plasticity (topsoil).	M		
					0.20						
							CI-CH	CLAY, orange brown, medium to high plasticity, with fine grained grained sand, trace coarse grained sand and fine sub-rounded to sub-angular gravel (colluvium/alluvium).		S-F	
				SPT 2/2/3 N=5	1.00						
1							CL	CLAY/Sandy CLAY, brown and grey mottled, fine grained sand, low to medium plasticity (residual).	M	St	
	V-bit + Solid Flight Auger			SPT 3/6/6 N=12							
2											
3				SPT 6/6/11 N=17				From 3.0m - with ironstone bands, and manganese oxide stained defects, grading to extremely weathered rock.			
					4.00						
4				SPT 9/17/ 23 for 110mm				SHALE, grey with brown bands, highly weathered low to very low strength.			
					4.43						
				HB N=ref				Start of coring at 4.43 metres. For Cored interval, see Core Log Sheet.			
5											

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH09**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 2 OF 3**	
Position :	302733.0 E 6258469.0 N MGA94 / 56 **Surface RL:** 50.3m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :**
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	17/10/08 **Date Completed :** 17/10/08 **Logged by :** CS	**Date Logged :** 17/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES		
Progress												
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
1												
2												
3												
4						4.43		Start of coring at 4.43 metres. For Non Cored interval, see Borehole Log Sheet.					
5				(0)				SHALE, grey with bands of brown and dark-grey/black, bedded from 5°-30°, indistinct bedding structure, highly friable.	HW-EW HW				4.55-4.65, FZ/SM, 20°, CLAY+FE gravel 4.71-4.73, SM, 15°, CLAY 4.76-4.79, FZ, FE 4.88, SM 10mm, 20° 4.95, SM, 5mm, 5°

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

CORE LOG SHEET

GEO_COREHOLE 21178700.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

Client :	GOODMAN PROPERTY SERVICES PTY LTD	**HOLE No. BH09**	
Project :	BUNGARIBEE INDUSTRIAL ESTATE		
Location :	HUNTINGWOOD	**SHEET 3 OF 3**	
Position :	302733.0 E 6258469.0 N MGA94 / 56 **Surface RL:** 50.3m approx AHD	**Angle from Horiz. :** 90°	**Processed :** RY
Rig Type :	HydroP Scout **Mounting:** Truck **Contractor :** Terratest	**Driller :** T Higgs	**Checked :** RWL
Casing Dia. :	HQ **Barrel (m) :** NMLC 3.5m **Bit :** Diamond (stepfaced)	**Bit Condition :** Good	**Date :** 5/12/08
Date Started :	17/10/08 **Date Completed :** 17/10/08 **Logged by :** CS	**Date Logged :** 17/10/08	

DRILLING						MATERIAL				NATURAL FRACTURES			
Progress													
SCALE (m)	Drilling & Casing	Water	Drill Depth (m)	(Core Loss / Run %)	SAMPLES & TESTS	Depth / (RL) metres	Graphic Log	Description ROCK TYPE, colour, grain size, structure (texture, mineral composition, hardness, alteration, cementation, etc. as applicable) and SOIL TYPE, moisture, colour, consistency, structure, minor components (origin)	Weathering	Estimated Strength $Is_{(50)}$ MPa EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	Spacing (mm) 20 40 100 300 1000	Visual	Additional Data (joints, partings, seams, zones and veins) Fracture type, orientation, infilling or coating, shape, roughness, other.
6	NMLC coring + HQ casing		5.45	(13)		5.93		As previous.	HW				5.03, JT, 45°, CLAY, PLN/UN, RF 5.04-5.17, JT, 80°, CLAY, PLN, CU, RF 5.41, BP, 25°, CLAY, PLN, SO 5.46, JT/BP, 70°, CLAY, ST, SO
			6.00			6.00		CORE LOSS 70mm thick. End of borehole at 6.0 metres.					5.80, BP, sub HZ, FE+CLAY, PLN/IR, SO
7													
8													
9													
10													

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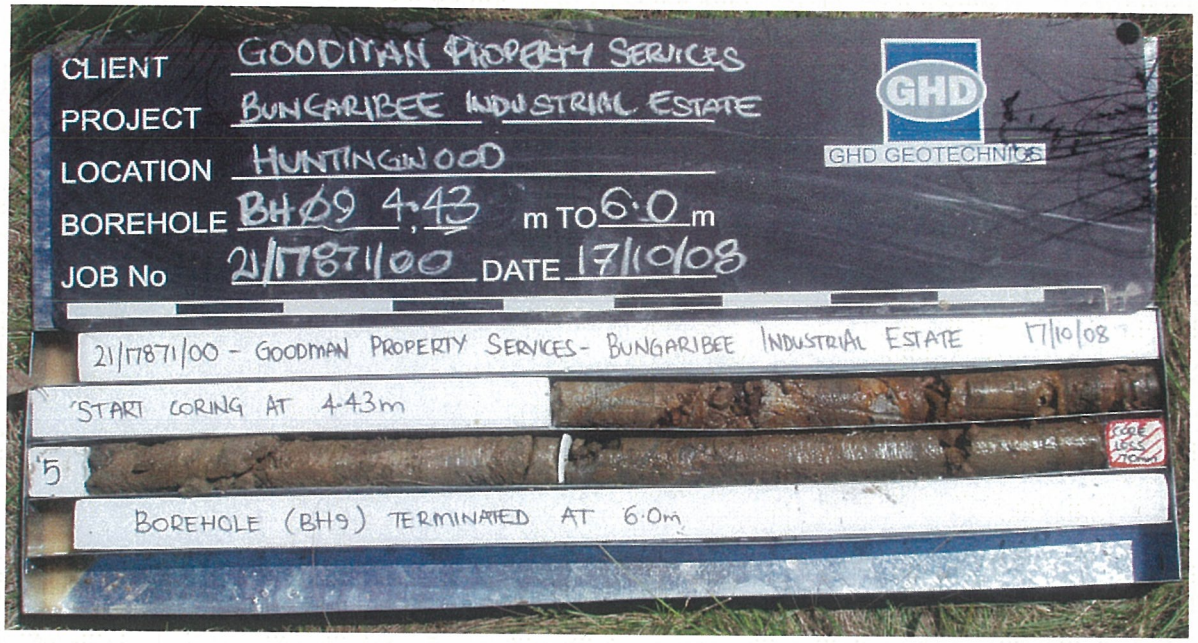
CLIENT GOODMAN PROPERTY SERVICES
PROJECT BUNGARIBEE INDUSTRIAL ESTATE
LOCATION HUNTINGWOOD
BOREHOLE BH09 4.43 m TO 6.0 m
JOB No 21/17871/00 DATE 17/10/08
GHD
GHD GEOTECHNICS
21/17871/00 - GOODMAN PROPERTY SERVICES - BUNGARIBEE INDUSTRIAL ESTATE 17/10/08
START CORING AT 4.43m
5
EDGE LOSS
BOREHOLE (BH9) TERMINATED AT 6.0m

Appendix B

Test Pit Logs

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP10

SHEET 1 OF 1

Position: 302211.0 E 6258493.0 N MGA94 / 56 **Surface RL:** 41.7m approx AHD **Processed:** RY

Method of Exploration: Backhoe CAT428C **Hole Size:** 1.2m x 3.5m **Checked:** RL

Date: 02/10/08 **Logged by:** CS **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.20		SM/ ML	Sandy SILT/Silty SAND, dark brown, fine grained, low plasticity, grass roots throughout (topsoil)	SM	St-VSt	50-100mm of fill at surface in areas of test pit
		D	0.90		Cl-CL	CLAY, light brown with grey brown mottles, low to medium plasticity, with fine to medium grained sand/sandy, trace coarse grained sand/fine sub-rounded lithic gravel, remnant roots (alluvium).	M	VSt	
1					SC/ CL	Clayey SAND/Sandy CLAY, brown and red brown mottles, low plasticity, fine grained, lightly cemented, remnant rootlets (residual).	M	VSt-H	
						From 1.5 - 1.8m, band of ironstone gravel.			
			1.90			SANDSTONE, grey and brown mottled, fine grained, horizontal to sub-horizontal bedding, highly to extremely weathered, very low strength, traces of iron and manganese oxide staining at base of test pit.			
2			2.20			End of test pit at 2.2 metres. Terminated on backhoe refusal. No free groundwater encountered.			
3									

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GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BANGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 21/10/08
TP10

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP11

SHEET 1 **OF** 1

Position: 302439.0 E 6258464.0 N MGA94 / 56 **Surface RL:** 48.8m approx AHD **Processed:** RY

Method of Exploration: Backhoe CAT428C **Hole Size:** 1.2m x 3.5m **Checked:** RWL

Date: 01/10/08 **Logged by:** CS **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine to medium grained, trace coarse sand and fine sub-rounded gravel (topsoil).	M		Only on western side of pit approx. 200mm of residual soil. Fill possibly colluvium.
			0.35						
		D			CI-CH	CLAY, brown and orange brown mottled, medium to high plasticity, trace medium to coarse grained sand and fine gravel (alluvium/colluvium).	M	F	
			0.70						
					CH	CLAY, red brown and grey mottled, high plasticity, trace fine grained sand (residual).	M	St	
1		B				From 1.3m, with ironstone bands/lenses.			
						From 1.7m, grades to extremely weathered shale.			
2									
		B	2.20			SILTSTONE/SHALE, grey and grey brown, laminated to very thinly bedded, horizontal bedding, highly weathered with extremely weathered clay bands, very low strength, manganese and iron oxide staining.			
			2.30			End of test pit at 2.3 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			
3									

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Job No. 21-17871-00


CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBE INDUSTRIAL DEVELOP.
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 1/10/08
TP11

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP12

SHEET 1 OF 1

Position: 302645.0 E 6258433.0 N MGA94 / 56	**Surface RL:** 51.8m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.2m x 3.5m	**Checked:** RML
Date: 07/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine grained, grass rootlets (topsoil).	VM		
			0.20		CL	Sandy CLAY, light brown, low plasticity, fine to medium grained sand, trace coarse sand/fine gravel (alluvium).	M	F	
			0.40		CL	Sandy CLAY, grey and brown mottled with bands/lenses of red brown ironstone gravel, low plasticity, fine grained sand, medium to coarse ironstone gravel lenses, roots (residual) (completely to extremely weathered sandstone).	M	VSt	
1		B							
						From 1.4m, reducing sand content with depth to trace/ with fine grained sand (extremely weathered shale).			
2		B							
			2.50			End of test pit at 2.5 metres. No free groundwater encountered.			
3									

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Job No. **21-17871-00**


CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/12871/00
LOCATION: HUNTINGWOOD
DATE: 7/10/08

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP13

SHEET 1 OF 1

Position: 302250.0 E 6258344.0 N MGA94 / 56 | **Surface RL:** 43.3m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.4m x 4.4m | **Checked:** RML

Date: 02/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SM	Silty SAND, brown, fine to medium grained (topsoil).	M		
			0.20		CL-CI	CLAY, light brown, low to medium plasticity, with fine to medium grained sand, trace coarse grained sand and fine sub-rounded gravel, remnant roots/rootlets (alluvium).	M	F-St	
		D				From 0.7m, reducing sand content, with red brown mottling.			
1			1.10		CI-CH	CLAY, grey and red brown mottled, with fine grained sand, remnant rootlets (residual).	M	St	
			1.30		SC	Clayey SAND, grey and light brown mottling, fine to medium grained cementation increasing with depth (residual).	M	VSt/D	
		D	1.70			SANDSTONE, grey and brown, fine to medium grained, horizontal to sub-horizontal bedding, highly weathered to extremely weathered, very low strength, manganese oxide staining at base of test pit.			
2			1.80			End of test pit at 1.8 metres. Terminated on backhoe refusal. No free groundwater encountered.			
3									

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Job No. 21-17871-00


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION: HUNTINGWOOD
DATE: 21/10/08
TP13

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP14

SHEET 1 OF 1

Position: 302379.0 E 6258367.0 N MGA94 / 56	**Surface RL:** 47.8m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.3m x 4.0m	**Checked:** RWL
Date: 03/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					ML	Sandy SILT, brown, low plasticity, fine grained sand, trace fine gravel (topsoil).	SM		
			0.20		CI-CH	CLAY, brown, medium to high plasticity, trace coarse lithic sand/fine sub-rounded lithic gravel, remnant roots (colluvium/alluvium). From 0.3m, with red-brown mottling.	M	F	
		D							
1			0.95		CH	CLAY, grey with orange brown and red brown ironstone mottles, high plasticity (residual).	M	F-St	
		D							
			1.50			SHALE, grey, orange brown and dark brown bands, very thinly bedded at approx 20°, extremely weathered bands with highly weathered bands increasing in thickness with depth, extremely low strength to low strength, evident manganese and iron oxide staining.			
2			2.20			End of test pit at 2.2 metres. Terminated on backhoe refusal, slow excavation. No free groundwater encountered.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


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CLIENT: GOODMAN PROPERTY SERVICE
PROJECT: BUNGARIBEE INDUSTRIAL DEVELO
JOB NO: 21/17877/00
LOCATION: HUNTINGWOOD
3/10/08
TP14

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP15

SHEET 1 OF 1

Position: 302519.0 E 6258294.0 N MGA94 / 56	**Surface RL:** 52.9m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.5m x 4.5m	**Checked:** RML
Date: 02/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine to medium grained, trace coarse grained sand / fine gravel (topsoil).	M		
			0.25		CL	CLAY, light brown, low plasticity, with coarse grained sand and fine sub-rounded gravel (alluvium).	M	St/MD	
		D							
			0.55		CI-CH	CLAY, light grey and orange brown mottled, medium to high plasticity, with medium to coarse lithic sand and fine sub-rounded to sub-angular lithic gravel (colluvium). From 0.7-0.8m, with medium to coarse sub-angular gravel clasts.	M	St	
		D	0.80		CH	CLAY, light grey and red-brown mottled, high plasticity, trace/with fine sand/silt, fragments/clasts of ironstone amongst ironstone bands, remnant rock structure. Ironstone band cementation increasing with depth (residual)	M	VSt	
1									
		B							
2			2.20			SILTSTONE/SHALE, brown and grey bands, very thinly bedded to thin horizontal bedding, highly weathered with extremely to completely weathered clay bands, very low to extremely low strength, iron and manganese oxide stained bedding partings and joints.			
			2.60			End of test pit at 2.6 metres. No free groundwater encountered.			
3									

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Job No. **21-17871-00**


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BANGARRA INDUSTRIAL DEVELOP
JOB NO: 21/12971/00
TP15
LOCATION. HUNTERWOOD
DATE 7/10/08

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP16

SHEET 1 OF 1

Position: 302818.0 E 6258211.0 N MGA94 / 56 | **Surface RL:** 57.1m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.5m x 4.6m | **Checked:** RMU

Date: 03/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SM	Sandy SILT, dark brown, low plasticity, fine to medium grained sand (topsoil).	M		
			0.30		CH	CLAY, brown and orange brown mottled, high plasticity, trace fine to medium grained lithic sand, remnant roots (colluvium/residual).	M	F-St	
1		B	1.00		CL	CLAY, grey and brown mottled, low plasticity, with fine grained sand/silt, sandy patches/lenses (residual)	M	VSt	
						From 1.4m, with ironstone lenses/bands, becoming lightly to moderately cemented (extremely weathered sandstone).		H	
2					CH	From 2.1m, no fine grained sand, no remnant rock structure, stiff to very stiff, high plasticity clay.		St-VSt	
		B				From 2.5m, some remnant rock structure.			
3			3.20			End of test pit at 3.2 metres. No free groundwater encountered.			

