## **Geotechnical Investigation**

Queanbeyan Palerang Regional Sports Complex

50520049

Prepared for Queanbeyan Palerang Regional Council

19 March 2020



APPENDIX L



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## 1 Introduction

Cardno (NSW/ACT) Pty Ltd (Cardno) has been commissioned by Queanbeyan Palerang Regional Council (QPRC) to undertake a geotechnical investigation at the proposed QPRC Regional Sports Complex (herein referred to as the Site). The site is a master planned sporting complex, approximately 17ha in area. The site is located between the suburbs of Hume to the west and Jerrabomberra to the east, within Environa, the site legally defined Lot 6, Plan DP239080. At the time of undertaking this geotechnical investigation it was understood that the site would be developed as follows:

- > Six (6) multipurpose playing fields
- > Four (4) soccer fields
- > Two (2) hockey fields
- > Four (4) basketball courts
- > A fifty (50) metre and twenty five (25) metre swimming pool
- > Other supporting infrastructure including pavement, lighting towers, stormwater drainage, bridges and buildings.

The current aerial image of the site is provided in Figure 1-1 and proposed master plan is provided in Figure 1-2.

Figure 1-1 Aerial image of the site





Figure 1-2 Proposed site Master Plan



#### 1.2 Objectives

The purpose of the geotechnical investigation to assist with the detailed design of the development and preparation of tender documentation for construction. The objective of the investigation to:

- > Assess the subsurface profile and identify presence and extent of topsoil/fill or other deleterious material;
- > Excavatability characteristics;
- > Groundwater;
- > Provide engineering assessment discussing the following:

Site classifications of the proposed new playing fields and buildings;

- Allowable bearing capacity (Vertical/Lateral) for structures including buildings and large lighting towers;
- Shallow and deep foundation design parameters for structures, incl. buildings, lighting towers and three (3) bridges
- Durability (exposure classification) of soils/groundwater to steel and concrete piles;
- Anticipated behaviour of soil during construction and during wet and dry periods;
- Determination of excavatability characteristics of encountered soil/rock;
- Dispersion/erodibility;
- Pavement design parameters for roads and carparks;
- Design of up to two (2) suitable pavement profiles, including brief to inform construction methodologies and discussion of site conditions pertaining to management of subsurface water. Pavement design to allow for Design Traffic Loadings of 1x10<sup>5</sup> ESA and 1x10<sup>6</sup> ESA; and
- Geotechnical design parameters pertaining to retaining wall design for cantilevered retaining walls up to 2m high.

The field investigations and laboratory testing were undertaken with reference to the following documentation:

- > Australian Standard AS1726:2017 "Geotechnical Site Investigations"; and,
- > Australian Standard AS1289:2014 "Methods of Testing Soil for Engineering Purposes".

Geotechnical interpretation and discussion of the report findings has been undertaken with reference to the following documentation:

- > Australian Standard AS2870:2011 "Residential slabs and footings"
- > Australian Standard AS2159:2009 "Piling-Design and Installation"; and,
- > Australian Standard AS3798:2007 "Guidelines on earthworks for commercial and residential developments"

## 2 Scope of work

#### 2.1 Desktop Study

Cardno reviewed publicly available information including soil landscape maps, geological maps and reports provided by the Client to gain an understanding of the expected ground and site conditions. The field investigation was developed based on the proposed development layout, survey information and limited information regarding proposed cut/fill exercise available at the time.

#### 2.2 Field Investigation

The proposed site investigation regime was provided as part of the brief nominating the fieldwork methodology, test locations and target depths.

The field investigation comprised of the excavation of twenty two (22) test pits and twenty two (22) bore holes, insitu testing and sampling of the encountered materials. Dynamic Cone Penetrometer (DCP) testing was undertaken to AS1289.6.3.2. DCP results were recorded and assessed in terms of insitu relative density/consistency of the soils and are presented on the relevant descriptive engineering log.

Test pits were excavated by a 5t track mounted excavator using 300mm general purpose (GP) standard toothed buckets by AJD Civil and Demolition. The boreholes were drilled by a Gemco 210B trailed mounted driller using 120mm TC Bit auger by GE Drilling.

Materials encountered during the investigation were classified based on visual and tactile properties and logged on site by an experienced Geotechnical Engineer/Engineering Geologist from Cardno with reference to AS1726:2017.

Selected representative samples of the encountered subsurface material were recovered and transported to a NATA accredited laboratory for testing. A site plan identifying the location of test pits and boreholes are presented in Appendix A. The descriptive engineering logs are presented in Appendix B. Site photographs are presented in Appendix D.

#### 2.3 Laboratory Testing

#### 2.3.1 Classification

Laboratory testing of selected samples was undertaken to provide geomechanical data for engineering assessment and to validate the material properties logged during the field investigation in the descriptive engineering logs. Soil characteristics such as composition, strength and mechanical properties are evaluated through a range of laboratory testing.

Selected samples recovered from the test pits and boreholes at the time of the field investigation were submitted for the following laboratory tests:

- > Moisture Content AS1289.2.1.1
- > Particle Size Distribution AS1289.3.6.1
- > Atterbergs Limits AS1289.3.1.1, 3.1.2, 3.2.1, 3.3.1
- > Shrink Swell Index AS1289.7.1.1

- > Emerson Classification AS1289.3.8.1
- > Durability (for concrete and steel piles) AS2159:2009
- > Maximum dry density/optimum moisture content relationship AS1289.5.1.1
- > California Bearing Ratio AS1289.6.1.1

The geomechanical testing was carried out at Construction Sciences Pty Ltd, a NATA accredited geotechnical laboratory (Fyshwick, NATA Accreditation No. 1986, Corporate Site 455) to the relevant Australian Standards. Laboratory reports are presented in Appendix C.

#### 2.3.2 Durability

Selected samples were submitted for chemical analysis from eight (8) locations and analysed for pH, electrical conductivity, chloride and sulphate content for exposure classification in accordance with AS 2159:2009 "Piling - Design and Installation", for concrete and steel pile durability.

The soil corrosion potential should be taken into consideration when designing for durability for concrete and steel foundations.

## **3** Site Description

#### 3.1 Site Location and Topography

The proposed Queanbeyan-Palerang Regional Sports Complex's (QPRSC) subject site is located within South Jerrabomberra, in between Hume and Jerrabomberra. The existing site is situated on open landscape characterised by the Jerrabomberra Creek corridor, and mounding related to the former Tralee Speedway/Fraser Park Raceway and 1/2 Mile Speedway. Additionally there is a basin located in the north east of the site and minor stockpiles and fill mounds located around the site. The site is bound to the north and east by the Jerrabomberra Creek and to the west by the ACT/NSW border and Hume industrial estate. South of the site, it is understood that the construction of a new road has commenced that will provide access to the future Environa and South Tralee residential developments (south) and the Queanbeyan-Palerang Regional Sports Complex from Thompsitt Drive to the east and Isabella Drive to the west.

#### 3.2 Regional Geology

The Canberra 1:100,000 Geological Map (Sheet 8727, BMR Canberra) indicates the immidiate area of the site is underlain by the Deakin Volcanics. The Deakin Volcanics is characterised by deposits including rhyodacitic ignimbrite and minor volcaniclastic and argillaceous sediments. To the northeast of the site are quaternary alluvium deposits (gravel, sand, silty clay and organic clay).



#### Figure 1-1 Geological map of the QPRSC area



#### 3.3 Soils

Review of the Canberra 1:100,000 Soil Landscape maps indicate that the site is situated on the boundary between the Williamsdale and Ginninderra Creek landscapes. The Williamsdale transferral landscape is characterised by undulating rises, fans, valley flats and depressions on Silurian Volcanics. Soils are moderately deep, moderately well-drained yellow chromosols (yellow podzolic soils) on red and brown kandosols (red and yellow earths) on upper rises and fan elements. The Ginninderra Creek landscape characterised by gently undulating floodplain on Quaternary alluvium. Local relief <10 m; elevation 540 - 680 m; slopes generally <3%. Many imperfectly drained areas. Extensively cleared riparian woodland. Soils are deep (>100 cm), imperfectly drained Sodic Brown Chromosols (Brown and Yellow Podzolic Soils) on margins of the unit. Deep (>100 cm), poorly drained Stratic Rudosols (Alluvial Soils) on floodplain elements.

## 4 Fieldwork

Fieldwork was undertaken between 15<sup>th</sup> January and 17<sup>th</sup> January 2020. Works were carried out in accordance with Cardno procedures.

Twenty two (22) test pits were excavated within the site using a 5t track mounted excavator using 300mm general purpose (GP) standard toothed buckets supplied and operated by AJD Civil and Demolition. The test pits were denoted in accordance with the design feature to be investigated as follows:

- > 100 series (total of eleven (11) test pits) Playing fields with a target depth of 1.0 m;
- > 200 series (total of three (3) test pits) Underground utilities with a target depth of 1.5 m;
- > 400 series (total of eight (8) test pits) Pavement design with a target depth of 1.0 m.

Twenty two (22) boreholes (denoted series 300 for infrastructure including buildings and lighting towers) were drilled within the site using a Gemco 210B trailed mounted driller using 120mm TC Bit auger supplied and operated by GE Drilling. Test pits were excavated to depths ranging from 1.0 m to 1.5 m below ground level (mbgl). Boreholes were drilled to depths ranging from 2.72 m to 6.6 m below ground level (mbgl). The encountered materials were logged by an experienced Geotechnical Engineer/Engineering Geologist form Cardno. Soil descriptions were made by observing the visual and tactile properties in accordance with AS1726-2017.

Test pit and borehole locations and termination depths with the descriptive engineering logs are presented in Appendix B, and photographic plates in Appendix D.

Dynamic Cone Penetrometer (DCP) testing was undertaken to AS1289.6.3.2. DCP results were recorded and assessed in terms of insitu relative density/consistency of the soils and are presented on the relevant descriptive engineering log in Appendix B.