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Job No. **21-17871-00**


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 3/10/08
TP16

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP17

SHEET 1 OF 1

Position: 302203.0 E 6258225.0 N MGA94 / 56	**Surface RL:** 42.4m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.6m x 4.4m	**Checked:** PMC
Date: 02/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SM	Silty SAND, brown, fine to medium grained (topsoil).	M		
			0.40		CL	CLAY, light brown, low plasticity, trace fine grained sand, numerous remnant rootlets and roots, sand content increasing with depth (alluvium).	M	F	
		D	0.90		SC	Clayey SAND, light brown, fine grained increasing with depth, numerous remnant roots and rootlets (alluvium).	M	F/MD	
1									
		D				From approx 1.4m, grades to SAND with clay/silt, lightly cemented ironstone lenses.	VM		
	▼						W		
2						From 2.0m, grey and brown mottled.			
		D	2.60			End of test pit at 2.6 metres.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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GHD GEOTECHNICS
IENT: GOODMAN PROPERTY SERVICES
PROJE T: BUNGARIBE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
2/10/08
TP17

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP18

SHEET 1 **OF** 1

Position: 302441.0 E 6258242.0 N MGA94 / 56	**Surface RL:** 49.7m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.2m x 3.5m	**Checked:** RWL
Date: 03/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.20		CL	Sandy CLAY/SILT, dark brown, low plasticity, fine to medium grained sand, with fine to medium sub-rounded gravel (topsoil).	M	F	
		B	0.70		CI-CH	CLAY, red-brown with brown mottling, medium to high plasticity, with fine grained sand, trace fine to coarse sub-rounded to angular gravel, few coarse gravel, rootlets and remnant rootlets (colluvium/residual)	M	F-St	
			0.80		CL	Sandy CLAY, brown and light brown mottled, low plasticity, fine to medium grained sand, numerous remnant roots (residual).	M	St	
1						SANDSTONE, brown with red-brown bands, thinly bedded at approx 30°, highly fractured, highly weathered, low strength.			
			1.40			SHALE, grey with red brown bands, thinly bedded at 30°, highly weathered with extremely to completely weathered clay bands, very low to extremely low strength.			
2			2.10			End of test pit at 2.1 metres. No free groundwater encountered.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00


CLIENT: Goodman Property
PROJECT: Rudgwick Industrial
JOB NO: 21/17211/001
LOCATION: Rudgwick
DATE: 2/10/21
TP18

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP19

SHEET 1 **OF** 1

Position: 302634.0 E 6258127.0 N MGA94 / 56	**Surface RL:** 55.0m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.3m x 4.0m	**Checked:** RMC
Date: 03/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.15		SM	Silty SAND, brown, fine to coarse grained, with fine to coarse round to angular gravel (topsoil/fill).	M		
			0.40		CH	CLAY, red brown, high plasticity, trace/with coarse sand and fine sub-rounded to angular gravel (colluvium).	M	St	
1			1.40		CI-CH	CLAY, grey with red brown and brown mottling, medium to high plasticity, trace/with fine grained sand/silt, trace ironstone gravel (residual). From 0.7m, ironstone lenses/bands, moderately cemented, grading to extremely weathered shale.	M	VSt	
2		B	2.00			SILTSTONE/SHALE, grey, brown and red-brown bands, very thinly bedded to laminated at 0-10°, alternating highly weathered and extremely to completely weathered bands, extremely low to very low strength.			
						End of test pit at 2.0 metres. Terminated on backhoe refusal. No free groundwater encountered.			
3									

GEO_TEST PIT_211787100.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

See standard sheets for details of abbreviations & basis of descriptions

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57 Herbert Street, Artarmon NSW 2064 Australia
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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIEE INDUSTRIAL DEVELOP
JOB NO: 21/17971/00
LOCATION: HUNTINGWOOD
DATE: 3/10/08
TP19

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP20

SHEET 1 OF 1

Position: 302216.0 E 6258034.0 N MGA94 / 56	**Surface RL:** 43.6m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.8m x 3.9m	**Checked:** RWL
Date: 02/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.15		SM	Silty SAND, dark brown, fine to medium grained (topsoil).	M		
		B			CI-CH	CLAY, light brown, medium to high plasticity, with fine grained sand (alluvium).	M	F	
		D				From 0.5m, trace to no sand, with grey mottles.			
			0.80		CH	CLAY, light brown with grey mottles, high plasticity (residual).	M	St-VSt	
1						From 1.2-1.3m, ironstone gravel band.			
						From 1.4-1.5m, ironstone gravel band.			
			1.50		SC	Clayey SAND, grey and light brown mottled, fine to medium grained sand, lightly cemented, trace ironstone gravel (residual).	M		
		D							
2			2.10			End of test pit at 2.1 metres. No free groundwater encountered.			
3									

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Job No. 21-17871-00


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION: HUNTINGWOOD
DATE 2/10/08
TP20

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP21

SHEET 1 **OF** 1

Position: 302505.0 E 6257984.0 N MGA94 / 56	**Surface RL:** 52.2m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 2.8m x 4.5m	**Checked:** RWL
Date: 02/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.30		SC	Clayey SAND, dark brown, fine to coarse grained, numerous fine roots (topsoil).	M		
		D/B	0.50		CH	CLAY, light brown, high plasticity, trace fine sub-rounded to sub-angular lithic gravel (alluvium).	M	St	
1		B	1.50		CH	CLAY, light grey with orange brown mottles, high plasticity, trace fine grained sand (residual). From 1.0m, becoming light grey and red brown, 300mm ironstone band/iron cemented band (extremely weathered shale). Grades to	M	St-VSt	
2			2.50			SHALE/SILTSTONE, brown with grey bands, highly weathered with extremely weathered grey clayey bands, low to very low strength, manganese oxide stained joints and bedding partings, very thinly horizontal bedding.			
3						End of test pit at 2.5 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			

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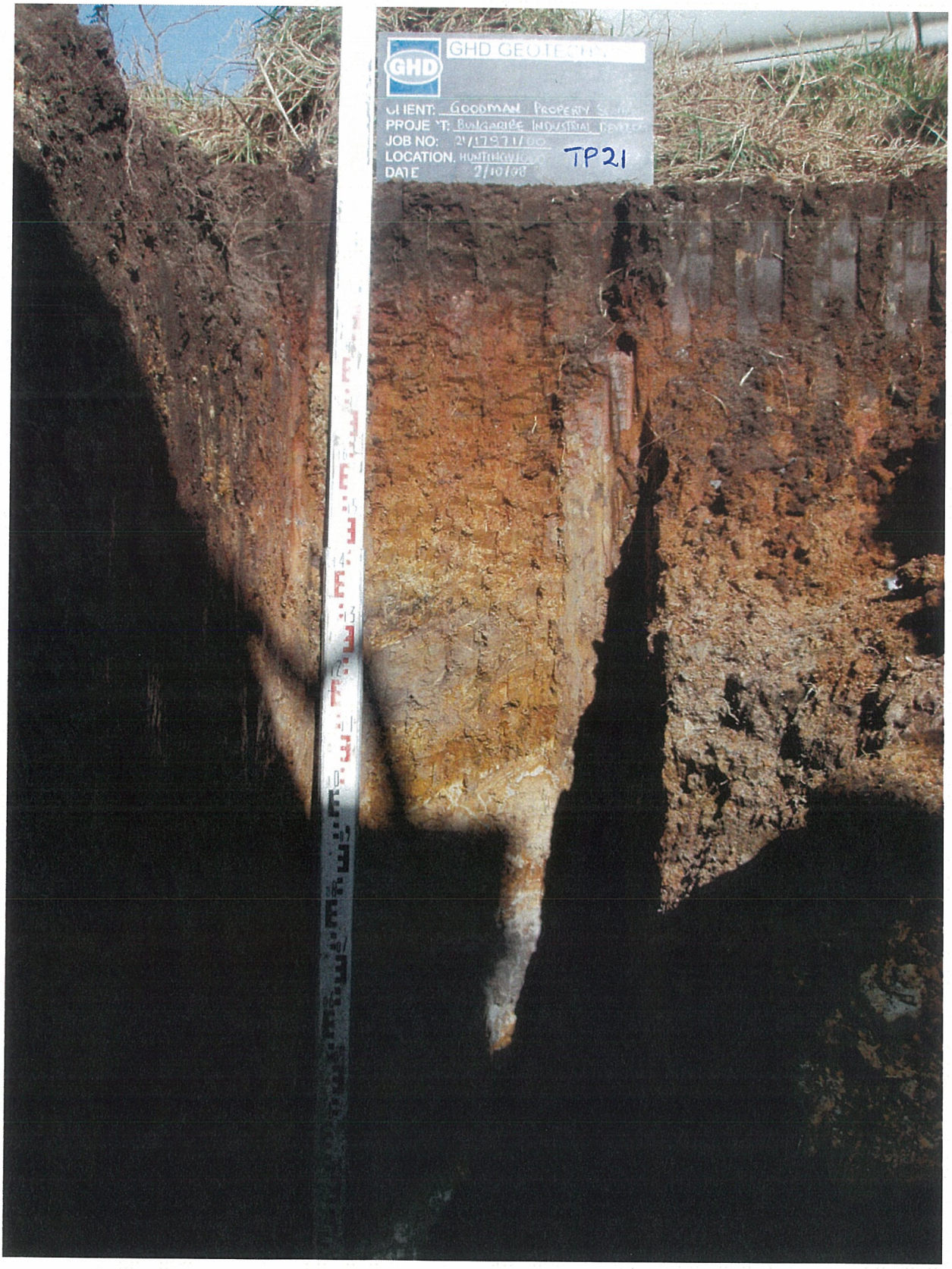
GHD GEOTECH
CLIENT: GOODMAN PROPERTY
PROJECT: BULGARRA INDUSTRIAL
JOB NO: 21/17971/00
LOCATION: HUNTINGWOOD
DATE 2/10/08
TP21

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP22

SHEET 1 OF 1

Position: 302246.0 E 6258551.0 N MGA94 / 56	**Surface RL:** 42.3m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.4m x 4.5m	**Checked:** RML
Date: 02/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SM	Silty SAND, brown, fine to medium grained, with fine to medium gravel (topsoil).	M		
			0.25		GC	Sandy Gravel, light brown, fine to coarse grained sand, fine to medium, rounded to sub-rounded gravel (alluvium/fill).	M		
		D	0.40		CI-CH	CLAY, red-brown and brown mottled, medium to high plasticity, with/trace coarse grained sand and fine to coarse sub-rounded to sub-angular lithic gravel (colluvium)	M	F-St	
1		D			CH	From 0.9m, reducing sand and gravel content with depth. Trace coarse grained sand / fine gravel.			
			1.40		CH	CLAY, light grey with orange brown and red brown mottles, high plasticity, with bands/lenses of gravel (fragmented iron rich rock) (residual).	M	St-VSt	
		D				From 1.7m, grading to extremely weathered shale/siltstone with iron cemented lenses.			
2			2.00			End of test pit at 2.0 metres. No free groundwater encountered.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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Job No. **21-17871-00**


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BANGARRÉE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION: HUNTINGWOOD
DATE: 21/10/08
TP22

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP23

SHEET 1 OF 1

Position: 302432.0 E 6258542.0 N MGA94 / 56 | **Surface RL:** 47.1m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.2m x 4.5m | **Checked:** RMC

Date: 01/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine to coarse grained, trace fine round to sub-rounded gravel. Fragments of building rubble at surface (topsoil).	M		
			0.20		CH	CLAY, orange brown, high plasticity, trace coarse grained sand and fine sub-rounded to sub-angular gravel (colluvium).	M	VSt	
		B	0.50		CH	CLAY, light grey with orange brown/red brown mottles reducing with depth, high plasticity, trace fine to medium grained sand and fine to medium sub-angular ironstone gravel (residual).	M	St	
1								VSt	
2						From 2.0m, with ironstone lenses, extremely to completely weathered rock.		H	
		B	2.60			SHALE, dark grey brown, horizontally bedded, highly weathered, low to very low strength, some manganese oxide staining.			
3			3.00			End of test pit at 3.0 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			

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Job No. 21-17871-00


GHD GEOTECHNICS
CLIENT: Goodman Property
PROJE T: Bangarra Industrial
JOB NO: 21/13871/00
LOCATION: Huntly Wood
DATE: 11/01/
TP35

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP24

SHEET 1 OF 1

Position: 302606.0 E 6258493.0 N MGA94 / 56	**Surface RL:** 52.2m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.2m x 4.2m	**Checked:** RML
Date: 03/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.20		SM	Silty SAND, dark brown, fine to medium grained, with fine sub-rounded gravel, numerous grass rootlets (topsoil).	M		
		B	0.80		CH	CLAY, brown, high plasticity, with fine to medium sub-rounded lithic gravel/gravelly (alluvium/colluvium). From 0.5m, red brown and grey mottled, trace gravel.	M	F-St	
1		D	1.30		CH	CLAY, light grey with red brown and orange brown mottles, high plasticity, with medium to coarse angular ironstone gravel (residual).	M	VSt	
2			2.20			SANDSTONE, light grey with red brown bands and lenses, fine grained, horizontal bedding, highly weathered with extremely to completely weathered bands, very low to extremely low strength.			
3						End of test pit at 2.2 metres. No free groundwater encountered.			

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Job No. **21-17871-00**


GHD GEOTECHNICS
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
TP24
3/10/08

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP25

SHEET 1 OF 1

Position: 302702.0 E 6258511.0 N MGA94 / 56 | **Surface RL:** 51.5m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.5m x 4.0m | **Checked:** RMC

Date: 07/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine grained, grass root/rootlets (topsoil).	M-VM		
			0.15		CL-CI	CLAY, orange brown and brown mottled, low to medium plasticity, trace fine grained sand and fine to medium sub-rounded gravel (residual).	M	F	
1						From 0.8m, brown, grey and orange brown mottling, reducing orange brown mottling with depth, reducing gravel content.			
			1.40		CL	Sandy CLAY, brown and grey mottled, low plasticity, fine grained sand (residual).	M	F-St	
2		B							
			2.60			End of test pit at 2.6 metres.			
3									

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CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP.
JOB NO: 21/17977/00
LOCATION: HUNTINGWOOD
7/10/08
TP25

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP26

SHEET 1 OF 1

Position: 302841.0 E 6258482.0 N MGA94 / 56 | **Surface RL:** 54.3m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.5m x 4.0m | **Checked:** RWL

Date: | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.15		CL	Sandy CLAY, dark brown, low plasticity, fine grained sand, grass roots (topsoil).	M	S-F	
			0.35		CL	CLAY, brown, low plasticity, trace fine grained sand and fine to medium sub-rounded gravel (alluvium).	M	F	
		B			CH	CLAY, red brown and grey mottled, high plasticity, gravelly ironstone bands, up to 30mm sub-rounded gravel fragments (residual).	M	St	
1		D				From 0.9m, grey with red brown mottles.		VSt	
		D							
2		B							
		D				From 2.6m, some remnant rock structure, ie; extremely weathered shale, some highly weathered lenses/bands.			
3			3.20			End of test pit at 3.2 metres. No free groundwater encountered.			

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00


GHD GEOTECHNICS
IENT: GOODMAN PROPERTY SERVICES
ROJE T: BUNGARIEE INDUSTRIAL DEVELOP.
B NO: 21/17871/00
CATION. HUNTINGWOOD
TP26

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP27

SHEET 1 OF 1

Position: 302328.0 E 6258629.0 N MGA94 / 56 | **Surface RL:** 42.7m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.4m x 4.0m | **Checked:** RAL

Date: 02/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.20		ML	Sandy SILT, brown, low plasticity, fine to medium grained sand, numerous grass rootlets (topsoil).	M		
		D	0.45		GP	Sandy GRAVEL, brown, fine to medium, sub-rounded to rounded gravel, fine to coarse grained sand, trace/with silt (alluvium/fill).	M		Variable depth of Sandy Gravel across test pit
		D	0.90		CI-CH	CLAY, red brown and brown mottled, medium to high plasticity, trace fine to coarse, sub-angular to sub-rounded gravel, few coarse gravel, remnant roots/rootlets (colluvium).	M	St	
1		D	1.80		CH	CLAY, grey with brown mottling, bands of red brown ironstone, high plasticity, brown sandy bands (residual).	M	St	
2			2.25			Interbedded SILTSTONE/SANDSTONE, grey with brown lenses, fine grained, laminated to very thinly bedded, extremely weathered, very low strength to extremely low strength.			
3						End of test pit at 2.25 metres. No free groundwater encountered.			

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 21-17871-00


CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP.
JOB NO: 21/17971/00
LOCATION: HUNTINGWOOD
DATE 2/10/08
TP27

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP28

SHEET 1 OF 1

Position: 302401.0 E 6258629.0 N MGA94 / 56	**Surface RL:** 44.2m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.4m x 4.0m	**Checked:** RMC
Date: 30/09/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC/ CL	Sandy CLAY/Clayey SAND, dark brown, low plasticity, fine to coarse grained (topsoil).	M		
			0.40		CH	Sandy CLAY, brown, low plasticity, fine to medium grained sand, trace fine sub-rounded gravel, remnant roots and fine rootlets (alluvium/residual).	M	St	
		D/B				From 0.8m, brown with grey mottles, completely weathered shale with ironstone bands/lenses.			
1		D				From 1.1-1.3m, band of ironstone gravel.	VM		
						From 1.5-1.8m, band/lense of ironstone.	VM-W		
2		D	2.10			End of test pit at 2.1 metres. No free groundwater encountered.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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TP28

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP29

SHEET 1 OF 1

Position: 302591.0 E 6258636.0 N MGA94 / 56 | **Surface RL:** 49.3m approx AHD | **Processed:** RY

Method of Exploration: Backhoe CAT428C | **Hole Size:** 1.4m x 4.0m | **Checked:** RMC

Date: 07/10/08 | **Logged by:** CS | **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
			0.25		CL	CLAY, brown, low plasticity, with fine to medium, sub-rounded to sub-angular gravel (topsoil).	M		
		D	0.60		CI-CH	CLAY, light grey brown with lenses of dark brown 'topsoil' material and roots, medium to high plasticity, roots up to 20mm (residual/alluvium).	M	F-St	
		D	0.95		CH	CLAY, grey with red brown and orange-brown mottles, high plasticity (residual).	M	St	
1			1.40			SILTSTONE/SANDSTONE, brown and red-brown, fine grained, thinly bedded, ironstone bands, highly weathered, very low strength.			
		D	2.25			SHALE, light grey with red brown mottles/lenses, generally horizontally bedded, extremely weathered with highly weathered siltstone bands, extremely low strength.			
2						End of test pit at 2.25 metres. Terminated on backhoe refusal on siltstone. No free groundwater encountered.			
3									

GEO_TEST PIT_21178710O.GPJ GHD_GEO_TEMPLATE.GDT 1/12/08

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


GHD GEOTECHNICS
GHD
CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP.
JOB NO: 21/17971/00
LOCATION. HUNTINGWOOD
DATE 7/10/08
TP29

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP32

SHEET 1 OF 1

Position: 302261.0 E 6258743.0 N MGA94 / 56	**Surface RL:** 40.8m approx AHD		**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.3m x 4.0m		**Checked:** PMC
Date: 03/10/08	**Logged by:** CS		**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					CL	Sandy CLAY, dark brown, low plasticity, fine grained sand, grass rootlets (topsoil).	M	F	
			0.20		CI-CH	CLAY, brown with grey mottling, medium to high plasticity, with fine to medium grained sand, some lithic, remnant roots, lithic sand reducing with depth (alluvium).	M	F	
		B							
			0.95		CI-CH	CLAY, brown and grey mottled, medium to high plasticity, with fine grained sand, fine rootlets. Some sandy bands/lenses, lightly cemented in regions, sand generally increasing with depth (residual).	M	St	
1			1.40		SC/CL	Sandy CLAY/Clayey SAND, brown and grey mottled, fine grained sand, low plasticity (residual).	M	St/MD	
		D							
2	▶		2.10			End of test pit at 2.1 metres.			Seepage at back of pit
3									

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00

JOB NO:
LOCATION
DATE
TP32

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP33

SHEET 1 **OF** 1

Position: 302472.0 E 6258735.0 N MGA94 / 56 **Surface RL:** 47.3m approx AHD **Processed:** RY

Method of Exploration: Backhoe CAT428C **Hole Size:** 2.2m x 4.3m **Checked:** RWL

Date: 30/09/08 **Logged by:** CS **Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, brown, fine to medium grained, trace fine sub-rounded gravel, grass rootlets (topsoil).	M		
			0.15		CL-CI	CLAY, red brown and orange brown/brown, low to medium plasticity, trace fine to medium grained sand and fine sub-rounded to sub-angular gravel (colluvium possible alluvium).	M	St	
		D				At 0.5m, 100mm band of clayey GRAVEL, fine to coarse rock fragments (siltstone), angular to sub-angular.	M		
		D	0.60		SC	Clayey SAND, grey and light brown bands, low plasticity, fine to medium grained (extremely weathered sandstone) (residual).	M	VSt/D	
						From 0.8m, with red brown ironstone bands.			
1			1.00		CI-CH	CLAY, light grey with orange-brown and red brown mottles, medium to high plasticity, occasional remnant roots, trace fine rootlets (residual).	M	VSt	
		D				From 1.6m, becoming grey, with ironstone bands/lenses, grading to extremely weathered shale, extremely low strength.			
2			2.10			End of test pit at 2.1 metres. No free groundwater encountered.			
3									

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 21-17871-00


GHD GEOTECHNICS
GOODMAN PROPERTY SERVICES
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 30/9/08
TP33

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP34

SHEET 1 OF 1

Position: 302623.0 E 6258701.0 N MGA94 / 56	**Surface RL:** 49.3m approx AHD	**Processed:** RY
Method of Exploration: Backhoe CAT428C	**Hole Size:** 2.2m x 4.3m	**Checked:** RNL
Date: 30/09/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, dark brown, fine to medium grained, trace fine gravel (topsoil).	M		Remnant roots to 1.3m deep
		D	0.30		CI-CH	CLAY, brown/light brown, medium to high plasticity, trace coarse grained sand/fine rounded to sub-rounded gravel (alluvium).	M	F-St	
		D/B	0.50		CH	CLAY, light grey with orange brown and red brown mottles/speckles, high plasticity, trace lightly cemented ironstone gravel/nodules (residual).	M	St	
1									
						From 1.7m, increasing ironstone lenses, few orange brown mottles.			
2			2.10			SHALE, grey with red brown bands/lenses, generally horizontally bedded, extremely to completely weathered, very low to extremely low strength.			
			2.60			End of test pit at 2.6 metres. Terminated on backhoe refusal on ironstone/iron rich shale. No free groundwater encountered.			
3									

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Job No. 21-17871-00


OTECH
PROPERTY
INDUSTRIAL

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP35

SHEET 1 OF 1

Position: 302397.0 E 6258867.0 N MGA94 / 56	**Surface RL:** 44.6m approx AHD	**Processed:** HW
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.3m x 2.0m	**Checked:** PMC
Date: 30/09/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
					SC	Clayey SAND, fine to medium grained, abundant grass roots (topsoil).	M		
			0.30						
		D			CL/ SC	Sandy CLAY/Clayey SAND, brown and light brown mottled, fine grained sand, low plasticity, trace/with fine to medium sub-rounded to rounded gravel, numerous rootlets (alluvium).	M	VSt	
			0.45		CL-Cl	CLAY, red brown and brown mottled, low to medium plasticity, with fine to medium grained sand, trace fine to coarse sub-rounded to sub-angular gravel, remnant root/rootlets, numerous fine rootlets (alluvium/colluvium).	M	VSt	
		D/B	0.90		CH	CLAY, grey with orange brown mottled, high plasticity, numerous fine rootlets (residual possible alluvium).	M	St	
1						From 1.4m, lightly cemented ironstone bands/lenses, becoming extremely weathered rock.			
			1.80			SILTSTONE/SHALE, grey with red brown and brown bands, horizontally bedded, extremely weathered with highly weathered, very low strength, iron and manganese oxide stained joints/bedding partings.			
2			2.00			End of test pit at 2.0 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			
3									

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Job No. 21-17871-00


CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP.
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 30/9/08
TP35

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP36

SHEET 1 OF 1

Position: 302507.0 E 6258845.0 N MGA94 / 56	**Surface RL:** 48.8m approx AHD	**Processed:** HW
Method of Exploration: Backhoe CAT428C	**Hole Size:** 1.4m x 4.5m	**Checked:** PML
Date: 30/09/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
						Sandy CLAY, brown, low plasticity, fine to coarse rubble gravel. Fragments of brick and concrete (fill).	M		
			0.30		CI-CH	CLAY, brown with red brown mottling, medium to high plasticity (residual).	M	St-VSt	
		D/B				From 0.7m, becoming grey brown and red brown mottled, with lightly to moderately cemented ironstone lenses / gravel.			
1									
			1.40		CL-CI	SILTSTONE / SHALE, grey with grey brown lenses, thinly to very thinly bedded, very low and low strength bands, some manganese oxide stained joints, moderately to highly weathered.	M	VSt	
		D/B							
2			2.10			End of test pit at 2.1 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			
3									

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CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION: HUNTINGWOOD
30/9/08
TP36

TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP37

SHEET 1 OF 1

Position: 302668.0 E 6258813.0 N MGA94 / 56	**Surface RL:** 48.3m approx AHD	**Processed:** HW
Method of Exploration: Backhoe CAT428C	**Hole Size:** 2.2m x 5.0m	**Checked:** pMc
Date: 30/09/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
						Clayey SAND, dark brown, fine to medium grained, with fine to medium rounded to sub-rounded gravel (topsoil/alluvium).	VM	S/L	Seepage around roots
			0.30						
		D/B			CI-CH	Sandy CLAY, medium to high plasticity, fine grained sand, trace fine sub-rounded to sub-angular gravel, remnant roots (alluvium).	VM	S-F	
1			1.00						
		D			CI	Sandy CLAY, brown and grey mottled, fine grained sand (residual).	M	St	
						From 1.5m, red brown bands / lenses of ironstone, trace ironstone gravel.			
		D/B							
2						2.0m, ironstone lenses more regular, well cemented (completely weathered SILTSTONE / SANDSTONE).			
		D							
			2.70			End of test pit at 2.7 metres.			
3									

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TEST PIT LOG SHEET

Client: GOODMAN PROPERTY SERVICES PTY LTD

Project: BUNGARIBEE INDUSTRIAL ESTATE

Location: HUNTINGWOOD

HOLE No. TP38

SHEET 1 OF 1

Position: 302752.0 E 6257981.0 N MGA94 / 56	**Surface RL:** 57.8m approx AHD	**Processed:** HW
Method of Exploration: Backhoe CAT428C	**Hole Size:** 2.0m x 4.3m	**Checked:** RWC
Date: 03/10/08	**Logged by:** CS	**Date:** 5/12/08

Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description (SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength)	Moisture Condition	Consistency / Density Index	Comments Observations
						Sandy SILT, dark brown, low plasticity, fine to medium grained sand, with fine sub-rounded gravel (topsoil).	M		
			0.40		CH	CLAY, red brown, high plasticity, trace coarse lithic sand and fine sub-rounded lithic gravel (colluvium).	M	S-F	
		B				From 0.7m, with grey mottling, few gravel / sand particles, remnant roots.		F	
1			1.30		CI	Sandy CLAY, brown and grey mottled, medium plasticity, fine to medium grained sand, gravelly ironstone bands / lenses increasing with depth, lightly cemented (residual).	M	VSt	
		B				From 2.5m, numerous closely spaced ironstone bands / ironstone gravel bands 20-50mm thick at 20-50mm spacing.			
2									
3			3.10			End of test pit at 3.1 metres. Terminated on backhoe near refusal, slow excavation. No free groundwater encountered.			

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CLIENT: GOODMAN PROPERTY SERVICES
PROJECT: BUNGARIBEE INDUSTRIAL DEVELOP
JOB NO: 21/17871/00
LOCATION. HUNTINGWOOD
DATE 3/10/08
TP38

Appendix C

DCP Test Results

DYNAMIC CONE PENETROMETER LOG SHEET

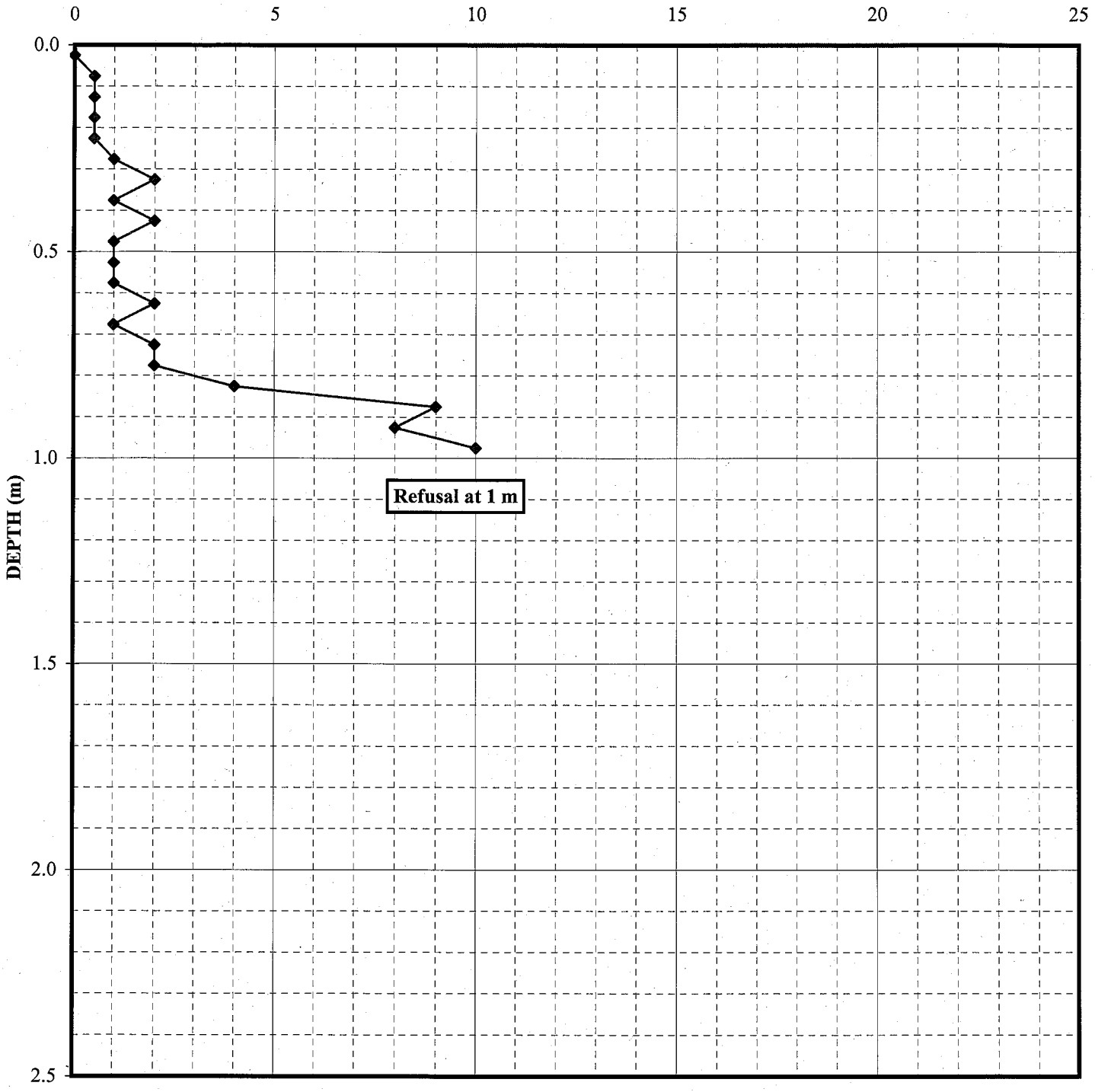
Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP12

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position:	**Chainage:**	**Date:**	07/10/2008
Elevation:	**Offset:**	**Operator:**	CS

NUMBER OF BLOWS TO PENETRATE 50 mm



Comments:

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Job No. **21-17871-00**

File: DCP12.xls

Template: \\G:21\Geo_LAB\DCP Results\GHD_ATN_DCP2007.XLT
File:GHD_ATN_DCP20071

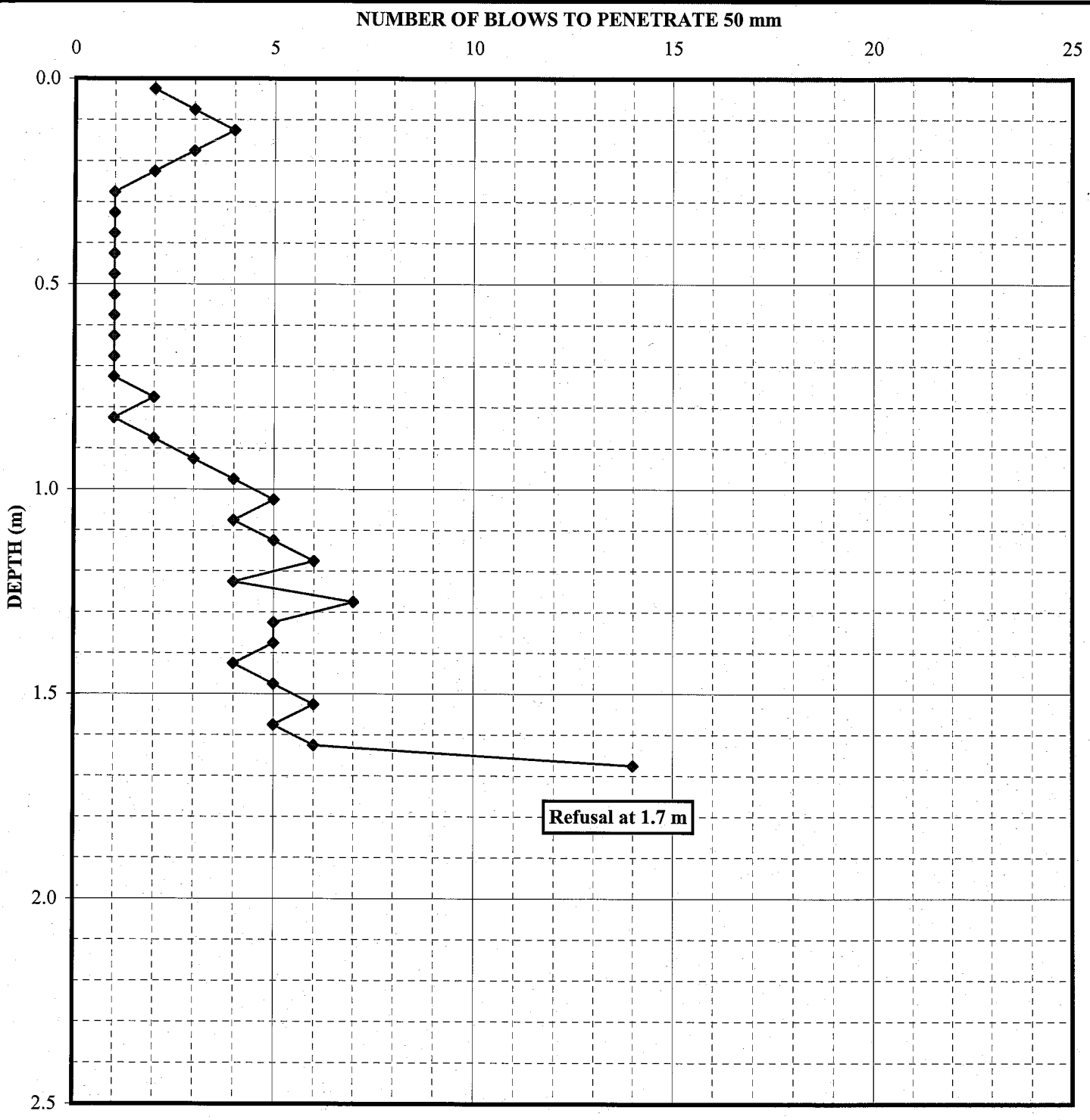
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP14

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 03/10/2008
Elevation: **Offset:** **Operator:** CS