## 5 Results

#### 5.1 Subsurface Conditions

The subsurface profile encountered was considered consistent with geological maps, a summary of the encountered strata and thicknesses of those strata are presented in Tables 5-1 and 5-2 below. The detailed descriptions of encountered materials are contained in the descriptive engineering logs in Appendix B.

In summary, subsurface conditions encountered that may result in problematic ground conditions for development include:

- > Potential high to very high strength rock horizon with minimal weathering profile limiting ability for piles to socket within rock unit using conventional pile installation equipment;
- > Isolated section of high shrink/swell potential material;
- Very loose to loose sand unit at depth encountered within BH301, BH302, BH303, BH306, BH315, BH317, BH319 encountered at depths from 2.0 m to 3.2 m below ground level and up to 4.3 m in thickness directly above the weathered rock horizon.

Unit	Depth to base (mbgl)	Thickness (m)	Description			
			Silty SAND and clayey silty SAND: fine to coarse grained, light brown, grey, light grey, medium plasticity clay, trace fine to medium, sub-angular gravel, frequent rootlets (<2mm)			
Unit 1 – Topsoil/Fill	0.1 – 0.35	0.0 - 0.35	Sandy SILT: low plasticity, brown, light brown, fine to course sand, trace fine, sub-angular gravel, frequent rootlets (<2mm)			
			Sandy GRAVEL: fine to coarse, sub-rounded to sub-angular, light yellowish brownish grey, fine to coarse sand, with medium plasticity clay, occasional rootlets (<2mm)			
		Sandy SILT and clayey SILT: low to medium plasticity, brown, light brown, fine to medium sand				
Unit 2 – Alluvium	0.35 – 1.5	0.65 – 1.38	SAND, Silty SAND and clayey SAND: fine to coarse grained, brown, light brown, yellowish brown, grey, dark grey/black, white, medium to high plasticity clay, trace fine to coarse, sub- rounded gravel, frequent rootlets (<2mm)			
			Sandy GRAVEL: fine to medium, light brown			
			Silty CLAY and sandy CLAY: medium to high plasticity, dark brown, grey, dark grey mottled red and orange, trace/with fine to medium sand			

Table 5-1 Inferred Geotechnical Model, TP101 – TP110, TP201 – TP203, TP401 – TP408

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Unit	Depth to base (mbgl)	Thickness (m)	Description		
			Sandy SILT: low plasticity, light grey, light brown, brown, fine to coarse sand, trace fine, sub-rounded gravel		
Unit 1 – Topsoil/Fill/ Pavement	0.1 – 0.8	<ul> <li>− 0.8</li> <li< td=""><td>Silty SAND and clayey SAND: fine to coarse grained, brown, light brown, grey, light grey, mottled red and yellow, trace/with fine, sub-rounded to sub-angular gravel, frequent rootlets (&lt;2mm)</td></li<></ul>	Silty SAND and clayey SAND: fine to coarse grained, brown, light brown, grey, light grey, mottled red and yellow, trace/with fine, sub-rounded to sub-angular gravel, frequent rootlets (<2mm)		
Favement			Silty Sandy GRAVEL: fine to coarse, sub-rounded, sub- angular to angular, light yellowish grey locally light reddish brown, fine to coarse sand, frequent rootlets (<2mm) SPRAY SEAL		
			Sandy SILT and clayey SILT: low to medium plasticity, brown, light brown, grey, dark grey, fine to coarse sand, trace/with fine sub-rounded gravel		
Unit 2 – Alluvium	1.2 – 6.3	1.0 - 6.0	CLAY, silty CLAY, sandy CLAY and sandy silty CLAY: medium to high plasticity, brown, grey, dark grey/black, mottled orange, yellow and grey, trace/with fine to coarse sand, trace fine, sub-rounded gravel, occasional rootlets (<2mm)		
			SAND, Silty SAND, clayey SAND and silty clayey SAND: fine to coarse grained, brown, red brown, light brown, dark brown, light grey, dark grey, mottled yellow and orange, trace/with medium plasticity clay, trace/with fine sub- rounded to sub-angular gravel, occasional relic organic material		
Unit 3 – Residual Soil	3.6 – 6.4	0.95 – 2.6	SAND, clayey SAND, clayey Gravelly SAND : fine to coarse grained, grey, brown, mottled orangish brown and yellowish brown, greenish grey mottled light green, medium to high plasticity clay, fine to coarse, sub-angular to sub-rounded gravel		
Unit 4 – Rock/Weathered Rock	Not encountered	N/A	DACITE: orange brown, yellow brown, grey, greyish green, blueish green, very low to low strength, highly weathered, medium grained		

Table 5-2	Inferred Geotechnical Mode	I, BH301 – BH322

#### 5.2 Laboratory Testing

#### 5.2.1 Atterberg Limits and Particle Size Distribution Results

Atterberg limit and particle size distribution testing was conducted on selected samples to assess plasticity and grading. Table 5-3 below shows the results for liquid limit, plastic limit, and plasticity index, and percentage gravel, sand and clay contents. Laboratory certificates are presented in Appendix C.

	,	0						
Sample	Depth (m)	Geotechnical Unit	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel Content (%)	Sand Content (%)	Clay/Silt Content (%)
BH306	6.0-6.45	2 – Alluvium/4 - Rock/Weathered Rock	28	20	8	37	50	13
BH321	1.8-2.3	2 – Alluvium	30	18	12	2	25	73
TP101	0.2-0.3	2 – Alluvium	22	21	1	1	54	45
TP101	0.7-0.8	2 – Alluvium	33	27	6	0	8	92
TP105A	0.3-0.4	2 – Alluvium	25	18	7	2	41	57
TP406	0.6-0.8	2 – Alluvium	19	16	3	4	50	46

 Table 5-3
 Summary of Atterberg Limits Results

#### 5.2.2 Shrink-Swell Index Results

Shrink-Swell testing was conducted on selected samples to assess the site classifications for the proposed playing fields and buildings. Table 5-4 below shows the results for the Shrink-Swell Index. Laboratory certificates are presented in Appendix C.

Sample	Depth (m)	Geotechnical Unit	Shrink-Swell Index
BH307	4.5-4.95	2 - Alluvium	1.2
BH309	3.0-3.45	2 - Alluvium	2.2
TP102	0.4-0.5	2 - Alluvium	0.9
TP104	0.2-0.3	2 - Alluvium	0.8
TP107	0.2-0.3	2 - Alluvium	1.5
TP110	0.7-0.8	2 - Alluvium	1.0

#### Table 5-4 Summary of Shrink Swell Index Results

#### 5.2.3 California Bearing Ratio Results

Standard compaction (95%) and CBR testing was conducted on selected samples to allow assessment of subgrade conditions for pavement design and compaction properties. Table 5-5 below shows the results for the maximum dry density, optimum moisture content, CBR and CBR swell. Laboratory certificates are presented in Appendix C.

Table 5-5	Summary of CBR Results
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Sample	Depth (m)	Geotechnical Unit	Field moisture content (%)	ОМС (%)	MDD (t/m³)	CBR (%)	CBR Swell (%)
TP401	0.6-0.8	2 - Alluvium	13.6	16.0	1.76	10	0.5
TP402	0.6-0.8	2 - Alluvium	8.0	12.0	1.87	8	0.5
TP403	0.6-0.8	2 - Alluvium	6.4	11.0	1.79	3.5	1.0
TP404	0.6-0.8	2 - Alluvium	16.9	17.0	1.73	4.5	1.5
TP405	0.6-0.8	2 - Alluvium	-	15.5	1.45	2.0	5.0
TP406	0.6-0.8	2 - Alluvium	4.0	10.0	1.93	8	0.0
TP407	0.6-0.8	2 - Alluvium	11.0	18.5	1.49	1.5	3.0
TP408	0.6-0.8	2 - Alluvium	10.0	16.5	1.68	3.0	2.5

Notes:

1) MDD 2) CBR = Maximum Dry Density (t/m3)

CBR = California Bearing Ratio @ 95% MDD (modified maximum dry density)

3) OMC = Optimum moisture content (%)

#### 5.2.4 Emerson Class Number

Emerson Class Number testing was conducted on selected samples to assess the soils coherence in water, which enables assessment of soil erosion and durability. Table 5-6 below shows the results of the Emerson Class Number. Laboratory certificates are presented in Appendix C.

Sample	Depth (m)	Geotechnical Unit	Emerson Classification
TP101	0.2-0.3	2 - Alluvium	8
TP104	0.2-0.3	2 - Alluvium	5
TP105A	0.3-0.4	2 - Alluvium	2
TP107	0.2-0.3	2 - Alluvium	5
TP110	0.3-0.4	2 - Alluvium	4
TP406	0.6-0.8	2 - Alluvium	6

Table 5-6 Emerson Classification

#### 5.2.5 Exposure Classification

During the field investigation, eight (8) soil samples were collected and analysed for pH, Electrical Conductivity, chloride and sulphate content in terms of aggressivity. The table below provides exposure classification for concrete and steel piles in accordance with AS 2159:2009 Piling – Design and Installation. The assessment has assumed Class A soil conditions for boreholes BH301, BH303 and BH308 as the encountered soils being

located within the water table and Class B for boreholes BH311, BH312 and BH321 as the encountered soils being located above the water table.

The soil corrosion potential should be taken into consideration when designing for durability for concrete and steel foundations. Results are presented in Table 5-7. Certificates of Analysis are presented in Appendix C.