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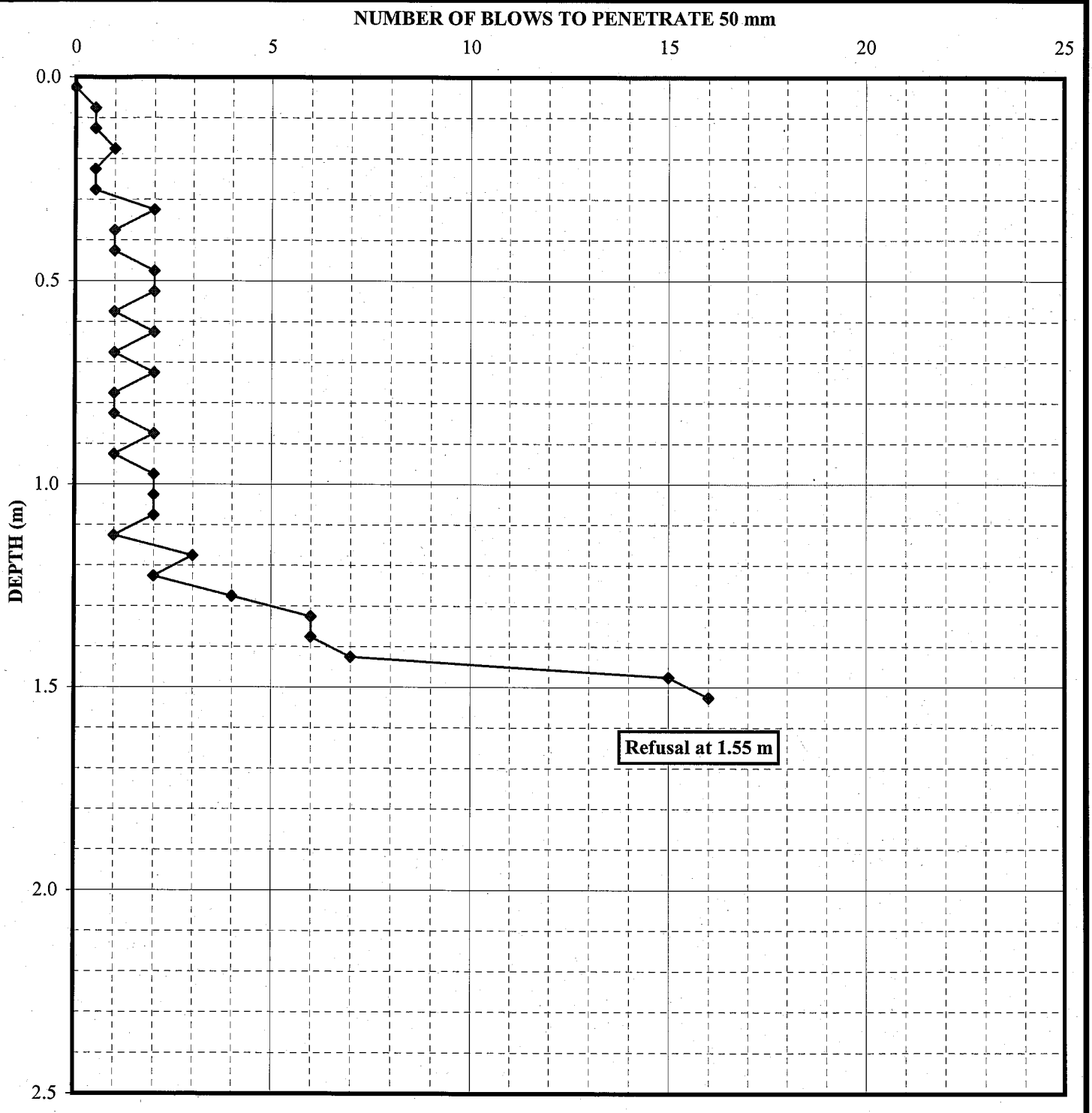
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP16

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 03/10/2008
Elevation: **Offset:** **Operator:** CS



Comments:

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Job No. **21-17871-00**
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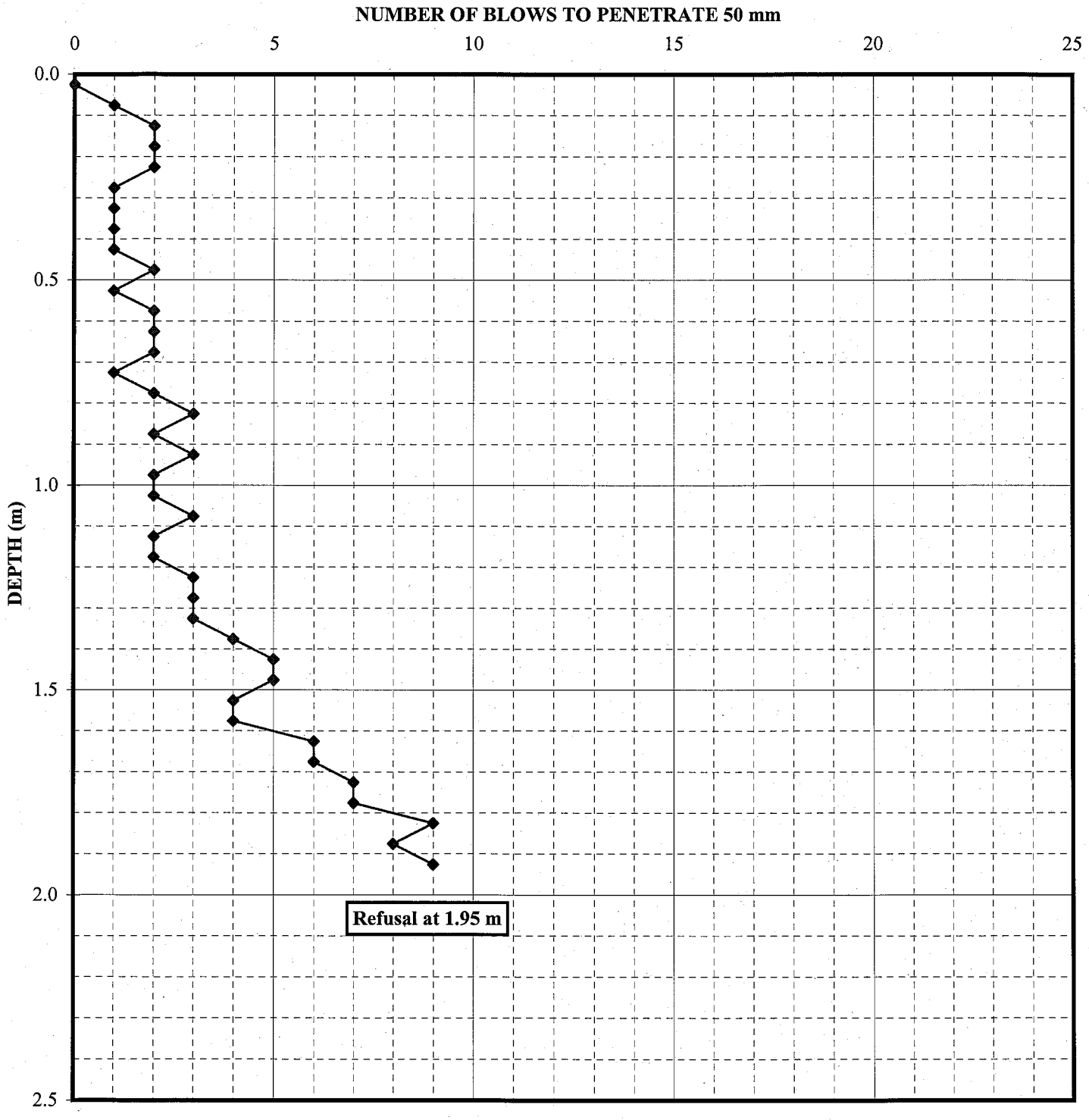
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP17

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 02/10/2008
Elevation: **Offset:** **Operator:** CS



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Job No. **21-17871-00**
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File:G:\Geo_Lab\DCP Results\2117871\DCP16.xls

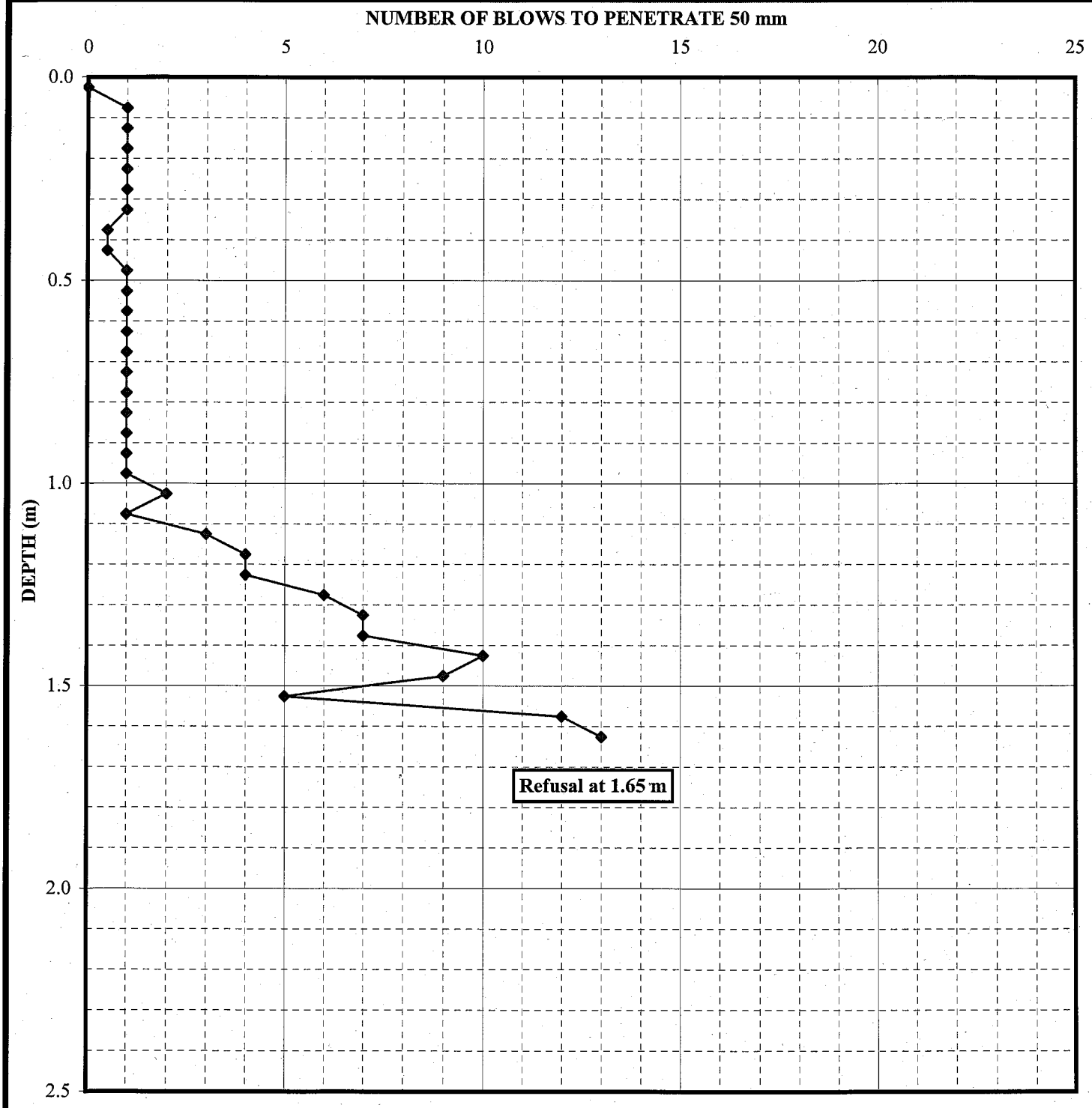
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP21

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position:	**Chainage:**	**Date:**	02/10/2008
Elevation:	**Offset:**	**Operator:**	CS



Comments:

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Job No. **21-17871-00**

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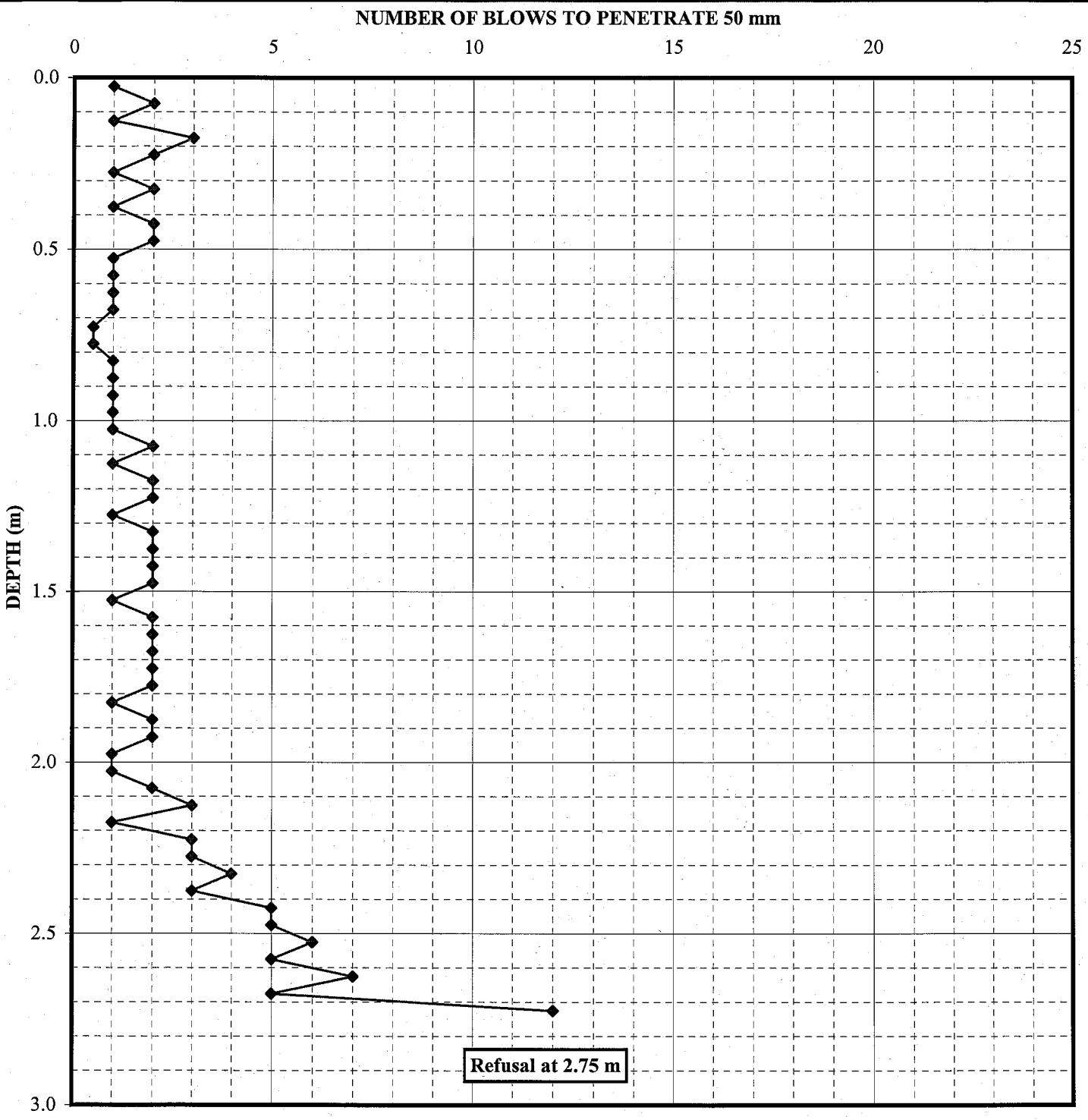
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP23

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 01/10/2008
Elevation: **Offset:** **Operator:** CS