Table 5-7	Summary of Corrosivity Exposure Classification									
Sample	Depth (m)	pН	Electrical Conducti	Resistivit y (ohm	Sulpha Chloride te - - Cl SO/			Classification – s A soils	Exposure Classification – Class B soils	
Sample	Deptil (III)	pn	vity (dS/m)	cm)			Concrete	Steel	Concrete	Steel
BH301	4.5-4.95	6.8	0.15	6660	38	314	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH303	3.0-3.45	7.5	0.05	20000	29	43	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH308	1.5-1.95	8.2	0.08	12500	28	67	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH308	3.0-3.45	8.4	0.09	11100	40	64	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH311	1.5-1.95	8.1	0.03	33300	23	22	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH312	4.5-4.95	7.6	0.06	16700	35	32	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH321	1.5-1.95	8.8	0.06	16700	22	76	Mild	Non- aggressive	Non- aggressive	Non- aggressive
BH321	4.5-4.95	8.3	0.04	25000	23	21	Mild	Non- aggressive	Non- aggressive	Non- aggressive

#### 5.3 Groundwater

At the time of the investigation (January – middle of summer), ground water was not encountered in any of the test pits (depths 1.0m-1.5m). Dry to moist soils were encountered in TP101-TP102, TP105A, TP106-TP110, TP201-TP203 and TP401. However, ground water was encountered at depths of 1.2m-5.0m in boreholes BH301-BH304, BH306-BH310, BH312, BH314-BH315, BH317-BH319 and BH321. A summary of the encountered ground water depths are presented in Table 5-8 below.

Table 5-8 Summary of encountered ground water depths

Borehole Location	Ground water Depth (mbgl)		
BH301	3.1		
BH302	3.9		
BH303	3.0		
BH304	4.3		
BH305	Not Encountered		
BH306	1.8		
BH307	4.9		
BH308	1.2		
BH309	2.3		
BH310	2.5		
BH311	Not Encountered		
BH312	4.1		
BH313	Not Encountered		
BH314	2.7		
BH315	2.1		
BH316	Not Encountered		
BH317	2.6		
BH318	2.9		
BH319	2.4		
BH320	Not Encountered		
BH321	5.0		
BH322	Not Encountered		

Groundwater is expected to fluctuate throughout the year due to seasonal influence. It is likely that groundwater will be locally encountered as a perched water table within Alluvial soils overlying the residual soils/extremely weathered rock or low permeability bedrock, especially after significant and prolonged rainfall events.

## 6 Engineering Assessment

The engineering assessment presented herein has been based on observations made during the site investigation, the material succession encountered within the test pits, boreholes and insitu and laboratory test results.

#### 6.1 Site Classification

Site classification assessments for the proposed playing fields and buildings has been conducted based on the Shrink Swell Index in accordance with AS2870:2011.

Based on the calculated characteristic ground movements for the proposed playing fields (TP102, TP104, TP107 and TP110) and buildings (BH307 and BH309) within the site is classified as Class M.

This Classification is applicable only for ground conditions encountered at the time of this investigation. If cut or fill earthworks are carried out, then the Site Classification will need to be re-assessed, and possibly changed.

#### 6.2 Shallow Foundations

#### 6.2.1 Allowable Bearing Capacity Recommendations

All footing systems for residential structures should be designed and constructed in accordance with AS2870-2011 for the appropriate classification. Suitable footing systems may comprise pad/strip footing or raft slabs.

An allowable bearing capacity assessment using material descriptions and strengths obtained from the descriptive engineering logs has been carried out for shallow pad foundations, which are presented in Table 6-1 below.

Table 6-1   Preliminary all		owable bearing capacities
Geotechnical Unit		Allowable Bearing Capacity <sup>1</sup> (kPa)
2 – Alluvium		100
3 – Residual soil		150

Notes:

1) <sup>1</sup>Bearing capacity assessment assuming a 1.0m wide footing and does not account for embedment.

Footings founded on engineered fill may be proportioned for an allowable bearing pressure of 150kPa and 100kPa for pad and strip footing respectively.

These are the assessed design allowable bearing capacities for the site at the time of the investigation at the locations of the investigation holes. Drying of the site or increased soil moisture (subsurface water infiltration) may have an effect on the insitu soil strengths. Due to these factors and the potential for variability within the natural soils across the site, it is considered imperative that the site be inspected by an experienced Geotechnical Consultant at regular intervals during excavation and construction to confirm design allowable bearing pressures across the entire foundation have been achieved.

#### 6.2.2 Settlement

Settlement of spread footings will depend on the size, shape and founding depth of the footings. At the time of preparing this report, details of the footing loads have not been provided. However, based on the allowable bearing pressures presented above, settlements in the range of 15mm to 20mm may be anticipated for spread footings up to 2m wide for preliminary purposes with a proportion of this settlement likely to occur during construction. Particular attention shall be paid to the very loose to loose sand layer that has been encountered which is likely to generate immediate settlements.

A detailed review of settlements should be undertaken once footing layouts and loadings are finalised.

#### 6.3 Deep Foundations

#### 6.3.1 Pile Design Parameters

Deep foundations are expected to be required for the proposed structures including buildings, bridges and large lighting towers and bored piles are considered feasible.

For the design of piles, geotechnical design parameters for ultimate strength limit state are provided in Table 6-2 for bored piles. The design should also include assessment of both strength and serviceability limit states.

Table 6-2 Preliminary Geotechnical Parameters for Bored Piles

Geotechnical Unit	Ultimate Shaft Adhesion (fs) kPa	Working Base Resistance (kPa)	Ultimate End Bearing Resistance (fb) kPa	Elastic Modulus (MPa)
3 – Residual Soil	50	-	-	35
4 – Rock/ Weathered Rock	150	1,000	3,000	80

Notes:

1) Design parameters for piles in the upper 1.0m of the soil profile across the site should be neglected due to the potential of soil reactivity as a result of seasonal moisture changes.

2) Pile parameters are based on a minimum pile embedment depth of 2.0m.

3) At allowable/working bearing pressures, pile settlements are expected to be less than 1% foundation width

4) Reference should be made to investigation logs for exact material description and depths.

Piles should be designed for both ultimate and serviceability conditions. Ultimate end bearing and shaft adhesion values are to be used with appropriate load factors and geotechnical strength reduction factors to assess ultimate capacity.

The geotechnical strength reduction factor will depend on various influences such as the level of information available for the rock and the level of construction control. Based on the above influence factors applicable for the site and uncertainty with construction method and quality control etc., an average risk rating, ARR and geotechnical strength reduction factor,  $\Phi$ gb should be calculated. For limit state strength design, a geotechnical strength reduction factor ( $\Phi$ gb) of 0.45 can be applied to the ultimate capacity presented in Table 6-2. Pile testing requirements will be dependent on AS2159-2009. For piles subject to uplift loads, the geotechnical strength should be multiplied by a factor of 0.7 in addition to the geotechnical strength reduction factor.

Whilst bored piles are considered feasible, constructability with a high groundwater level may be problematic and will likely require temporary lining.

Piles should extend a minimum of 2 pile diameters into the founding bedrock. The design values require good construction practices which includes socket cleaning and concreting in a continuous process without delay. It is recommended that an experienced geotechnical engineer or engineering geologist observes pile drilling as well as shaft and mechanical base cleaning to confirm the adequacy of founding strata. Such observations would be undertaken from the piling platform level and would include observation of returned cuttings and drill rig performance, as well as the effectiveness of shaft roughening (if required) and down-hole cleaning.

Piling contractors should be provided with the descriptive engineering logs and be required to make their own assessment of suitability of piling plant and to verify the ultimate load-carrying pile capacities.

Further geotechnical investigation where deep foundations are expected to be required i.e. at the location of large lighting towers, buildings and bridges should be undertaken to confirm the subsurface profile and design parameters prior to design of foundations. These should include proof coring of rock to a minimum depth of 3m below the pile base and Standard Penetration Tests (SPTs) to allow assessment of the in situ strength properties of the encountered materials.

#### 6.4 Lateral Earth Pressures

Retaining walls may be required as part of the development. The design of retaining walls depends upon the type of wall, the ground profile and the sequencing of construction. Detailed soil-structure interaction analyses will be required during the detailed design stage to assess magnitudes of movement.

For detailed design of the retention system, location specific geotechnical profiles should be developed. Recommended preliminary design parameters for the various soil units are presented in Table 6-3.

Geotechnical Unit	Bulk Density γ (kN m³)	Effective Friction Angle φ' (degrees)	Active Earth Pressure (Ka)	Passive Earth Pressure (Kp)	At-rest earth Pressure Coefficient (Ko)
2 – Alluvium	17	28	0.36	2.77	0.53
3 – Residual soil	20	30	0.33	3.0	0.5
4 – Weathered Rock	22	30	0.33	3.0	0.5

#### Table 6-3 Preliminary Design Parameters for Retaining Wall Design

Notes.

1. Assuming no sloping ground and area above and below the retaining structure is horizontal

The above advice assumes level ground above and below the retaining wall and no seismic actions. The design of any retaining structures should make allowance for all applicable surcharge loading including construction activities and ground water conditions.

#### 6.5 Earthworks

#### 6.5.1 Site Preparation

Prior to bulk earthworks, any fill, pavement or structure footings areas shall be cleared of any foreign matter or unsuitable material which includes but may not be limited to the following:

- > Vegetation or organic matter including root balls of any larger trees onsite;
- > Topsoil or soil significantly affected by roots or root fibres;
- > Any scattered waste or dumped materials;
- > Loose or low strength (soft) soils or otherwise 'unsuitable' soils.

Deleterious materials that cannot be reused on site shall be disposed of at a licenced waste facility and classified in accordance with the NSW EPA Waste Classification Guidelines. Stripped topsoils shall be stockpiled for re-use where suitable.

#### 6.5.2 Excavatability

Based on the field investigation and testing we can estimate the excavatability using the Kirsten's Classification System presented in Table 6-4. Soil and rock encountered during the investigation are expected to range from Class 2 to 5 and should be able to be excavated using conventional earth moving plant.

	Material Excavation Classification <sup>(1)</sup>		
Material Type	Class	Class Index Boundaries	Description of Excavatability
Soil	1	N <sup>(2)</sup> <0.01	Hand spade
	2	0.01 <n<0.1< td=""><td>Hand pick and spade</td></n<0.1<>	Hand pick and spade
	3	0.1 <n<1.0< td=""><td>Power tools</td></n<1.0<>	Power tools
Rock	Rock 4 1.0 <n<10< td=""><td>Easy ripping</td></n<10<>		Easy ripping
	5	10 <n<100< td=""><td>Hard ripping</td></n<100<>	Hard ripping
	6	100 <n<1,000< td=""><td>Very hard ripping</td></n<1,000<>	Very hard ripping
	7 1,000 <n<10,000< td=""><td>Extremely hard ripping/blasting</td></n<10,000<>		Extremely hard ripping/blasting
	8	N > 10,000	Blasting

 Table 6-4
 Definition of eight point excavation classification system for soil and rock

Notes:

<sup>(1)</sup> Kirsten's Classification System <sup>(2)</sup> Ripping Index

It is recommended that Contractors are provided with the descriptive engineering logs to review and make their own assessment of the ground conditions.