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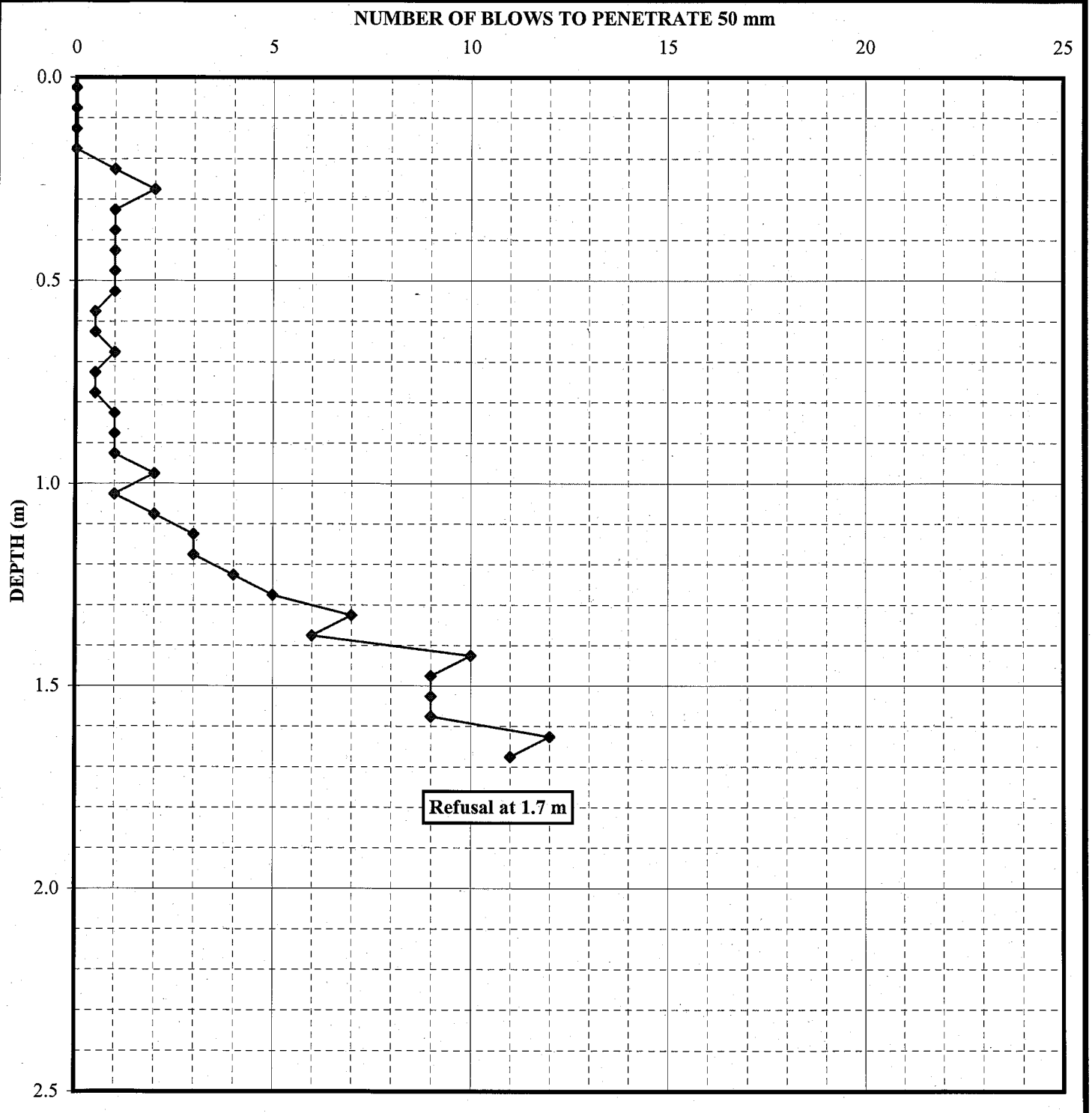
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP26

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 01/10/2008
Elevation: **Offset:** **Operator:** CS



Comments:

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Telephone: 61 2 9462 4700 Fax: 61 2 9462 4710 Email: atnmail@ghd.com.au
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Job No. **21-17871-00**
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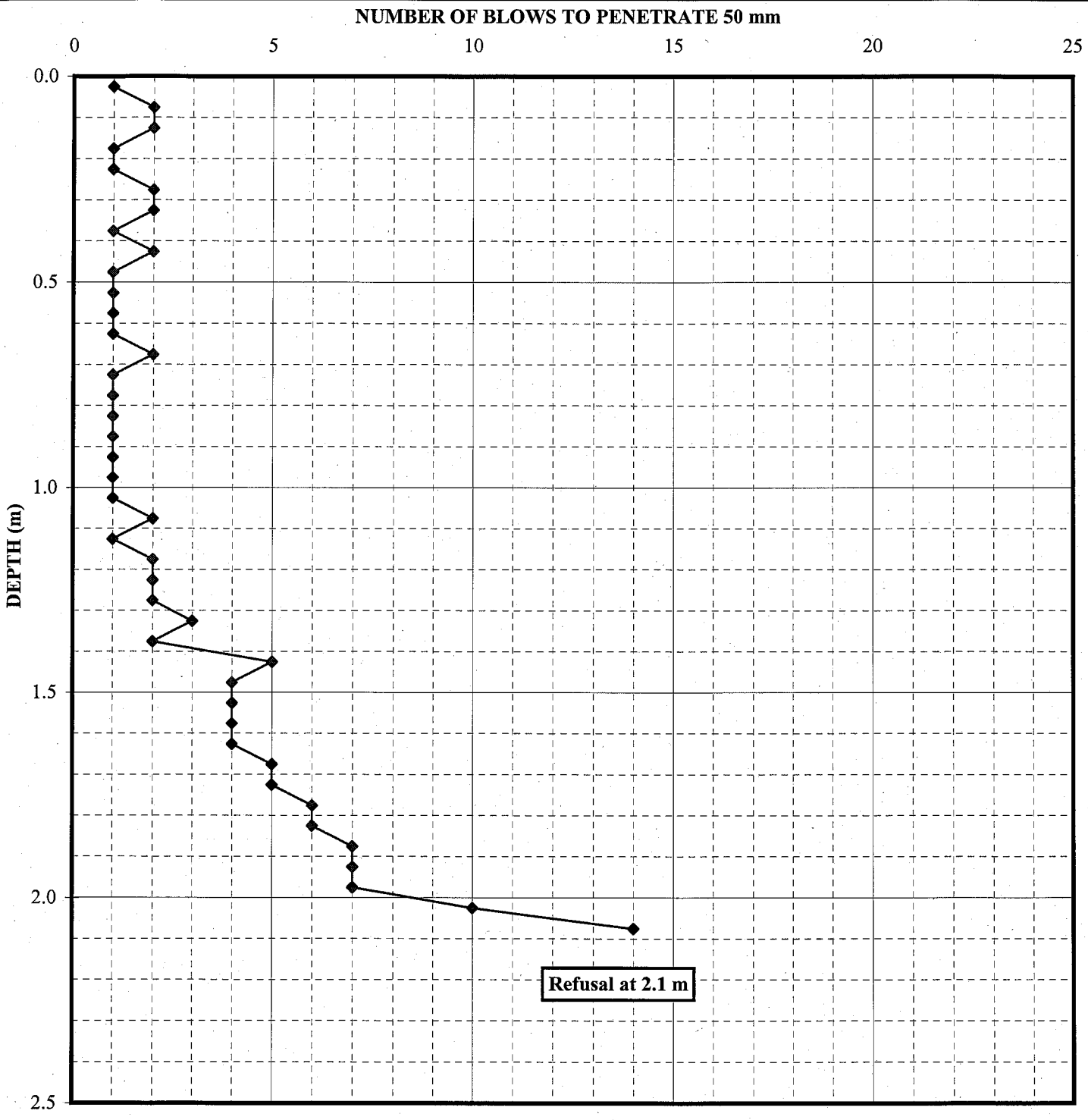
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP27

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 02/10/2008
Elevation: **Offset:** **Operator:** CS



Comments:

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Job No. **21-17871-00**
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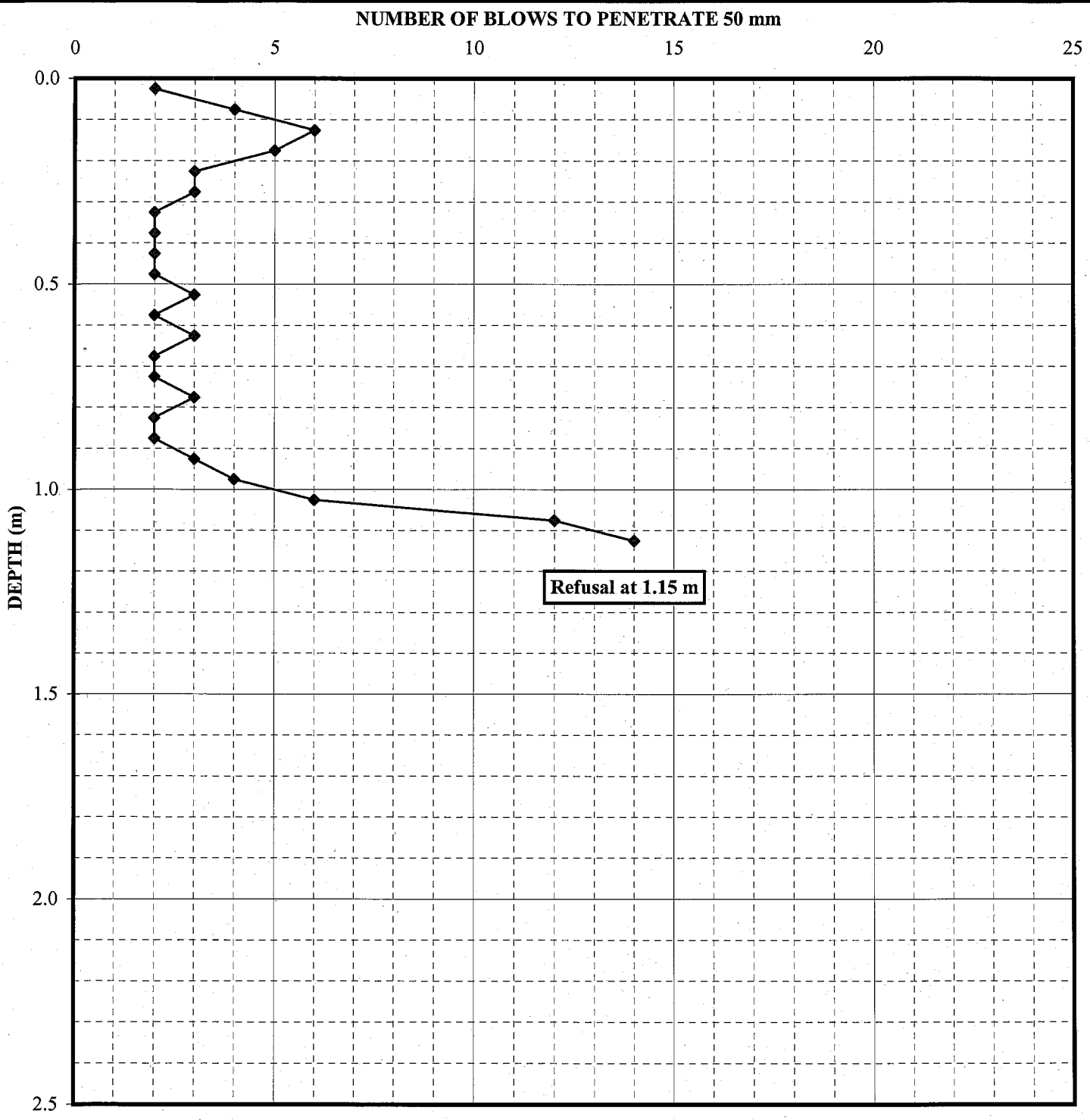
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP29

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position:	**Chainage:**	**Date:**	07/10/2008
Elevation:	**Offset:**	**Operator:**	CS



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File: DCP29.xls

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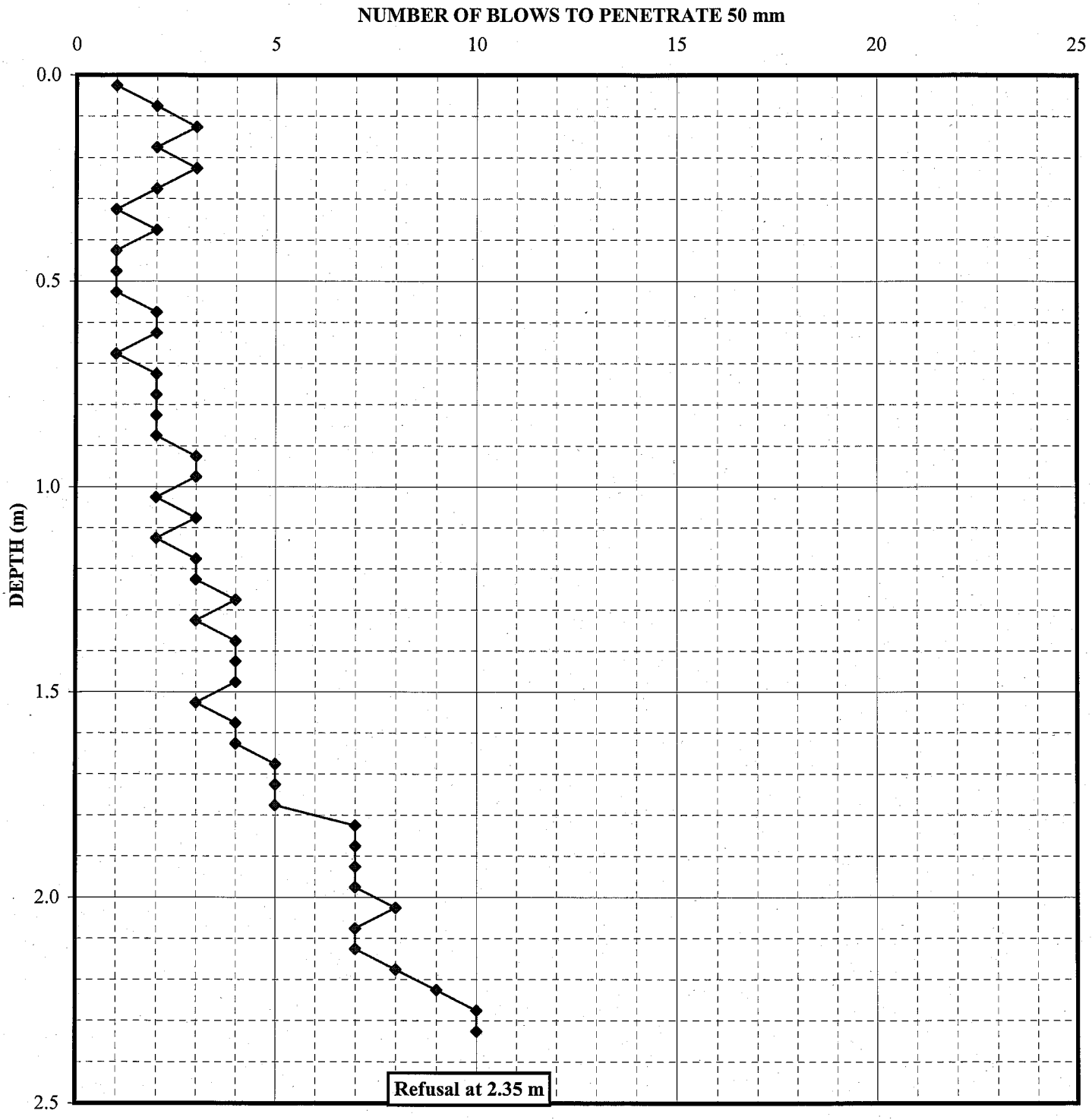
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP32

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 03/10/2008
Elevation: **Offset:** **Operator:** CS



Comments:

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Job No. **21-17871-00**
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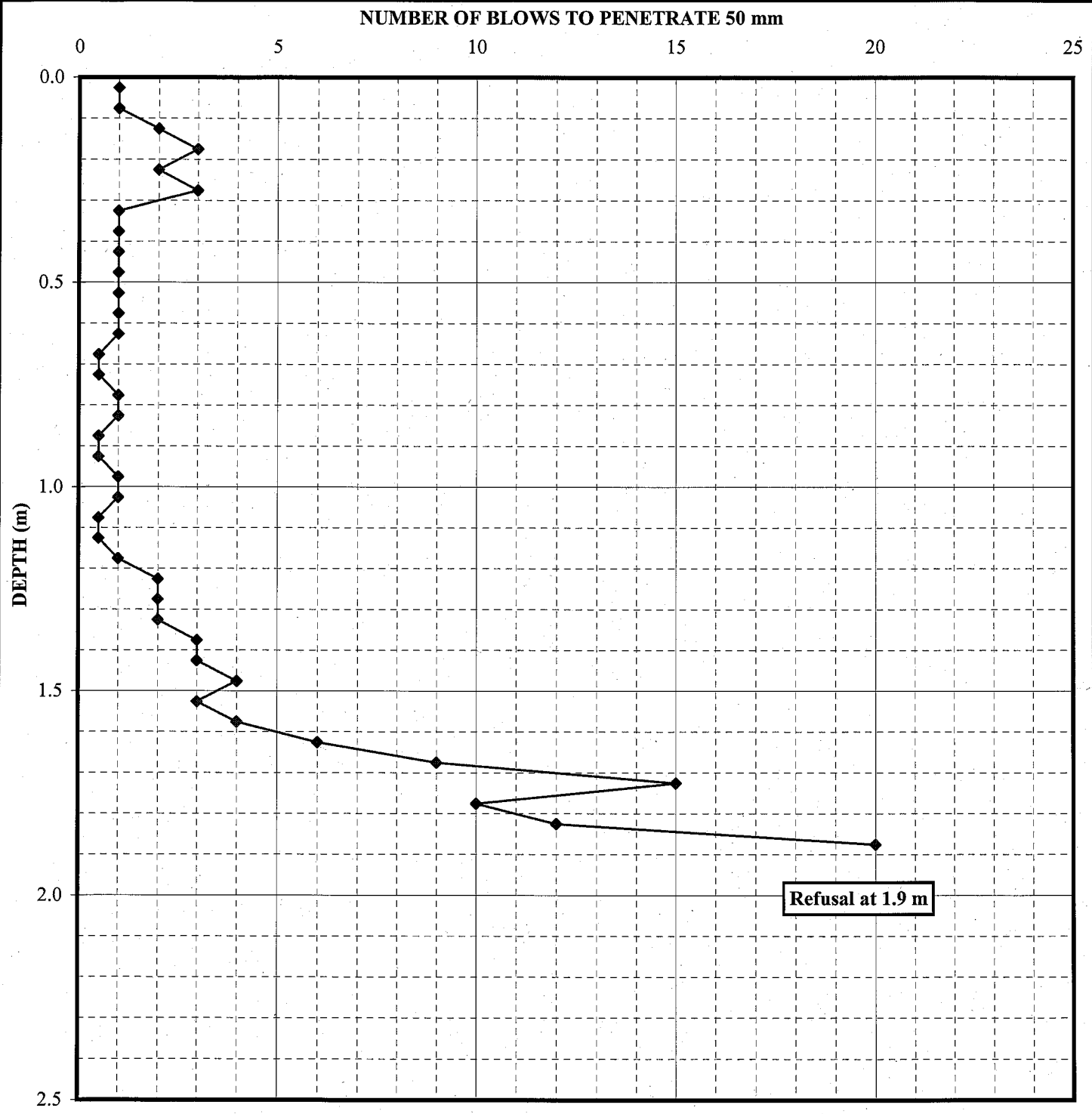
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP35