Rock outcrops were encountered in a number of areas, typically northwest of the site. Where shallow rock is encountered for deep excavation, use of rippers or rock hammers may be required. Due to the lateral confinement present during test pit excavation, it is possible that large scale excavation will experience less problematic excavation conditions than those experienced during this investigation.

Groundwater was not encountered during the investigation in test pits (depths from 1.0m to 1.5m), however is known to fluctuate due to rainfall events. Any excavations within the alluvial soils should be planned during and preceded by dry weather.

#### 6.5.3 **Excavation Stability**

The materials encountered during the investigation typically comprised alluvium, residual soils, weathered rock/rock.

Excavations deeper than 1m within the soil profile (alluvium and residual soils) should be no steeper than 1V:1H in the short term.

Excavations deeper than 1m within the rock profile (highly weathered dacite) should be no steeper than 2V:1H in the short term. Note that excavation stability in rock is highly influenced by natural and induced defects, as such the stability is controlled by the orientation of the defects with respect to the excavation.

Battering or benching the trenches would be appropriate methods for reducing the batter angle of the trench walls. Should steeper excavations be required, shoring methods such as shields should be used. Surcharge loads should be kept well clear of the crests of excavations. If steeper excavations or surcharge loading is required to be placed close to the crest of the excavation, temporary shoring support or engineering retaining solutions are recommended. Permanent excavations in the residual soils/extremely weathered rock are recommended to have maximum batter of 1V:2H.

All trenching work should be conducted in accordance with WorkSafe ACT, Excavation Work Code of Practice (October 2018) or other relevant document in force at the time of works.

#### 6.5.4 Trafficability

At the time of the investigation, site was covered by grass and some mature trees. Predominantly sandy clay and silty clay soils were encountered beneath a topsoil/fill layer of up to 0.8m.

It is likely that imported road base or recycled road base type material such as crushed brick and concrete will be required to provide a stable surface for temporary access and roadways during or following wet weather.

Following excavation to the proposed subgrade level, or stripping for pavement construction, the subgrade should be proof rolled in accordance with AS3798:2007 "Guidelines on earthworks for commercial and residential developments". Any areas where excessive heave or deflection is found to occur should be excavated and replaced with appropriate fill.

Consideration should be given to the design of crane pads or working platforms for sensitive plant and equipment should these be a requirement of the project.

#### 6.5.5 Site management

In order to minimise foundation and pavement movement, it is important that proper site management for the existing soil conditions are observed.

We recommend that appropriate drainage be provided around roads, buildings and structures to ensure adequate foundation performance and prevent scouring. It is also recommended that the ground surface around structures or building platforms should slope away at a gradient of 1V:20H for 2m and then fall to the stormwater runoff system. Subsoil drains either side of roads should be incorporated into the design.

The importance of avoiding leakage from underground services and drains near the buildings and structures is stressed. Any leaking services or blocked drains should be remedied promptly. It is advisable to use flexible joints, allowing horizontal and vertical movement where service pipes pass through the foundation structure (floor and slab). The bases of service trenches should fall away from the buildings and structures.

It is recommended that future shrubs and trees be planted away from the buildings and structures, at a distance at least equivalent to their mature height. This reduces the likelihood of those trees influencing shrinkage movement in expansive founding soils. New buildings and structures should also be located away from any existing trees on the site, at a distance equivalent to the tree's mature height.

#### 6.5.6 Material Reuse

The material encountered across the site and with depth exhibits limited variation in geotechnical properties which will influence the suitability and methodology for reuse during construction.

It is likely that various site won material would require treatment or blending to achieve the best possible outcomes in terms of their engineering properties. This may include wetting/drying to achieve optimum moisture content or blending soils with a higher than required fines content with more coarse material. Any such requirements should be identified in the design.

Highly to moderately weathered rock materials encountered on site are considered suitable for reuse as controlled filling subject to removal or crushing of particles greater than 75mm (least dimension) in size. The Alluvial soils encountered during the investigation are generally considered suitable for reuse.

#### 6.5.7 Fill Placement

Following site preparation works, fill should be placed and compacted in accordance with the following guidelines and specifications:

> AS 3798-2007 Earthworks for Commercial and Residential Development

It is recommended that the following procedures be adopted for subgrade preparation:

> Remove any vegetation from the surface and strip off any topsoil or surficial fill containing significant organic matter or pavement seal.

> To reduce the potential for voids and to provide compaction of the upper fill materials it is recommended that the site be compacted with at least 6 passes of a heavy compactor (say 30 tonne) or similar.

> Any soft, weak or otherwise unsuitable areas identified during the subgrade compaction process that do not respond to further compaction, should then be removed and replaced with select fill in layers not exceeding 200mm loose thickness and should be compacted to achieve a dry density ratio of 98%Modified in accordance with AS1289 5.1.1 and 5.4.1 or 5.7.1. Excavations to remove soft or weak areas should have side slopes battered to no steeper than 1H:1V.

> Further excavate or fill to design subgrade level, as required.

> The exposed subgrade should then be scarified and moisture conditioned to within 2% of Optimum Moisture Content (OMC) and compacted over the top 200mm to achieve a minimum dry density ratio of 98% Modified in accordance with AS1289 5.1.1 and 5.4.1 or 5.7.1.

> Where engineered fill is required to raise the subgrade level, it should be placed and compacted as described above.

The consultant responsible for the Level 1 Inspection and Testing should review the proposed earthworks specification and satisfy themselves that the frequency of inspections and testing is commiserate with AS3798-2017, Section 8.2, with the purpose of the fill placement and with the operations being undertaken.

It is worth noting that moisture content of tested materials ranged in field moisture content of between optimum and 4.7% dry of optimum.

#### 6.5.8 Piling Platform

Depending on final bulk earthworks, a working platform may need to be constructed to allow access and support piling plant. The need and extent of a working platform would need to be assessed once piling plant track/wheel loads are known.

#### 6.6 Pavement Profile Design

Laboratory CBR testing conducted on selected samples reported CBR values of between 1.5% and 10% within test pits TP401 to TP408 across the site. Insitu DCP testing conducted at each test pit indicated insitu CBR values between 2% and >15% in TP401 to TP408 (proposed access road and car park area).

Note that the inferred CBR values from DCP data are unlikely to be achieved where the soils are reused as fill.

It is recommended that a design CBR value of 3% is adopted for the pavement design due to the generally consistent and quality of the encountered alluvium soils.

Where site won fill materials are to be placed for pavement subgrade, a preliminary design CBR of 5% can be adopted. The laboratory CBR values exhibited a high degree of variance (between 1.5% and 10%). As such during fill placement the subgrade CBR should be confirmed by a suitability qualified geotechnical engineer. Where fill materials are unable to achieve the design CBR, soil treatment methods such as the addition of lime may be suitable.

During pavement construction it is recommended that the prepared subgrade is assessed by a suitably experienced geotechnical engineer to confirm the ability of the actual subgrade materials to meet the design subgrade requirements. All topsoil, root affected soils, uncontrolled fill or deleterious material should be removed as part of subgrade preparation.

#### 6.6.1 Design Basis

The design guides used in the pavement profile designs are:

- Austroads "Guide to Pavement Technology Part 2: Pavement Structural Design dated 2017 (referred to as AGPT02-17)
- Austroads "Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design dated 2011 (referred to as AGPT05-11)
- > RMS Supplement to Austroads Guide to Pavement Technology Part 2: Pavement Structural Design, Publication No. 11.050 Version 2.2 August 2018 (referred to as RMS11.050)
- > RMS QA Specification R44 Earthworks, Edition 3/Revision 0, dated March 2015 (referred to as R44)
- > Queanbeyan Palerang Development Design Specification-D2-Pavement Design, Version 1 November 2018 HPRM: SF130198
- > Queanbeyan Palerang Development Construction Specification-C242-Flexible Pavements, Version 1 January 2019

#### 6.6.2 Design Traffic Loading

The equivalent standard axles (ESA) of designed traffic loading was assumed as 1x10<sup>5</sup> and 1x10<sup>6</sup>.

#### 6.6.3 **Pavement Profiles**

Flexible unbound granular pavement profiles are presented in Table 6-5 and Table 6-6 for the two design ESA values 1x10<sup>5</sup> and 1x10<sup>6</sup>.

Subarade	Subgrade min. CBR 3%	
Total Pavement Thickness	380	
SMZ	120	Select Material Upper 150mm CBR33%, Lower 50mm CBR 19%, Swell ≤1.5%, Plasticity Index ≤15
Sub base Course	100	DGS20
Base Course	120	DGB20
Wearing Course	40	AC14 A15E
Layer	Thickness (mm)	Material
able 0-5 Offbouriu Granulai Faver	nent – Subgrade CBR–5 %, LSA–1710	

Table 6-5 Unbound Granular Pavement – Subgrade CBR=3%, ESA=1x10<sup>5</sup>

Table 6-6 Unbound Granular Pavement – Subgrade CBR=3%, ESA=1x10<sup>6</sup>

Layer	Thickness (mm)	Material
Wearing Course	40	AC14 A15E
Base Course	150	DGB20
Sub base Course	100	DGS20
SMZ	230	Select Material Upper 150mm CBR33%, Lower 50mm CBR 19%, Swell ≤1.5%, Plasticity Index ≤15
Total Pavement Thickness	520	
Subgrade	Subgrade min. CBR 3%	

Note:

1. Basecourse thickness includes 10mm construction tolerance in accordance with RMS supplement to AGPT02-17

2. SMZ Only required where CBR Swell  $\geq 2.5\%$  or CBR  $\leq 3.0\%$ 

#### 6.7 Erosion and Sediment Control

Emerson Class Number results of the soils indicated Class 2 to Class 8 dispersion. As such untreated and exposed batters within problematic areas particularly around TP105A will likely be susceptible to erosion. As such it is probable that treatment of the onsite materials by methods such as mixing gypsum, placement of geosynthetic erosion protection products or vegetation would be required on constructed permanent batters. Further testing should be considered to better delineate the boundaries of this problematic material.