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 30/09/2008
Elevation: **Offset:** **Operator:** CS



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Job No. **21-17871-00**
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DYNAMIC CONE PENETROMETER LOG SHEET

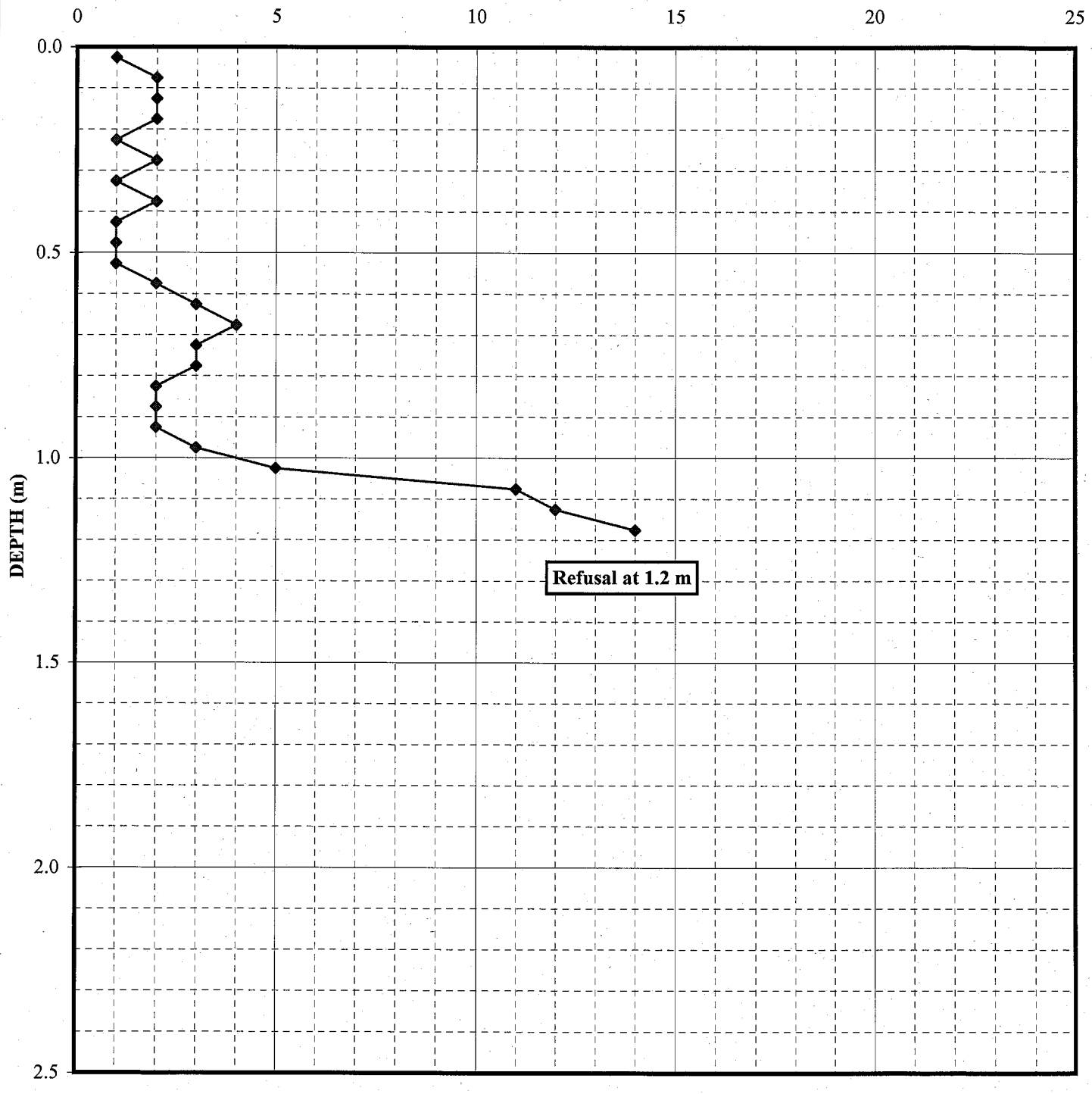
Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP36

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position:	**Chainage:**	**Date:**	30/09/2008
Elevation:	**Offset:**	**Operator:**	CS

NUMBER OF BLOWS TO PENETRATE 50 mm



Comments:

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS
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Telephone: 61 2 9462 4700 Fax: 61 2 9462 4710 Email: atnmail@ghd.com.au
GHD GEOTECHNICS

Job No. **21-17871-00**

File: DCP36.xls

Template: \\G:21\Geo_LAB\DCP Results\GHD_ATN_DCP2007.XLT
File:G:\Geo_Lab\DCP Results\2117871\DCP35.xls

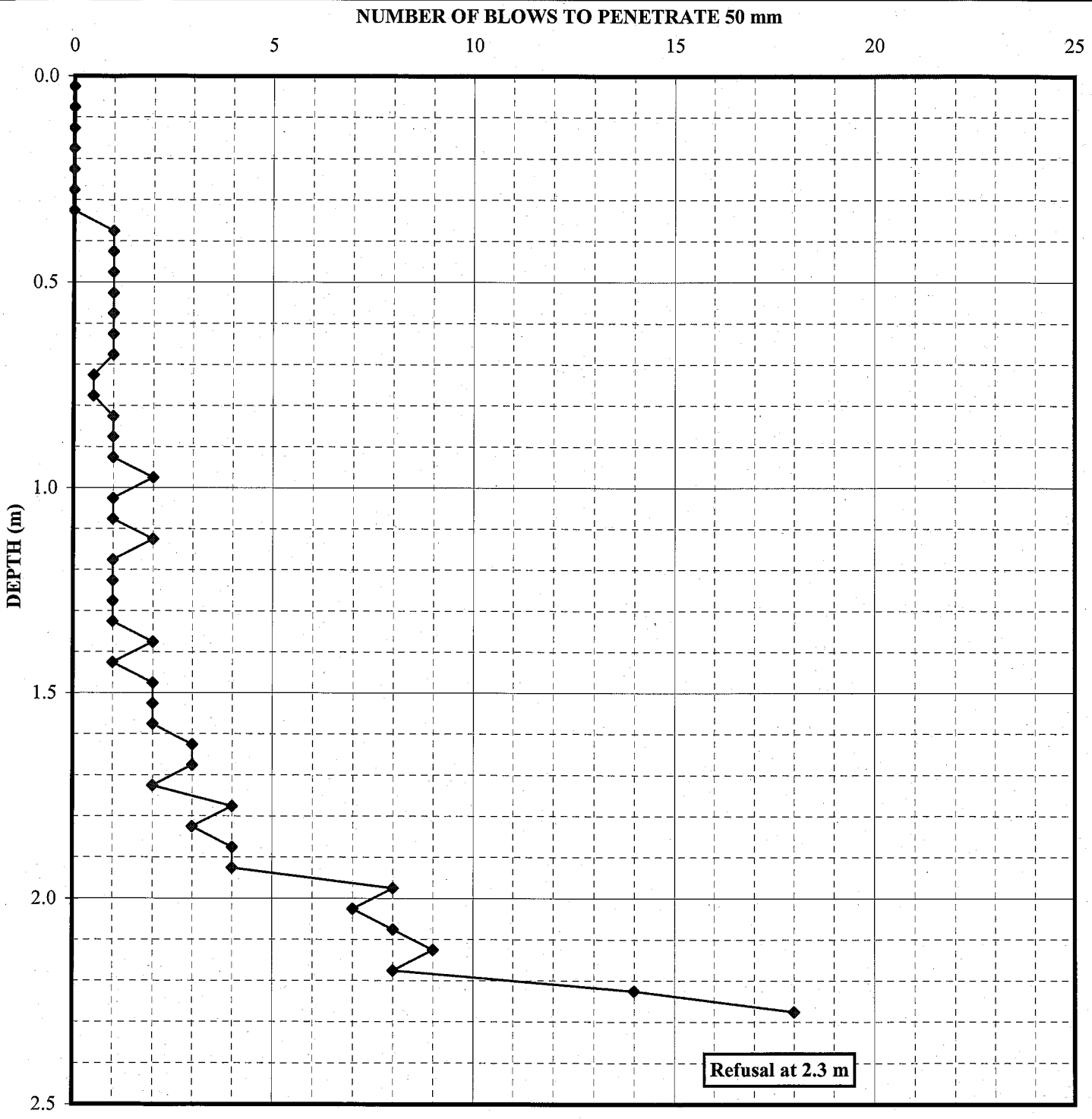
DYNAMIC CONE PENETROMETER LOG SHEET

Client: Goodman International
Project: Bungaribee Estate
Location: Great Western Hwy, Huntingwood

PROBE No. DCP37

AS1289 6.3.2 (Cone tip) 510 mm drop height.

Position: **Chainage:** **Date:** 30/09/2008
Elevation: **Offset:** **Operator:** CS



Comments:

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GHD GEOTECHNICS

Job No. **21-17871-00**
File: DCP37.xls

Template: \\G:21\Geo_LAB\DCP Results\GHD_ATN_DCP2007.XLT
File:G:\Geo_Lab\DCP Results\2117871\DCP36.xls

Appendix D

Laboratory Test Certificates

GHD GEOTECHNICS
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GHD GEOTECHNICS

Material Test Report

Report No: SYD081553
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

NATA Accredited Laboratory Number: 679

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Material Details

Source:	N/A	**Sampled From:**	N/A
Description:	N/A	**Location:**	N/A
Specification:	N/A	**Sample Method:**	

Sample Details

					Limits
Sample ID:	SYD08-2923	SYD08-2924	SYD08-2925	SYD08-2926	
Field Sample ID:	BH01, 0.5m	BH06, 0.5m	BH07, 0.5m	BH09, 1.5m	
Date Sampled:	15/10/2008	15/10/2008	15/10/2008	15/10/2008	
Progressive Quantity (t):					

Particle Size Distribution

Method:	Sieve Size	% Passing	Limits

Description:

Drying by:
N/A

Washed:
Sample Washed

Other Test Results

Description	Method	Results				Limits
Emerson Class Number	AS 1289.3.8.1	2(s)	4	1	2 (s)	
Soil Description		clay	clay	clay	clay	
Type of Water		distilled	distilled	distilled	distilled	
Temperature of Water (°C)		21	21	21	21	

Comments

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GHD GEOTECHNICS

Material Test Report

Report No: SYD081539
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Material Details

Source: N/A
Description: N/A
Specification: N/A
Sampled From: N/A
Location: N/A
Sample Method:

Sample Details

							Limits
Sample ID:		SYD08-2753	SYD08-2754	SYD08-2755	SYD08-2756	SYD08-2757	SYD08-2758	
Field Sample ID:		TP11, 0.4-0.6m	TP11, 1.1-1.3m	TP12, 0.8-0.9m	TP12, 1.9-2.0m	TP13, 0.4-0.5m	TP13, 1.5-1.7m	
Date Sampled:		13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	
Progressive Quantity (t):								

Particle Size Distribution

Method:	Sieve Size	% Passing	Limits

Description:

Drying by:
N/A

Washed:
Sample Washed

Other Test Results

Description	Method	Results						Limits
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Air-dried			Air-dried			
Preparation		Dry Sieved			Dry Sieved			
Linear Shrinkage (%)		16.5			16.0			
Mould Length (mm)		125			125			
Crumbling		No			No			
Curling		Yes			Yes			
Liquid Limit (%)		67			53			
Method		Four Point			Four Point			
Plastic Limit (%)		22			16			
Plasticity Index (%)		45			37			
Moisture Content (%)	AS 1289.2.1.1	26.0	19.7	18.9	22.7	22.5	13.4	
Emerson Class Number	AS 1289.3.8.1	2 (m)			2 (m)			

Comments

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GHD GEOTECHNICS

California Bearing Ratio Test Report

Report No: CBR:SYD08-2755
Issue No: 1

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

NATA Accredited Laboratory Number: 679

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

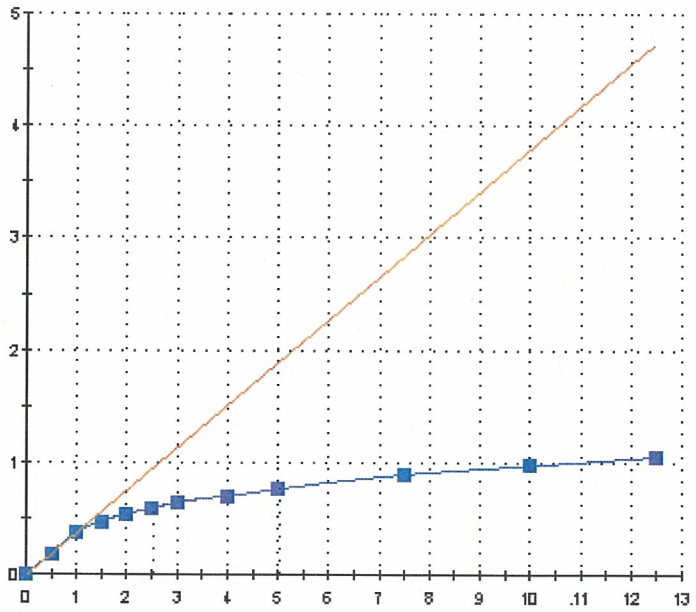
Product: N/A
Source: N/A
Location: N/A
Client Ref: TP12, 0.8-0.9m

Date Sampled: 13/10/2008
Sampling Method: N/A
Sample ID: SYD08-2755

Test Results

Description	Result
Maximum Dry Density (t/m³)	1.850
Optimum Moisture Content (%)	16.6
Preparation	Soaked
CBR 2.5mm	**4.5**
CBR 5.0mm	4.0
Test Method	AS 1289.6.1.1
Initial Moisture Content (%)	17.2
Dry Density (t/m³)	1.803
Swell (%)	0.5
Moisture after penetration (%)	17.1
Period of soaking	4
Moisture Content of top 30mm (%)	17.0
Compaction type	Std
Surcharge mass	4.50
Laboratory Moisture Ratio after compaction (%):	104
Laboratory Density Ratio after compaction (%):	98
Material retained on 19mm sieve excluded:	YES
Mass of material retained on sieve (%):	0.0

Chart



Comments

N/A

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GHD GEOTECHNICS

Material Test Report

Report No: SYD081540
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Material Details

Source: N/A
Description: N/A
Specification: N/A
Sampled From: N/A
Location: N/A
Sample Method:

Sample Details

							Limits
Sample ID:		SYD08-2759	SYD08-2760	SYD08-2761	SYD08-2762	SYD08-2763	SYD08-2764	
Field Sample ID:		TP14, 0.5-0.7m	TP15, 0.3-0.5m	TP15, 0.6-0.8m	TP15, 1.4-1.6m	TP16, 0.8-1.0m	TP17, 0.5-0.7m	
Date Sampled:		13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	
Progressive Quantity (t):								

Particle Size Distribution

Method:	**Sieve Size**	**% Passing**						**Limits**
	53.0mm							
	37.5mm							
Description:	26.5mm							
	19.0mm							
	13.2mm							
	9.5mm							
Drying by:	6.7mm	100						
N/A	4.75mm	99						
	2.36mm	95				100		
Washed:	1.18mm	87				100		
Sample Not Washed	600µm	84				99		
	425µm	84				99		
	300µm	83				99		
	150µm	82				99		
	75µm	78				97		

Other Test Results

Description	**Method**	**Results**						**Limits**
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Air-dried		Air-dried		Air-dried		
Preparation		Dry Sieved		Dry Sieved		Dry Sieved		
Linear Shrinkage (%)		17.0		16.0		16.0		
Mould Length (mm)		125		125		125		
Crumbling		No		No		No		
Curling		Yes		Yes		Yes		
Liquid Limit (%)		68		58		53		
Method		Four Point		Four Point		Four Point		
Plastic Limit (%)		23		20		19		
Plasticity Index (%)		45		38		34		
Moisture Content (%)	AS 1289.2.1.1	25.2	20.8	22.6	23.1	21.4	17.7	
Emerson Class Number	AS 1289.3.8.1	2 (m)				3 (s)		

Comments

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Material Test Report

Report No: SYD081541
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

Sample ID: SYD08-2762
Field Sample: TP15, 1.4-1.6m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.70	N/A
Optimum Moisture Content (%)		18.8	N/A
Oversize Sieve (mm)		19.0	N/A
Oversize Material (%)		0	N/A
Moisture Content (%)	AS 1289.2.1.1	23.1	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081543
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

Sample ID: SYD08-2765
Field Sample: TP18, 0.6-0.7m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.73	N/A
Optimum Moisture Content (%)		16.8	N/A
Oversize Sieve (mm)		19.0	N/A
Oversize Material (%)		0	N/A
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	16.5	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		Yes	N/A
Liquid Limit (%)	AS 1289.3.1.1	50	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	16	N/A
Plasticity Index (%)	AS 1289.3.3.1	34	N/A
Moisture Content (%)	AS 1289.2.1.1	21.2	N/A
Emerson Class Number	AS 1289.3.8.1	3 (m)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		24	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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California Bearing Ratio Test Report

Report No: CBR:SYD08-2766
Issue No: 1

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

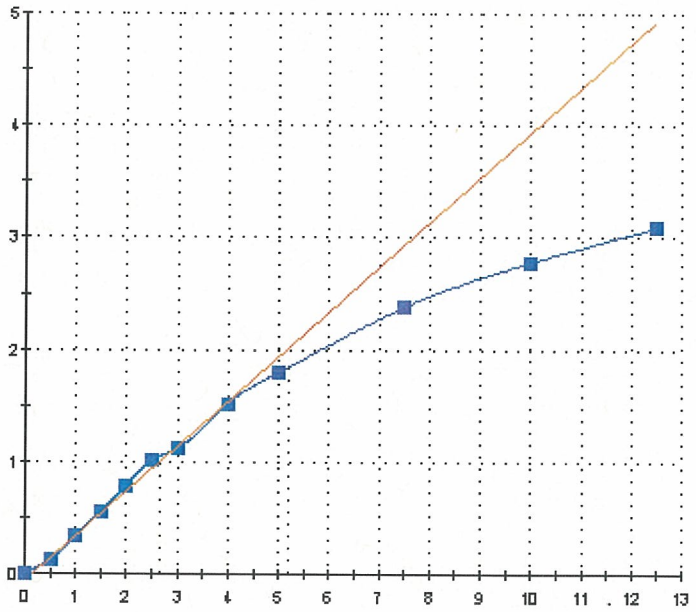
Product: N/A
Source: N/A
Location: N/A
Client Ref: TP19, 1.8-1.9m

Date Sampled: 13/10/2008
Sampling Method: N/A
Sample ID: SYD08-2766

Test Results

Description	Result
Maximum Dry Density (t/m³)	1.920
Optimum Moisture Content (%)	12.8
Preparation	Soaked
CBR 2.5mm	8.0
CBR 5.0mm	**9.0**
Test Method	AS 1289.6.1.1
Initial Moisture Content (%)	13.7
Dry Density (t/m³)	1.867
Swell (%)	0.5
Moisture after penetration (%)	14.1
Period of soaking	4
Moisture Content of top 30mm (%)	14.7
Compaction type	Std
Surcharge mass	4.50
Laboratory Moisture Ratio after compaction (%):	107
Laboratory Density Ratio after compaction (%):	97
Material retained on 19mm sieve excluded:	YES
Mass of material retained on sieve (%):	0.0

Chart



Comments

Natural Moisture Content = 8.1%

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Material Test Report

Report No: SYD081546
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

Sample ID: SYD08-2767
Field Sample: TP20, 0.4-0.5m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.2	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081547
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

Sample ID: SYD08-2768
Field Sample: TP20, 0.6-0.8m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	19.0	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		Yes	N/A
Liquid Limit (%)	AS 1289.3.1.1	60	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	18	N/A
Plasticity Index (%)	AS 1289.3.3.1	42	N/A
Moisture Content (%)	AS 1289.2.1.1	23.4	N/A
Emerson Class Number	AS 1289.3.8.1	2 (m)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		24	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081548
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 18/11/2008

Sample Details

Sample ID: SYD08-2769
Field Sample: TP21, 0.3-0.5m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	16.5	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		Yes	N/A
Liquid Limit (%)	AS 1289.3.1.1	64	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	20	N/A
Plasticity Index (%)	AS 1289.3.3.1	44	N/A
Moisture Content (%)	AS 1289.2.1.1	25.1	N/A
Emerson Class Number	AS 1289.3.8.1	2 (m)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		24	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081549
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Material Details

Source:	N/A	**Sampled From:**	N/A
Description:	N/A	**Location:**	N/A
Specification:	N/A	**Sample Method:**	

Sample Details

							Limits
Sample ID:	SYD08-2770	SYD08-2771	SYD08-2772	SYD08-2773	SYD08-2774	SYD08-2775	
Field Sample ID:	TP22, 0.25-0.4m	TP22, 0.9-1.1m	TP23, 0.3-0.5m	TP23, 2.4-2.6m	TP24, 0.6-0.7m	TP24, 1.0-1.2m	
Date Sampled:	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	
Progressive Quantity (t):							

Particle Size Distribution

Method:

Description:

Drying by:
N/A

Washed:
Sample Washed

Sieve Size	% Passing	Limits
53.0mm		
37.5mm		
26.5mm		
19.0mm		
13.2mm	100	
9.5mm	95	
6.7mm	86	
4.75mm	73	
2.36mm	52	
1.18mm	40	
600µm	37	
425µm	36	
300µm	36	
150µm	35	
75µm	30	

Other Test Results

Description	Method	Results						Limits
Moisture Content (%)	AS 1289.2.1.1	9.3	30.9	21.3	15.1	24.8	16.2	
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1		Air-dried		Air-dried	Air-dried	Air-dried	
Preparation			Dry Sieved		Dry Sieved	Dry Sieved	Dry Sieved	
Linear Shrinkage (%)			22.0		13.5	17.5	15.5	
Mould Length (mm)			125		125	254	125	
Crumbling			No		No	No	No	
Curling			Yes		Yes	No	Yes	
Liquid Limit (%)			91		58	75	50	
Method			Four Point		Four Point	Four Point	Four Point	
Plastic Limit (%)			23		24	19	16	
Plasticity Index (%)			68		34	56	34	
Emerson Class Number	AS 1289.3.8.1		2 (m)				3 (m)	

Comments

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Material Test Report

Report No: SYD081563
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID:	SYD08-2776
Field Sample:	TP25, 2.0-2.2m
Date Sampled:	13/10/2008
Source:	N/A
Material:	N/A
Specification:	N/A
Sampling Method:	N/A
Location:	N/A
Time Sampled:	N/A
Sampled By:	GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.8	N/A

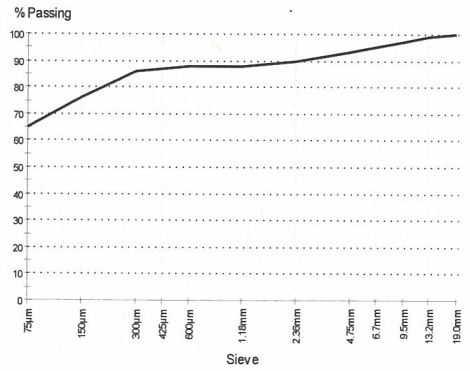
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	N/A
13.2mm	99	N/A
9.5mm	97	N/A
6.7mm	95	N/A
4.75mm	93	N/A
2.36mm	90	N/A
1.18mm	88	N/A
600µm	88	N/A
425µm	87	N/A
300µm	86	N/A
150µm	76	N/A
75µm	65	N/A

Chart



Comments

N/A

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California Bearing Ratio Test Report

Report No: CBR:SYD08-2777
Issue No: 2
This issue replaces all previous issues of CBR:SYD08-2777.

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

NATA

NATA Accredited Laboratory Number: 679

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Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

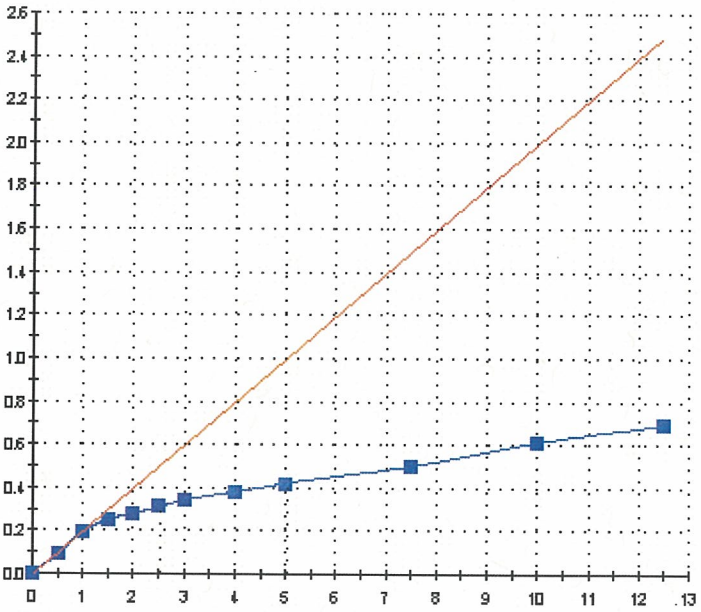
Product: N/A
Source: N/A
Location: N/A
Client Ref: TP26, 0.5-0.6m

Date Sampled: 13/10/2008
Sampling Method: N/A
Sample ID: SYD08-2777

Test Results

Description	Result
Maximum Dry Density (t/m³)	1.710
Optimum Moisture Content (%)	20.2
Preparation	Soaked
CBR 2.5mm	**2.5**
CBR 5.0mm	2.0
Test Method	AS 1289.6.1.1
Initial Moisture Content (%)	19.1
Dry Density (t/m³)	1.689
Swell (%)	2.0
Moisture after penetration (%)	19.9
Period of soaking	4
Moisture Content of top 30mm (%)	23.4
Compaction type	Std
Surcharge mass	4.50
Laboratory Moisture Ratio after compaction (%):	95
Laboratory Density Ratio after compaction (%):	99
Material retained on 19mm sieve excluded:	YES
Mass of material retained on sieve (%):	0.0

Chart



Comments

Natural moisture content (%) = 24.5

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Material Test Report

Report No: SYD081564
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID: SYD08-2778
Field Sample: TP26, 1.0-1.2m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	17.5	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		Yes	N/A
Liquid Limit (%)	AS 1289.3.1.1	75	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	21	N/A
Plasticity Index (%)	AS 1289.3.3.1	54	N/A
Moisture Content (%)	AS 1289.2.1.1	25.5	N/A
Emerson Class Number	AS 1289.3.8.1	2 (s)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		21	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081565
Issue No:
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Project: 2117871/00

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NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID: SYD08-2779
Field Sample: TP27, 0.2-0.4m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	8.6	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081566
Issue No:
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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID:	SYD08-2780
Field Sample:	TP27, 0.6-0.8m
Date Sampled:	13/10/2008
Source:	N/A
Material:	N/A
Specification:	N/A
Sampling Method:	N/A
Location:	N/A
Time Sampled:	N/A
Sampled By:	GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	27.5	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081567
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
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Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID: SYD08-2781
Field Sample: TP28, 0.5-0.7m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	18.0	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		Yes	N/A
Liquid Limit (%)	AS 1289.3.1.1	59	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	18	N/A
Plasticity Index (%)	AS 1289.3.3.1	41	N/A
Moisture Content (%)	AS 1289.2.1.1	25.7	N/A
Emerson Class Number	AS 1289.3.8.1	3 (m)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		22	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081550
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
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Huntingwood NSW

Project: 2117871/00

NATA Accredited Laboratory Number: 679

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Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Material Details

Source:	N/A	**Sampled From:**	N/A
Description:	N/A	**Location:**	N/A
Specification:	N/A	**Sample Method:**	

Sample Details

							Limits
Sample ID:	SYD08-2782	SYD08-2783	SYD08-2784	SYD08-2785	SYD08-2786	SYD08-2787	
Field Sample ID:	TP29, 0.4-0.6m	TP29, 0.7-0.9m	TP32, 0.5-0.7m	TP32, 1.5-1.7m	TP33, 0.2-0.4m	TP33, 0.5-0.6m	
Date Sampled:	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	13/10/2008	
Progressive Quantity (t):							

Particle Size Distribution

Method:	Sieve Size	% Passing		Limits
	53.0mm		100	
	37.5mm		84	
Description:	26.5mm		70	
	19.0mm		65	
	13.2mm		62	
	9.5mm		59	
Drying by:	6.7mm		54	
N/A	4.75mm		51	
	2.36mm	100	49	
Washed:	1.18mm	100	48	
Sample Washed	600µm	100	48	
	425µm	100	48	
	300µm	100	48	
	150µm	93	47	
	75µm	77	46	

Other Test Results

Description	Method	Results						Limits
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Air-dried	Air-dried					
Preparation		Dry Sieved	Dry Sieved					
Linear Shrinkage (%)		16.0	15.0					
Mould Length (mm)		125	125					
Crumbling		No	No					
Curling		Yes	Yes					
Liquid Limit (%)		66	58					
Method		Four Point	Four Point					
Plastic Limit (%)		23	20					
Plasticity Index (%)		43	38					
Moisture Content (%)	AS 1289.2.1.1	18.6	19.7	9.6	17.6	20.3	13.7	
Emerson Class Number	AS 1289.3.8.1	3 (s)	2 (m)					

Comments
Sample SYD08-2787 - Insufficient sample to comply with AS1289.1.1 - Minimum mass requirements

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California Bearing Ratio Test Report

Report No: CBR:SYD08-2784
Issue No: 1

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

NATA Accredited Laboratory Number: 679

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Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

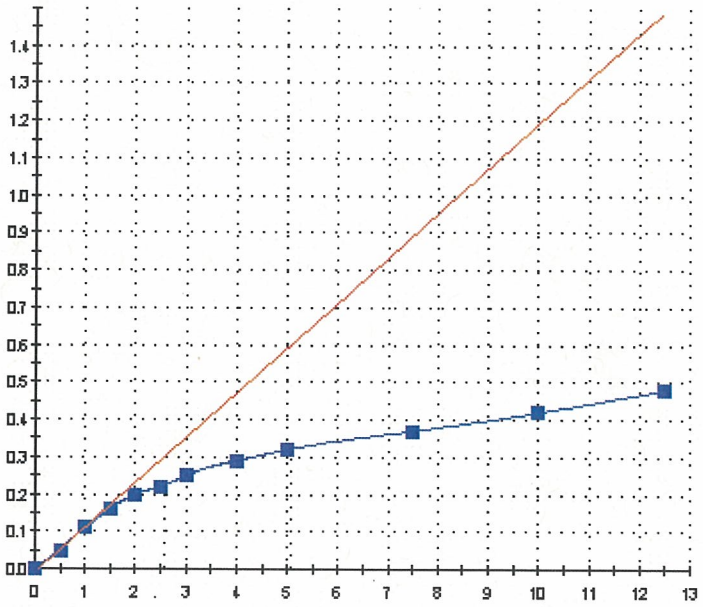
Product: N/A
Source: N/A
Location: N/A
Client Ref: TP32, 0.5-0.7m

Date Sampled: 13/10/2008
Sampling Method: N/A
Sample ID: SYD08-2784

Test Results

Description	Result
Maximum Dry Density (t/m³)	1.730
Optimum Moisture Content (%)	17.4
Preparation	Soaked
CBR 2.5mm	**1.5**
CBR 5.0mm	**1.5**
Test Method	AS 1289.6.1.1
Initial Moisture Content (%)	17.4
Dry Density (t/m³)	1.695
Swell (%)	2.5
Moisture after penetration (%)	17.3
Period of soaking	4
Moisture Content of top 30mm (%)	24.8
Compaction type	Std
Surcharge mass	4.50
Laboratory Moisture Ratio after compaction (%):	100
Laboratory Density Ratio after compaction (%):	98
Material retained on 19mm sieve excluded:	YES
Mass of material retained on sieve (%):	0.0

Chart



Comments

N/A

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Material Test Report

Report No: SYD081551
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Material Details

Source:	N/A	**Sampled From:**	N/A
Description:	N/A	**Location:**	N/A
Specification:	N/A	**Sample Method:**	

Sample Details

					Limits
Sample ID:	SYD08-2788	SYD08-2789	SYD08-2790	SYD08-2791	
Field Sample ID:	TP34, 0.3-0.5m	TP34, 0.6-0.7m	TP35, 0.3-0.45m	TP35, 0.5-0.7m	
Date Sampled:	13/10/2008	13/10/2008	13/10/2008	13/10/2008	
Progressive Quantity (t):					

Particle Size Distribution

Method:	Sieve Size	% Passing	Limits

Description:

Drying by:
N/A

Washed:
Sample Washed

Other Test Results

Description	Method	Results		Limits	
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Air-dried	Air-dried		
Preparation		Dry Sieved	Dry Sieved		
Linear Shrinkage (%)		16.5	15.0		
Mould Length (mm)		125	125		
Crumbling		No	No		
Curling		Yes	Yes		
Liquid Limit (%)		61	70		
Method		Four Point	Four Point		
Plastic Limit (%)		18	19		
Plasticity Index (%)		43	51		
Moisture Content (%)	AS 1289.2.1.1	25.3	25.6	19.1	22.5
Emerson Class Number	AS 1289.3.8.1	2 (m)	2 (m)		

Comments

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Material Test Report

Report No: SYD081558
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
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Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID:	SYD08-2792
Field Sample:	TP36, 0.5-0.6m
Date Sampled:	13/10/2008
Source:	N/A
Material:	N/A
Specification:	N/A
Sampling Method:	N/A
Location:	N/A
Time Sampled:	N/A
Sampled By:	GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.5	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081559
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
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Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID:	SYD08-2793
Field Sample:	TP36, 1.5-1.6m
Date Sampled:	13/10/2008
Source:	N/A
Material:	N/A
Specification:	N/A
Sampling Method:	N/A
Location:	N/A
Time Sampled:	N/A
Sampled By:	GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	11.4	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Material Test Report