It is imperative that during earthworks, erosion and sediment control practices are investigated and put in place to ensure any activities carried out on site will not have a detrimental impact to the neighbouring environment. It is also recommended that during the development of the bulk earthworks specification, consideration is made to the *Urban Stormwater: Soils and Construction*, Landcom 2004 ("the Blue Book")

Erosion and sediment controls should be incorporated early in any large or small scale development process and be included in budget estimates. In selecting and constructing erosion and sediment control systems, an appreciation of the differences between the two is important.

- > Erosion control measures assist in protecting or strengthening the soil's surface or subsurface from being eroded and diverts runoff in a non-erosive way.
- > Sediment control measures capture and remove eroded soil particles from runoff prior to the water leaving the site.

The key to successful erosion and sediment control is planning. Generally control measures are not enough if just considered on their own. There must be a combination of structural controls, good site management and construction practices to achieve effective controls. An Erosion and Sediment Control Plan (ESCP) can assist

in bringing together all of these aspects. These plans should communicate how erosion and sedimentation can be controlled on and off site. The erosion and sediment control measures as outlined in the plan must be installed before any disturbance of the site occurs.

It is best practice to develop an ESCP for any earthworks to be undertaken whether they are subject to statutory requirements or not. Developing a plan helps to identify the overall requirements for drainage and revegetation, assists in determining what level of protection methods may be required and reduces costs for repairs and/or rehabilitation.

## 7 Closure

We appreciate the opportunity to work collaboratively with you on this project. Our team looks forward to bringing our high level of expertise to deliver successful outcomes in your future projects.

Your attention is drawn to the appended document titled "*Important Information about this Geotechnical Report*". This document is intended to clarify to the reader what the realistic expectations of this report should be, and what is the correct use of the document. Misinterpretation of geotechnical information presents significant risk to projects: The document includes a discussion on general limitations of geotechnical services, which by nature, are based extensively on opinion and judgement.

The statements included in this document are not intended to be exculpatory clauses or to reduce the general responsibility accepted by Cardno, but rather to identify where Cardno and our Client's responsibilities lie. The statements ensure that all parties that may rely on the report are aware of their respective responsibilities.

For further enquiries, please do not hesitate to contact Cardno on the information supplied.

## 8 References

- [1] Abell, R. S. 1992, Canberra 1:100 000 scale geological map. 8727. 1st Edition, BMR, Canberra Jenkins BR, 2000
- [2] Soil Landscapes of the Canberra 1:100,000 Sheet map and report, Department of Land and Water Conservation, Sydney.
- [3] Australian Standard AS3798-2007, "Guidelines on Earthworks for Commercial and Residential Structures," Standards Australia, 2007.
- [4] Australian Standard AS2159-2009, "Piling Design & Installation," Standards Australia, 2009.
- [5] Look, B, "Handbook of Geotechnical investigation and Design Tables", 1st edition
- [6] Australian Standard AS1726:2017 Geotechnical Site Investigations
- [7] Australian Standard AS1289:2014 "Methods of Testing Soil for Engineering Purposes"
- [8] Australian Standard AS2870:2011 "Residential slabs and footings"
- [9] Austroads "Guide to Pavement Technology Part 2: Pavement Structural Design dated 2017 (referred to as AGPT02-17)
- [10] Austroads "Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design dated 2011 (referred to as AGPT05-11)
- [11] RMS Supplement to Austroads Guide to Pavement Technology Part 2: Pavement Structural Design, Publication No. 11.050 Version 2.2 August 2018 (referred to as RMS11.050)
- [12] RMS QA Specification R44 Earthworks, Edition 3/Revision 0, dated March 2015 (referred to as R44)
- [13] Queanbeyan Palerang Development Design Specification-D2-Pavement Design, Version 1 November 2018 HPRM: SF130198
- [14] Queanbeyan Palerang Development Construction Specification-C242-Flexible Pavements, Version 1 – January 2019

Queanbeyan Palerang Regional Sports Complex

# APPENDIX









Queanbeyan Palerang Regional Sports Complex

## APPENDIX

# B

## DESCRIPTIVE ENGINEERING LOGS



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	Drilling			Sampling & Testing	Inpiete	u. 17	/ 1/2	0	Material Description		STIECK	eu by. DR
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Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification		SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
					-		м	L	Sandy SILT: low plasticity, light grey, fine to coarse sand, trace fine, sub-rounded gravel	D	S to F	TOPSOIL
					-		<u>-</u>	0.40	Im Sandy SILT: low plasticity, grey, fine to medium			ALLUVIUM
					-		M	L 0.90	sand	D	F to St	
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				SPT 1.50 - 1.95 m 3, 5, 6 N=11	-		с	I		M ( <pl)< td=""><td>St</td><td>-</td></pl)<>	St	-
	E-F		Ε		-2			2.00	Silty CLAY: high plasticity, dark grey, with fine sand,			
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							SN	л		M to W		-
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			GW	SPT 3.00 - 3.45 m	-3				PL)				
				2, 4, 4 N=8	-		1	3.20m Silty SAND: fine to medium grained, red brown		VS to S	-		
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Data Sta				nplete	d: 17/1	/20	Logged By: JIA			ed By: DR	
Drilling	g		Sampling & Testing				Material Description				
Method Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density		UCTURE Observations
				-		ML	Sandy SILT: low plasticity, light brown, fine to coarse sand	D	S to F	TOPSOIL	
				- 1		ML	Clayey SILT: low to medium plasticity, grey, with fine to medium sand 1.10m Sandy CLAY: low to medium plasticity, grey mottled	D	F to St	ALLUVIUM	
		d at 3.0m	SPT 1.50 - 1.95 m 10, 9, 12 N=21	- - - - - - - - - - - - - - - - - - -		CL- CI	orange, fine to medium sand	D	VSt		
 	3ER/N	GW encountered	SPT 3.00 - 3.45 m 8, 5, 4 N=9			SM SC	2.40m         Silty SAND: fine to coarse grained, grey, trace fine, sub-rounded gravel, trace clay         2.80m         Clayey SAND: fine to coarse grained, brown motiled yellow, with fine, sub-rounded gravel	D D to M	L to MD		
				- - - - - 4		СН	3.25m Sandy CLAY: high plasticity, brown mottled yellow and orange, fine to medium sand, trace fine, sub-rounded gravel 4.0m: becoming brown	M (>PL) to M ( <ll)< td=""><td>F to St</td><td></td><td></td></ll)<>	F to St		
			SPT 4.50 - 4.95 m 7, 6, 11 N=17	- - - - - - - - -		SM	4.40m     Silty SAND: fine to coarse grained, brown mottled orange and red, with fine to medium, sub-rounded gravel     4.8m: becoming gravelly     5.10m	M to W	MD	-	
				-			TERMINATED AT 5.10 m EOH: Refusal at 5.1m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-5.1m GROUNDWATER: Encountered at 3.0m PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:				
R Rip HA Ha PT Pu SON So AH Air PS Pe AS So AD/T So HFA Ho WB W3	cavato pper and au ush tub onic dri r hamn ercussi nort sp olid flig	ger be lling ner on sam iral aug ht aug ht aug ight au re drilli	ppler ger ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit ger v_bit v v_bit v v_bit v v_bit v v v v v v v v v v v v v v v v v v v	Refusal) Level on		S H D M M I N	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     U     Thi       SP     Perth Sand Penetrometer     U     Thi       CP     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dr.       ID     Photoionisation Detector     M     Mo       ID     Photoionisation Detector     W     We       Re-Bodind (wavesmedter)     LL     Lit     Lit	/ ist	ample tal sampl be 'undist	le VS s F turbed' St VSt H	CONSISTENCY - Very Soft - Soft - Firm - Very Stiff - Very Stiff - Hard ATIVE DENSITY - Very Loose - Loose - Medium Dens - Dense - Very Dense

Client:			PR	ino'							
Projec Locati	:t:	C	PR					Job No: 50520049		ПС	DIE NO: BH304 Sheet: 1 of
				883 6081666				Angle from Horizontal: 9	0° \$	Surface	e Elevation:
Rig Ty	/pe:	Ge	mcc	210B				Mounting: Trailer		Driller:	JB
Casing	g Di	ame	eter:	AUGER/NMLC						Contra	ctor: GE Drilling
Data S	Star	ted:	17/1	/20 Date Cor	nplete	d: 17/ <sup>,</sup>	1/20	Logged By: JIA		Checke	ed By: DR
Drill	lling			Sampling & Testing				Material De	escription		
Method Resistance	Kesisiance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characti colour, secondary and minor compone ROCK TYPE, grain size and type, colo fabric & texture, strength, weatherin, defects and structure	our, st p	Consistency Relative Density	STRUCTURE & Other Observations
1		1			_		ML	Sandy SILT: low plasticity, brown, fine to m sand	nedium D	S to F	TOPSOIL
					-		. SM		rown, D	L to MD	ALLUVIUM
				SPT 1.50 - 1.95 m	- 1			0.70m Silty SAND: fine to medium grained, brown fine, sub-rounded gravel, trace clay	n, trace	MD	
		ER/NI	red at 4.3m	5, 8, 11 N=19	2		CI	1.80m Sandy CLAY: medium plasticity, brown mor yellow, fine sand	ttled D to M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
- AD/1	₽₽GE	ER/NI	GW encounte	SPT 3.00 - 3.45 m 4, 5, 6 N=11	- - - - 3 -			Sitty CLAY: medium to high plasticity, brow fine sand 2.6m: decreasing sand content becoming light grey	n, with	St	
				SPT 4.50 - 4.85 m 3, 23, 6/50mm HB N=R	- - 4 - -		CI-CH		M ( <pl)< td=""><td>н</td><td></td></pl)<>	н	
*		*			5 5 			4.90m TERMINATED AT 4.90 m EOH: Refusal at 4.9m (on possible dacite) EXCAVATION: Gemco 210B with 120mm TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracke layers at the surface 0.00-4.9m GROUNDWATER: Encountered at 4.3m PHOTOS; Yes INSITU TESTING: ADDITIONAL NOTES:	n diameter		
EX R HA PT SON AH PS AD/V AD/T HFA WB	R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: V-Bit AD/T Solid flight auger HA Air hammer MATER Water Level o shown ₩ water inflow				No Resistar Refusal) Level on		S ⊢ □ ₽ ₽ ₽	SPT     -     Standard Penetration Test     E       HP     -     Hand/Pocket Penetrometer     E       DCP     -     Dynamic Cone Penetrometer     E       PSP     -     Perth Sand Penetrometer     E       VGC     -     Moisture Content     M       PBT     -     Plate Bearing Test     E       MP     -     Borehole Impression Test     M       PID     -     Photoionisation Detector     W       VS     -     Vane Shear: P=Peak.     F	D - Disturbed sa ES - Environmeni J - Thin wall tut MOISTURE 0 - Dry M - Moist W - Wet PL - Plastic limit L - Liquid limit	ample tal sampl be 'undist	e S - Soft F - Firm