Report No: SYD081560
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

Sample Details

Sample ID: SYD08-2794
Field Sample: TP37, 0.5-0.7m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.68	N/A
Optimum Moisture Content (%)		20.5	N/A
Oversize Sieve (mm)		19.0	N/A
Oversize Material (%)		0	N/A
Moisture Content (%)	AS 1289.2.1.1	25.1	N/A

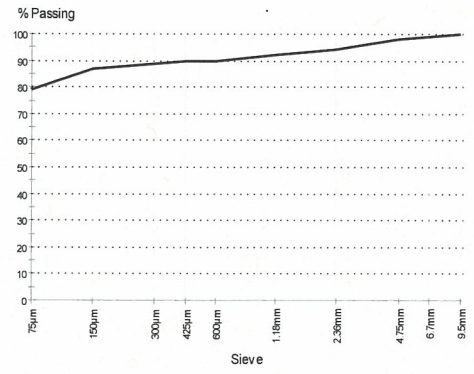
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	N/A
6.7mm	99	N/A
4.75mm	98	N/A
2.36mm	94	N/A
1.18mm	92	N/A
600µm	90	N/A
425µm	90	N/A
300µm	89	N/A
150µm	87	N/A
75µm	79	N/A

Chart



Comments

N/A

GHD GEOTECHNICS
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email: artarmon@ghd.com.au
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Material Test Report

Report No: SYD081561
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID: SYD08-2795
Field Sample: TP37, 1.0-1.2m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	14.5	N/A
Mould Length (mm)		125	N/A
Crumbling		No	N/A
Curling		No	N/A
Liquid Limit (%)	AS 1289.3.1.1	42	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	14	N/A
Plasticity Index (%)	AS 1289.3.3.1	28	N/A
Moisture Content (%)	AS 1289.2.1.1	19.0	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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GHD GEOTECHNICS

Material Test Report

Report No: SYD081562
Issue No:
This issue replaces all previous issues of Report No:

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

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Laboratory Accreditation No. 679

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

Sample ID: SYD08-2797
Field Sample: TP38, 1.4-1.5m
Date Sampled: 13/10/2008
Source: N/A
Material: N/A
Specification: N/A
Sampling Method: N/A
Location: N/A
Time Sampled: N/A
Sampled By: GHD Geotechnics

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	N/A
Preparation	AS 1289.1.1	Dry Sieved	N/A
Linear Shrinkage (%)	AS 1289.3.4.1	11.5	N/A
Mould Length (mm)		254	N/A
Crumbling		Yes	N/A
Curling		No	N/A
Liquid Limit (%)	AS 1289.3.1.1	44	N/A
Method		Four Point	N/A
Plastic Limit (%)	AS 1289.3.2.1	12	N/A
Plasticity Index (%)	AS 1289.3.3.1	32	N/A
Moisture Content (%)	AS 1289.2.1.1	15.6	N/A
Emerson Class Number	AS 1289.3.8.1	2 (m)	N/A
Soil Description		clay	N/A
Type of Water		Distilled	N/A
Temperature of Water (°C)		27	N/A

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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California Bearing Ratio Test Report

Report No: CBR:SYD08-2796
Issue No: 2
This issue replaces all previous issues of CBR:SYD08-2796.

Client: Goodman Property Services
Bungaribe Industrial Estate
Huntingwood NSW

Project: 2117871/00

NATA Accredited Laboratory Number: 679

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO IEC 17025
Laboratory Accreditation No. 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 19/11/2008

Sample Details

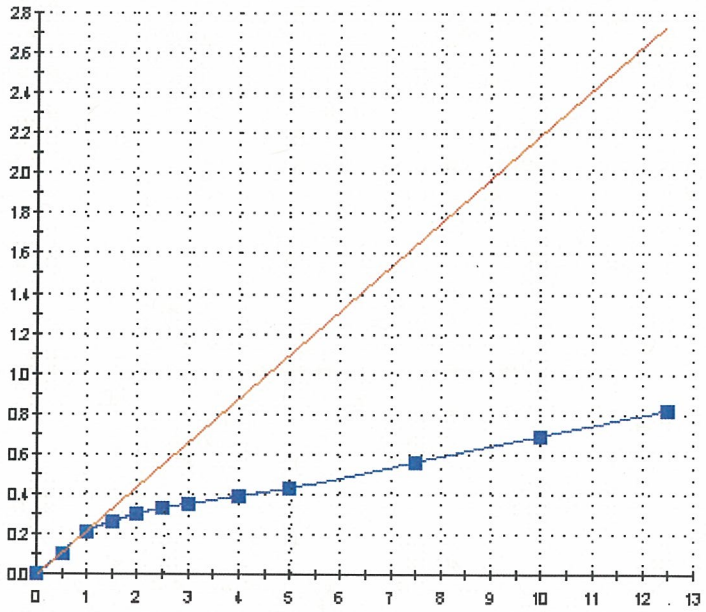
Product: N/A
Source: N/A
Location: N/A
Client Ref: TP38, 0.5-0.8m

Date Sampled: 13/10/2008
Sampling Method: N/A
Sample ID: SYD08-2796

Test Results

Description	Result
Maximum Dry Density (t/m³)	1.570
Optimum Moisture Content (%)	24.3
Preparation	Soaked
CBR 2.5mm	**2.5**
CBR 5.0mm	2.0
Test Method	AS 1289.6.1.1
Initial Moisture Content (%)	24.6
Dry Density (t/m³)	1.537
Swell (%)	2.5
Moisture after penetration (%)	5935.8
Period of soaking	4
Moisture Content of top 30mm (%)	28.6
Compaction type	Std
Surcharge mass	4.50
Laboratory Moisture Ratio after compaction (%):	101
Laboratory Density Ratio after compaction (%):	98
Material retained on 19mm sieve excluded:	YES
Mass of material retained on sieve (%):	0.0

Chart



Comments

Natural moisture content (%) = 26.9

Point Load Strength Index - Report — *Report No.:* SYD081499.1

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH01

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
5.18	D	51.2	32.8		51.2	0.14	2	0.05	**0.05**	SH	BE/LA	M
5.21	A	32.8		51.2	46.2	0.01	3	0.00	**0.00**	SH	BE/LA	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 5 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$Is = \frac{P \times 1000}{(De)^2}$ $Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$

Date Sampled: 15/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory:
Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* SYD081499.2

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH02

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
7.92	D	50.9	30.3		50.9	0.25	2	0.10	**0.10**	SH	BE/LA	M
7.96	A	30.3		50.9	44.3	0.25	3	0.13	**0.12**	SH	BE/LA	M
9.32	A	35.1		50.8	47.6	0.36	3	0.16	**0.16**	SH	BE/LA	M
4.02	A	33.2		50.8	46.3	0.25	3	0.12	**0.11**	SH	BE/LA	M
4.04	D	50.8	33.2		50.8	0.22	2	0.09	**0.09**	SH	BE/LA	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 3 Days

☒ CORE BOX ☒ UNDER COVER
☒ WRAPPED ☐ OPEN AIR
☐ UNWRAPPED ☐ UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$$Is = \frac{P \times 1000}{(De)^2} \qquad Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$$

Date Sampled: 14/10/08
Date Tested: 17/10/08
Tested By: CS
Checked By:
Authorised Signatory:
Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* **SYD081499.3**

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH03

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth	Test	Dimensions				Results				Sample Description		
(m)	Type (D,A,I)	D (mm)	L (mm)	W (mm)	De (mm)	Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Rock Type	Structure	Moisture
6.66	D	49.9	23.4		49.9	0.06	3	0.02	**0.02**	SH	BE/LA	M
6.67	A	23.4		49.9	38.6	0.11	3	0.07	**0.07**	SH	BE/LA	M
7.22	D	51.6	45.7		51.6	0.47	3	0.18	**0.18**	SH	BE/LA	M
7.24	A	45.7		51.6	54.8	0.64	3	0.21	**0.22**	SH	BE/LA	M
8.56	D	50.6	34.8		50.6	0.12	3	0.05	**0.05**	ST/SS	LA	M
8.54	A	34.8		50.6	47.3	0.64	3	0.29	**0.28**	ST/SS	LA	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 4 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$$Is = \frac{P \times 1000}{(De)^2} \qquad Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$$

Date Sampled: 16/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory:
Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* SYD081499.4

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH04

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
5.01	A	27.0		51.1	41.9	0.00	3	0.00	**0.00**	SH	BE/LA	M
5.03	D	51.1	27.0		51.1	0.09	2	0.03	**0.03**	SH	BE/LA	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 5 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$Is = \frac{P \times 1000}{(De)^2}$ $Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$

Date Sampled: 15/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory:
Date: 7/11/08

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Laboratory Accreditation Number : 679

Point Load Strength Index - Report — *Report No.:* **SYD081499.5**

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH05

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth	Test	Dimensions				Results				Sample Description		
	Type	D	L	W	De	Load	Failure	Is	$Is_{(50)}$	Rock	Structure	Moisture
(m)	(D,A,I)	(mm)	(mm)	(mm)	(mm)	P (kN)	Mode (1,2,3...)	(MPa)	(MPa)	Type		
3.78	D	50.8	36.9		50.8	0.28	2	0.11	**0.11**	SH	BE/LA	M
3.80	A	36.9		50.8	48.9	0.51	3	0.21	**0.21**	SH	BE/LA	M
5.64	D	50.8	28.2		50.8	0.76	2	0.29	**0.30**	SH	BE/LA	M
5.62	A	28.2		50.8	42.7	0.70	3	0.38	**0.36**	SH	BE/LA	M
6.64	D	51.4	28.8		51.4	0.90	2	0.34	**0.34**	SH	BE/LA	M
6.62	A	28.8		51.4	43.4	0.75	2	0.40	**0.37**	SH	BE/LA	M
8.92	D	51.1	24.2		51.1	0.31	2	0.12	**0.12**	SH	BE/LA	M
8.90	A	24.2		51.1	39.7	0.30	3	0.19	**0.17**	SH	BE/LA	M
10.07	D	50.8	26.5		50.8	0.39	2	0.15	**0.15**	SH	BE/LA	M
10.05	A	26.5		50.8	41.4	0.36	3	0.21	**0.19**	SH	BE/LA	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 5 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$$Is = \frac{P \times 1000}{(De)^2} \qquad Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$$

Date Sampled: 15/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory :

Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* SYD081499.6

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH06

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
6.41	D	51.0	33.1		51.0	0.57	2	0.22	**0.22**	SS	BE	M
6.39	A	33.1		51.0	46.4	0.75	3	0.35	**0.34**	SS	BE	M
8.52	D	51.5	30.0		51.5	0.76	2	0.29	**0.29**	ST/SH	BE	M
8.54	A	30.0		51.5	44.4	0.50	3	0.25	**0.24**	ST/SH	BE	M
9.72	D	50.9	35.4		50.9	0.85	2	0.33	**0.33**	ST/SH	BE	M
9.70	A	35.4		50.9	47.9	0.51	2	0.22	**0.22**	ST/SH	BE	M

Comments:

MOISTURE
(W) Wet
(M) Moist
(D) Dry
(AD) As Drilled
(AR) As Received

ROCK TYPE
(SS) Sandstone
(ST) Siltstone
(SH) Shale
(CL) Claystone
(G) Granitic
Other:

STRUCTURE
(MA) Massive
(BE) Bedded
(IB) Interbedded
(LA) Laminated
(CR) Crystalline
Other:

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 7 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$Is = \frac{P \times 1000}{(De)^2}$ $Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$

Date Sampled: 13/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory: DBrooke
Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* SYD081499.7

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH07

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
4.39	D	51.3	37.8		51.3	0.28	2	0.11	**0.11**	SS	BE	M
4.41	A	37.8		51.3	49.7	0.37	3	0.15	**0.15**	SS	BE	M
5.94	D	51.5	42.1		51.5	1.69	2	0.64	**0.65**	SS	BE	M
5.95	A	42.1		51.5	52.5	1.83	5	0.66	**0.68**	SS	BE	M

Comments:

MOISTURE		ROCK TYPE		STRUCTURE	
(W)	Wet	(SS)	Sandstone	(MA)	Massive
(M)	Moist	(ST)	Siltstone	(BE)	Bedded
(D)	Dry	(SH)	Shale	(IB)	Interbedded
(AD)	As Drilled	(CL)	Claystone	(LA)	Laminated
(AR)	As Received	(G)	Granitic	(CR)	Crystalline
		Other:		Other:	

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — $L > 0.5\ D$ — $De = D$

A = Axial — $0.3W < D < W$ — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — $0.3W < D < W$ — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 4 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$$Is = \frac{P \times 1000}{(De)^2} \qquad Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$$

Date Sampled: 16/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:
Authorised Signatory:
Date: 7/11/08

GHD-GEOTECHNICS
57 Herbert Street, Artarmon, N.S.W. 2064
Tel: (02) 9462 4700 Fax: (02) 9462 4710
GEOTECHNICAL TESTING SERVICES

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Laboratory Accreditation Number : 679

Point Load Strength Index - Report — *Report No.:* **SYD081499.8**

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH08

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth	Test	Dimensions				Results				Sample Description		
	Type	D	L	W	De	Load	Failure	Is	$Is_{(50)}$	Rock	Structure	Moisture
(m)	(D,A,I)	(mm)	(mm)	(mm)	(mm)	P (kN)	Mode (1,2,3...)	(MPa)	(MPa)	Type		
4.93	D	51.5	36.0		51.5	1.10	2	0.41	**0.42**	SS/ST	BE	M
4.95	A	36.0		51.5	48.6	1.94	3	0.82	**0.81**	SS/ST	BE	M
5.74	D	51.3	20.1		51.3	0.33	2	0.13	**0.13**	SH	BE/LA	M
5.73	A	20.1		51.3	36.2	0.42	3	0.32	**0.28**	SH	BE/LA	M

Comments:

MOISTURE		ROCK TYPE		STRUCTURE		FAILURE MODE
(W)	Wet	(SS)	Sandstone	(MA)	Massive	1 = Fracture through fabric oblique to bedding
(M)	Moist	(ST)	Siltstone	(BE)	Bedded	2 = Fracture along bedding
(D)	Dry	(SH)	Shale	(IB)	Interbedded	3 = Fracture through rock mass
(AD)	As Drilled	(CL)	Claystone	(LA)	Laminated	4 = Fracture influenced by pre-existing:
(AR)	As Received	(G)	Granitic	(CR)	Crystalline	(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
		Other:		Other:		5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 5 Days

[X] CORE BOX [X] UNDER COVER
[X] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$Is = \frac{P \times 1000}{(De)^2}$ $Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$

Date Sampled: 15/10/08
Date Tested: 20/10/08
Tested By: CS
Checked By:

Authorised Signatory: PBrooke
Date: 7/11/08

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Point Load Strength Index - Report — *Report No.:* **SYD081499.9**

Client: Goodman Property Services
Project: Bungaribee Industrial Estate
Location: Huntingwood

Job Number.: 21/17871/00
Sample No.: 08-2875
Borehole No.: BH09

TEST METHOD: AS4133.4.1

Client Sample ID:

Depth (m)	Test Type (D,A,I)	Dimensions D (mm)	L (mm)	W (mm)	De (mm)	Results Load P (kN)	Failure Mode (1,2,3...)	Is (MPa)	$Is_{(50)}$ (MPa)	Sample Description Rock Type	Structure	Moisture
4.48	D	49.7	41.4		49.7	0.12	2	0.05	**0.05**	SH	BE/LA	M
4.46	A	41.4		49.7	51.2	0.09	3	0.03	**0.03**	SH	BE/LA	M

Comments:

MOISTURE		ROCK TYPE		STRUCTURE	
(W)	Wet	(SS)	Sandstone	(MA)	Massive
(M)	Moist	(ST)	Siltstone	(BE)	Bedded
(D)	Dry	(SH)	Shale	(IB)	Interbedded
(AD)	As Drilled	(CL)	Claystone	(LA)	Laminated
(AR)	As Received	(G)	Granitic	(CR)	Crystalline
		Other:		Other:	

FAILURE MODE
1 = Fracture through fabric oblique to bedding
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by pre-existing:
(J) Joint plane, (M) Microfracture, (F) Foliation, (V) Vein
5 = Partial fracture or chip (Invalid result)

TEST TYPES

D = Diametral — L > 0.5 D — De = D

A = Axial — 0.3W < D < W — $De = 2 \times \sqrt{\frac{D \times W}{pi}}$

I = Irregular Lump — 0.3W < D < W — $De = 2 \times \sqrt{\frac{Area_{min}}{pi}}$

Elapsed Time Since Drilling = 0 Days

[X] CORE BOX [X] UNDER COVER
[ ] WRAPPED [ ] OPEN AIR
[ ] UNWRAPPED [ ] UNKNOWN

Test Apparatus: LM0556

FORMULAE:

$Is = \frac{P \times 1000}{(De)^2}$ $Is_{50} = Is \times \left[\frac{De}{50}\right]^{0.45}$

Date Sampled: 17/10/08
Date Tested: 17/10/08
Tested By: CS
Checked By:

Authorised Signatory :
Date: 7/11/08

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Roberta Lamont	Tony Colenbrander		Tony Colenbrander		11/12/08
1	Roberta Lamont	Tony Colenbrander		Tony Colenbrander		30/10/09