	nt: ect:		2 PRO							Но	ole No: BH30
	ation			CSC, Nr. Hume NSW				Job No: 50520049			Sheet: 1 c
Pos	ition	55H	697	980 6081643				Angle from Horizontal: 90°		Surfac	e Elevation:
-				210B				Mounting: Trailer		Driller:	-
	-			AUGER/NMLC	<u> </u>						ctor: GE Drilling
	a Sta		17/1		nplete	d: 17/	1/20	Logged By: JIA		Checke	ed By: DR
[	Drilling			Sampling & Testing				Material Descripti	on		1
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•		•			-		sм	Silty SAND: fine to medium grained, light brown, trace fine, sub-rounded gravel	D	L to MD	TOPSOIL
					-		SM	0.30m Silty SAND: fine to coarse grained, light brown, trace fine, sub-rounded gravel	D	L to MD	ALLUVIUM
					- 1		ML	0.80m Sandy SILT: low plasticity, brown, fine to medium sand, trace fine, sub-rounded gravel	D	F to St	
	E-F		λ	SPT 1.50 - 1.95 m 3, 4, 6 N=10	2		CI- CH	1.50m Silty CLAY: medium to high plasticity, grey, trace fine, sub-rounded gravel	M (mPL)	St	
—————АD/Т –	AUG	ER/N	AFC.		-		CI- CH	2.20m Sandy CLAY: medium to high plasticity, brown, fine to medium sand, trace fine, sub-rounded gravel		St to VSt	
				SPT 3.00 - 3.45 m 3, 10, 16 N=26		/////	sc	3.10m Clayey SAND: fine to coarse grained, brown mottled yellow and orange, with fine to medium,	м	MD	-
	H-VH				 - 4		+ + + + + + + + + + + +	sub-rounded gravel DACITE: orange brown, very low strength, highly weathered, medium grained	м		WEATHERED ROCK
Υ					- - - - - -			4.40m TERMINATED AT 4.40 m EOH: Refusal at 4.4m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diamet TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.4m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:	er		
ME EX R HA PT OAH PS AAD AD HE WE	Rip Ha Pu Air Pel Sh /V Sol /T Sol A Ho 8 Wa	per nd aug sh tub nic dril hamm cussic ort spi id fligh id fligh llow fli	e ling er on sam ral aug nt aug ght au ght au e drillin	ppler er tr: V-Bit ger er tr: V-Bit tr: tr-Bit tr: tr-Bit tr-B	Refusal) Level or nflow		SH DP P P	P     Hand/Pocket Penetrometer     D       CP     Dynamic Cone Penetrometer     U       SP     Perth Sand Penetrometer     U       C     Moisture Content     MOISTU       BT     Plate Bearing Test     D       IP     Borehole Impression Test     M       D     Photoionisation Detector     W       S     Vane Shear; P=Peak,     LL	Bulk disturb Disturbed si Environmen Thin wall tu <b>RE</b> Dry Moist	ample tal sampl be 'undist	le S - Soft F - Firm

S55H iame ted: Casing	encocineted at 1.0m Water at 1.0m Water	CSC, Nr. Hume NSW 3061 6081670 2 210B : AUGER/NMLC 1/20 Date Cc Sampling & Testing Sample or Field Test SPT 1.50 - 1.95 m 11, 6, 8 N=14 SPT 3.00 - 3.45 m 3, 4, 1 N=5		Graphic Log	ML Classification	0.40m 1.10m	Job No: 50520049 Angle from Horizontal: 90° Mounting: Trailer Logged By: JIA Material Descripti Coll TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, light grey, fine sand Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey, with fine, sub-rounded gravel	on	Driller Contra	actor: GE Drilling ed By: DR
Casing	enccur ieter: : 17// Mater Mater	SPT 1.50 - 1.95 m 11, 6, 8 N=14	Debty (m)		TM Classification	0.40m	Mounting: Trailer         Logged By: JIA         Material Descripti         Coll TYPE, plasticity or particle characteristic, colour, secondary and minor components         ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure         Sandy SILT: low plasticity, light grey, fine sand         Sandy SILT: low plasticity, dark grey, fine sand         Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel         Clayey SAND: fine to coarse grained, light grey,	on Woisture Condition	Stor         Stor           Stor         Stor           Fto St         Fto St	: JB actor: GE Drilling ed By: DR STRUCTURE & Other Observations
Casing	encountered at 1.8m Water	AUGER/NMLC         1/20       Date Co         Sampling & Testing         Sample or         Field Test    SPT 1.50 - 1.95 m 11, 6, 8 N=14 SPT 3.00 - 3.45 m	Debty (m)		TM Classification	0.40m	Logged By: JIA Material Descripti ColL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, light grey, fine sand Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	D Outgran	Contra Check Check Check Check Check Check Check Check Check Check Check	STRUCTURE & Other Observations
Casing	encommend at 1.8m Water	I/20     Date Co       Sampling & Testing       Sample or       Field Test         SPT 1.50 - 1.95 m       11, 6, 8 N=14         SPT 3.00 - 3.45 m	Debty (m)		TM Classification	0.40m	Material Descripti Coll TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, light grey, fine sand Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	D Outgran	Check Acuatistican Acuatistican S to F F to St	STRUCTURE & Other Observations
Casing	main the second	Sampling & Testing Sample or Field Test SPT 1.50 - 1.95 m 11, 6, 8 N=14 SPT 3.00 - 3.45 m	Debty (m)		TM Classification	0.40m	Material Descripti Coll TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, light grey, fine sand Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	O Woistrate D O Oudition	Consistency evaluation Consistency Elative Density	STRUCTURE & Other Observations
	encopurtered at 1.8m	Sample or Field Test SPT 1.50 - 1.95 m 11, 6, 8 N=14 SPT 3.00 - 3.45 m	- - - - - - - - - - - - - - - - - - -	Graphic Log	ML	0.40m	Clayey SAND: fine to coarse grained, light grey,	D Moisture Condition	S to F F to St	TOPSOIL
	encopurtered at 1.8m	SPT 1.50 - 1.95 m 11, 6, 8 N=14	- - - - - - - - - - - - - - - - - - -	Grade Contraction of the second se	ML	1.10m	fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, light grey, fine sand Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	D	S to F F to St	TOPSOIL
ER/N	O D	11, 6, 8 N=14	- - -		. ML	1.10m	Sandy SILT: low plasticity, dark grey, fine sand Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	D	F to St	ALLUVIUM
ER/NI	O D	11, 6, 8 N=14	- - -				Clayey SILT: low to medium plasticity, dark grey, with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,			- -
ER/NI	O D	11, 6, 8 N=14	- - -		ML	2.00m	with fine sand, trace fine, sub-rounded gravel Clayey SAND: fine to coarse grained, light grey,	D	St	-
ER/NI	O D		- - -		· · · · ·	2.00m				-
ER/NI	O D		- 3							
			_							
	GW		- 4		SC			м	L	
		SPT 4.50 - 4.95 m 2, 2, 3 N=5			· • · · · · · · · · · · · · ·					
		SPT 6.00 - 6.45 m 12, 9, 16 N=25	- - - 6 -		· · · · · · · · · · · · · · · · · · ·	6.30m	DACITE: arey year low strength highly weathered	4		WEATHERED ROCK
¥			1	+ +	GP	6.60m	medium grained	м м		
			- 7 - 7 				TERMINATED AT 6.60 m EOH: Refusal at 6.6m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diamet TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-6.6m GROUNDWATER: Encountered at 1.8m PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:	ter		
HA     Hand auger       PT     Push tube       SON     Sonic drilling       AH     har hammer       PS     Percussion sampler       AS     Short spiral auger       AD/V     Solid flight auger: V-Bit       AD/T     Solid flight auger: TC-Bit       HFA     Holow flight auger: TC-Bit					S F F F	:PT - IP - PCP - PSP - IC - PBT - ИР - PID -	Standard Penetration Test     B     -       Hand/Pocket Penetrometer     D     -       Dynamic Cone Penetrometer     U     -       Perth Sand Penetrometer     U     -       Moisture Content     Plate Bearing Test     D     -       Borehole Impression Test     M     -       Photoionisation Detector     W     -       Vane Shear; P=Peak,     PL     -	Bulk disturi Disturbed s Environmen Thin wall tu JRE Dry Moist Wet Plastic limit Liquid limit	sample ntal samp ibe 'undis	Ie S - Soft F - Firm
	ber d au h tub ic dr iamr cussi rt sp d flig ow fl shbo k rol	ber d auger h tube ic drilling nammer sussion sar rt spiral au d flight aug d flight aug ow flight au shbore drill k roller	SPT 6.00 - 6.45 m 12, 9, 16 N=25 PENETRATIO VE VeryEasy F Firm H Hard Ver VeryHard Ver Ver VeryHard Ver Ver Ver Ver VeryHard Ver Ver Ver Ver Ver Ver Ver Ver Ver Ver	SPT 6.00 - 6.45 m 12, 9, 16 N=25 SPT 6.00 - 6.45 m 12, 9, 16 N=25 PENETRATION VE Very Easy (No Resista F Firm H Hard VH Very Hard (Refusal) WATER Water Level or shown M Water Level or shown Water inflow water inflow water inflow water outflow Water Control of the first sof	Avator bucket ler d auger t spiral t	Avator bucket ler d auger h tube ic drilling sussion sampler t spiral auger t spiral auger thobre drilling k roller	Avator bucket ler d auger htube ic drilling sussion sampler t spiral auger t spiral auger t coller	SPT 6.00 - 6.45 m       -5         12, 9, 16 N=25       -6         ++       GP         0       -7         -7	SPT 6.00 - 6.45 m       6         12, 9, 16 N=25       6         Fight auger       -7         Group       -7         Group <td< td=""><td>SPT 6.00 - 6.45 m       -5         12. 9, 16 N=25       -6         + + + GP       BACITE: grey, very low strength, highly weathered, medium grained         medium grained       M         EXCAVATION: Geno 210B with 120mm diameter TC Bit auger Strate 10:00-6.60 m         EXCAVATION: Geno 210B with 120mm diameter TC Bit auger Strate 10:00-6.60 m         Ver       -7         -7       -7</td></td<>	SPT 6.00 - 6.45 m       -5         12. 9, 16 N=25       -6         + + + GP       BACITE: grey, very low strength, highly weathered, medium grained         medium grained       M         EXCAVATION: Geno 210B with 120mm diameter TC Bit auger Strate 10:00-6.60 m         EXCAVATION: Geno 210B with 120mm diameter TC Bit auger Strate 10:00-6.60 m         Ver       -7         -7       -7

	nt: ect: ation		QPR QPR QPR						Job No: 50520049		Но	DIE NO: BH30 Sheet: 1 of
				877 6081572					Angle from Horizontal: 90°		Surfac	e Elevation:
				210B					Mounting: Trailer		Driller	
				AUGER/NMLC					Mounting. Traner		-	ctor: GE Drilling
	<u> </u>		: 17/		nnloto	d. 17/	1/20		Logged By: JIA			ed By: DR
				Sampling & Testing	Inpiete		1/20				onecki	
	Drilling	,	-	Sampling & resurg					Material Description			
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	0	IL TYPE, plasticity or particle characteristic, olour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•		A			-		sм	0.30m	Silty SAND: fine to medium grained, light brown	D	L to MD	TOPSOIL
					- - 1		SM	5	SIND SAND: fine to coarse grained, light grey, trace ine, sub-rounded gravel	D	L to MD	ALLUVIUM
				SPT 1.50 - 1.95 m	-		SM		Sitty SAND: fine to coarse grained, brown, with fine, sub-rounded gravel	D	D	
				9, 15, 21 N=35	- - 2 -		сн	5	Silty CLAY: high plasticity, brown mottled grey, trace ine sand	D to M ( <pl)< td=""><td>н</td><td></td></pl)<>	н	
- AD/T	E-F AUG	SER/N	R enconntered at 4.9m	SPT 3.00 - 3.45 m 2, 4, 4 N=8				2.40m	Silty CLAY: medium to high plasticity, brown mottled orange and grey, with fine to medium sand			
			GW e	SPT 4.50 - 4.95 m 3, 4, 4 N=8	- - - - - - - - - - - - - - - - - - -		CCH		I.Om: becoming light grey	M ( <pl)< td=""><td>F to St</td><td></td></pl)<>	F to St	
	H-VH			SPT 6.00 - 6.45 m 10, 15, 21 N=36	- 6 	+ ·	SC + GP	1	Dayey SAND: fine to coarse grained, brown nottled orange, trace fine, sub-rounded gravel	w	D	WEATHERED ROCK
<u>.</u>					- - - - - -				ACITE: orange brown, highly weathered, very low strength, medium grained ERMINATED AT 6.50 m EOH: Refusal at 6.5m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter C Bit auge STABILITY: Stable BACKFILL: Arisings compacted and tracked in ayers at the surface 0.00-6.5m BACKFIL: Arisings compacted at 4.9m PHOTOS: Ves NSITU TESTING: ADDITIONAL NOTES:			
ME EX R HA PT OAH PS ADD ADD HE WER	Rip Ha Pu: N Sol Air Pel Sh V Sol T Sol A Ho Wa	oper nd au sh tub nic dr hamr rcussi ort sp lid flig lid flig llow fl	e Iling ner on san iral aug ht aug ht aug ight au re drilli	ppler ger ger tr. V-Bit ger tr. V-Bit ger tr. V-Bit ger tr. V-Bit tr. V-Bit	No Resistar Refusal) Level on inflow		S H D P M P	IP - I IPCP - [ IPSP - I IPC - I IPBT - I IPD - I IPD - I IPD - I IPD - I IPD - I	Standard Penetration Test Hand/Pocket Penetrometer     B     - Bu       Jynamic Cone Penetrometer Perth Sand Penetrometer     D     - Dit       Voisture Content     W     - Th       Valtat Bearing Test     D     - Dr       Borehole Impression Test     M     - Mu       Photoionisation Detector     W     - We       Vane Shear, P=Peak,     PL     - Pla	/ bist	ample tal sampl be 'undist	le F - Firm

ig Type: ( asing Dia ata Starte Drilling	Game ed: buiseo	ater: 17/1 Mater	CSC CSC, Nr. Hu 7949 60815 0 210B : AUGER/N 1/20 Samplir Sa	76 Date Con ng & Testing mple or eld Test	Depth (m)	d: 17/1 Graphic Log	CH Classification	Material Descri SOIL TYPE, plasticity or particle characterist colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown motiled light grey, fine to coarse sand	c, antision B B D	Surfac Driller Contra Checke Cousistency Cousies Cousies Cousies Cousies Cousies Cousting Cou	e Elevation: : JB actor: GE Di ed By: DR	
osition: 55 ig Type: ( asing Dia ata Starte Drilling Drilling	55H Ger ed: buseo	encontraction water Wa	7949 60815 o 210B : AUGER/N 1/20 Samplir Samplir Fie SPT 1.50 - 1.	76 Date Con ng & Testing mple or eld Test	Depth (m)		TM TM Classification	Angle from Horizontal: 90° Mounting: Trailer Logged By: JIA Material Descri SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	c, antison c, antiso e D c c, antisov c c c, antisov c c c c c c c c c c c c c c c c c c c	Contra Check Chech	: JB actor: GE Di ed By: DR ST & Othe	rilling
ig Type: 0 asing Dia ata Starte Drilling Britting Dritting Britti	Casing	encontered at 1.2m Water 11.2m	o 210B : AUGER/N 1/20 Samplin Samplin Fie SPT 1.50 - 1.	IMLC Date Con ng & Testing mple or eld Test	Depth (m)		TM TM Classification	Mounting: Trailer           Logged By: JIA           Material Descri           SOIL TYPE, plasticity or particle characterist colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure           Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel           0.40m           Sandy SILT: low plasticity, brown, fine to coarse sand           0.70m           Sandy CLAY: medium to high plasticity, brown motiled light grey, fine to coarse sand	c, antison c, antiso e D c c, antisov c c c, antisov c c c c c c c c c c c c c c c c c c c	Contra Check Chech	: JB actor: GE Di ed By: DR ST & Othe	TRUCTURE
asing Dia ata Starte Drilling	Casing	encontracted at 1.2m Water 1.2m	Samplir	Date Con ng & Testing mple or eld Test	Depth (m)		TM TM Classification	Logged By: JIA     Material Descri     SOIL TYPE, plasticity or particle characterist colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure     Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel     Sandy SILT: low plasticity, brown, fine to coarse sand     O.40m     Sandy SILT: low plasticity, brown, fine to coarse sand     O.40m     Sandy SILT: low plasticity, brown, fine to coarse sand     O.70m     Sandy CLAY: medium to high plasticity, brown motiled light grey, fine to coarse sand	c, antision B D C, antision D D	Contra Checker Cousisience existence S to F S to F	actor: GE Di ed By: DR	TRUCTURE
E-F	Casing	encentered at 1.2m Water 1.2m	1/20 Samplir Sai Fie SPT 1.50 - 1.	Date Con ng & Testing mple or eld Test	Depth (m)		TM TM Classification	Material Descri SOIL TYPE, plasticity or particle characterist colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown motiled light grey, fine to coarse sand	c, antision D D D D	Check	ed By: DR ST & Othe	TRUCTURE
E-F	Casing	encountered at 1.2m Water	Samplin San Fie	ng & Testing mple or eld Test	Depth (m)		TM TM Classification	Material Descri SOIL TYPE, plasticity or particle characterist colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown motiled light grey, fine to coarse sand	c, antison c, antison	Consistency Relative S to E Density	ST & Othe TOPSOIL	
Metrod Resistance	A	encountered at 1.2m	Sal Fie	mple or Id Test	- - - - - - - - - - -	Graphic	ML ML	SOIL TYPE, plasticity or particle characteristi colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	c, Moisture Condition	S to F	& Othe	
E-F	A	encountered at 1.2m	Fie	Jd Test	- - - - - - - - - - -	Graphic	ML ML	colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to coarse sand, trace fine, sub-rounded gravel 0.40m Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	D Woisture	S to F	& Othe	
E-F 2 AUGER	R/Nw	encountered		.95 m	1		ML CI-	0.40m       0.40m       Sandy SILT: low plasticity, brown, fine to coarse sand       0.70m       Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	D	S to F		
E-F 3 AUGER	R/NN	encountered		95 m	1		CI-	Sandy SILT: low plasticity, brown, fine to coarse sand 0.70m Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	D		ALLUVIUM	
E-F AUGER	R/Nw	encountered		.95 m	- 1			Sandy CLAY: medium to high plasticity, brown mottled light grey, fine to coarse sand	M ( <b>æ</b> PL	.) F	-	
E-F	R/NM	encountered		.95 m								
					-2			1.70m Sitty CLAY: high plasticity, light brown, trace fine sand	,		_	
			SPT 3.00 - 3. 8, 8, 12 N=20				СН		M (>PL to M ( <ll)< td=""><td>) St to VSt</td><td>t</td><td></td></ll)<>	) St to VSt	t	
н-үн						+ • +	GP	3.30m DACITE: grey, low strength, highly weathered, medium grained	м		WEATHERED	ROCK
	Y				- 4 - - - - - 5 -	. + . +		3.60m EOH: Refusal at 3.60 (on possible dacite) EXCAVATION: Gemco 210B with 120mm diar TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-3.6m GROUNDWATER: Encountered at 1.2m PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:	neter			
METHOD EX Excave R Ripper HA Hand i SON Sonic AH Air har PS Percus AS Short i AD/V Solid f HFA Hollow WB Washt	er d auge n tube c drilli amme ussion t spira l flight l flight ow flig	ger e ling ler on san ral aug nt aug ght aug	mpler ger jer: V-Bit jer: TC-Bit uger	PENETRATION VE Very Easy (F F Firm VH Very Hard (F WATER Water shown water i water i	No Resistar Refusal) Level on inflow		S H P P I P	HP     -     Hand/Pocket Penetrometer     D       DCP     -     Dynamic Cone Penetrometer     U       PSP     -     Perth Sand Penetrometer     U       WC     -     Moisture Content     MOIS       PBT     -     Plate Bearing Test     D       MP     -     Borehole Impression Test     M       PID     -     Photoinsation Detector     W       VS     -     Vane Shear: P=Peak.     PL	PLES Bulk disturi Disturbed s Environne Thin wall tu TURE Dry Moist Wet Plastic limit Liquid limit	sample ntal sampl ibe 'undis	ele VS S sturbed' St VS H	- Soft - Firm - Stiff t - Very Stiff - Hard ELATIVE DENSITY - Very Loose - Loose

Clie	12 nt:		QPR	d <b>no</b> ' c												
Proj	ect: atior		QPR	CSC CSC, Nr. Hun	no NSW								H		o: BH	
				3001 6081576						Job No: 50520049 Angle from Horizontal	• 90°		Surfac	e Elevatio	Sheet:	1 OT
				o 210B	,					Mounting: Trailer	. 50		Driller:		/11.	
-				: AUGER/NN	ILC									ctor: GE	Drilling	
	a Sta				Date Com	plete	d: 17/1	/20		Logged By: JIA				ed By: DF	-	
[	Drilling	3		Sampling	& Testing						al Description					
Method	Resistance	Casing	Water		ple or Test	Depth (m)	Graphic Log	Classification	S	OIL TYPE, plasticity or particle cha colour, secondary and minor com ROCK TYPE, grain size and type fabric & texture, strength, weath	ponents , colour,	Moisture Condition	Consistency Relative Density		STRUCTURE Other Observatio	ns
A	R	A						Ö		Silty SAND: fine to coarse grained, bu	rown, trace		0	TOPSOIL		
								SM CI- CH	0.40m	fine, sub-angular gravel Silty CLAY: medium to high plasticity, yellow, with fine to medium sand	brown mottled	D M ( <pl)< td=""><td>L F to St</td><td>ALLUVIUM</td><td></td><td></td></pl)<>	L F to St	ALLUVIUM		
				SPT 1.50 - 1.99 4, 5, 5 N=10	5 m	-		CI- CH	1.20m 1.90m	Sandy CLAY: medium to high plasticit to coarse sand	ty, brown, fine	M ( <pl)< td=""><td>St</td><td></td><td></td><td></td></pl)<>	St			
AD/T	E-F AUC	GER/N	GW encountered at 2.3m	SPT 3.00 - 3.45 2, 4, 3 N=7	5 m	- 2		· · · · · ·		Sandy CLAY: medium to high plasticit mottled grey, fine to medium sand	y, brown	M (=PL)	F to St			
•	H-VH			SPT 4.50 - 4.75 19, 20/100mm		- 4 - - -	+ + +		4.40m 4.80m	DACITE: grey, low strength, highly we medium grained		м		WEATHERE	ED ROCK	
						- 5				EOH: Refusal at 4.8m (on possible di EXCAVATION: Gemco 210B with 12 TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and 1 layers at the surface 0.00-4.8m GROUNDWATER: Encountered at 2 PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:	20mm diameter tracked in					
EX R HA PT SO AF S AD/ AD/ HF/ WB	R     Ripper     Very Lasy (Write: E       HA     Hand auger     F       PT     Push tube     H       SON     Sonic drilling     VH       AH     Air hammer     VH       PS     Percussion sampler     WATER				efusal) ∟evel on nflow		SI H D P M P I M P	P - CP - SP - IC - BT - MP - ID -	ESTS Standard Penetration Test Hand/Pocket Penetrometer Dynamic Cone Penetrometer Perth Sand Penetrometer Moisture Content Plate Bearing Test Borehole Impression Test Photoionisation Detector Vane Shear; P=Peak, R=Resdual (uncorrected kPa)	D - Dist ES - Env U - Thin <b>MOISTURE</b> D - Dry M - Moi W - We PL - Pla LL - Liqu	turbed sa vironment n wall tub st st t	tal sampl	le e turbed'	SOIL CONSISTE           VS         - Very S           S         - Soft           F         - Firm           St         - Stiff           VSt         - Very S           H         - Hard           RELATIVE DEN         VL           VL         - Very L           L         - Loose           MD         - Mediur           D         - Dense           VD         - Very D	oft tiff <b>SITY</b> pose n Dense	

Clier Proje			QPR(							На	ole No: BH310
Loca				CSC, Nr. Hume NSW				Job No: 50520049			Sheet: 1 of
Posit	tion:	55⊦	l 697	933 6081525				Angle from Horizontal: 90°	5	Surfac	e Elevation:
_				210B				Mounting: Trailer		Driller:	
	-			AUGER/NMLC							ctor: GE Drilling
			: 17/1		nplete	d: 17/1	1/20	Logged By: JIA	(	Checke	ed By: DR
D	rilling			Sampling & Testing				Material Description			
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
1		•			-		sм	Silty SAND: fine to coarse grained, brown, trace fine, sub-rounded gravel	D	L	TOPSOIL
					- - -		SM	0.30m Silty SAND: fine to coarse grained, dark brown, trace clay	D to M	L to MD	ALLUVIUM
				SPT 1.50 - 1.95 m	-		CI- CH	Sandy CLAY: medium to high plasticity, brown, fine to coarse sand	M (■PL)	St	-
	E-F AUG		itered at 2.5m	6, 7, 5 N=12	-	////// / / / /	,	1.60m Clayey SAND: fine to coarse grained, brown			_
AD/T	AUG	ER/N	GW encount		-2		SC		м	MD	
ŀ	H-VH			SPT 3.00 - 3.45 m 12, 10, 9 N=19				3.60m DACITE: grey, low strength, highly weathered, medium grained	м		WEATHERED ROCK
*		¥			-4 - - - - - - - - - - - -	+ • 1	+	4.10m TERMINATED AT 4.10 m EOH: Refusal at 4.1m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.1m GROUNDWATER: Encountered at 2.5m PHOTOS: Yes INSITU TESTING: ADDITIONAL NOTES:			
MET EX R HA PT ON AB AD/T HFA WB RR	Rip Hai Pu: Soi Air Pei Shi Soi Soi Hol Wa	per nd aug sh tub nic dri hamm rcussio ort spi id fligi id fligi llow fli	e Iling ner on sam iral auge ht auge ight au re drillir	pler er er: V-Bit ger	No Resistar Refusal) Level on inflow		S H D M P M	P     Hand/Pocket Penetrometer     D     D     ES       CP     Dynamic Cone Penetrometer     U     - Th       SP     Perth Sand Penetrometer     U     - Th       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     - Dr       IP     Borehole Impression Test     M     MK       D     Photoionisation Detector     W     W       Vane Shear, P=Peak,     PL     - Pic	y bist	ample tal sampl be 'undist	e S - Soft F - Firm

		-	art	lno'								В	ORE	HOLE LOG SHEE
	nt: ect: atior	(	QPR( QPR(		o NSW								Но	ble No: BH311
				001 6081503						Job No: 50520049 Angle from Horizontal	• 00°		Surface	Sheet: 1 of e Elevation:
				210B						Mounting: Trailer	. 90		Driller:	
				AUGER/NMI	C					woulding. Haller			-	ctor: GE Drilling
	-		: 17/1		Date Comp	leter	1. 17/	1/20		Logged By: JIA				ed By: DR
	Drilling		1	Sampling &	i	//0100					al Description		JICONC	
		9 T	-	- Oamping C	x resulty			1		Wateric				
Method	Resistance	Casing	Water	Samp Field		Depth (m)	Graphic Log	Classification	s	OIL TYPE, plasticity or particle cha colour, secondary and minor com ROCK TYPE, grain size and type fabric & texture, strength, weath defects and structure	ponents , colour,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•							~~~~		0.10m	SPRAY SEAL		D	VD	PAVEMENT
					F			sм		Silty SAND: fine to coarse grained, lig	ght brown	D	L to MD	
									0.40m					
							$\bigotimes$			FILL: Clayey SAND: fine to coarse g mottled red and yellow	rained, brown			FILL
					F		$\bigotimes$	sc		······································		D to M	L to MD	
							XXX	<u> </u>	0.80m					
										Silty SAND: fine to coarse grained, lig clay, trace fine, sub-rounded gravel	ght grey, trace			ALLUVIUM
					-	-1								
							: .:	1						
					ſ			1						
					ŀ		:: <b> </b> ::	:						
				SPT 1.50 - 1.88	m									
				12, 12, 10/80mm	n HB N=R			1						
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Ļ	E-F		Dry											
AD/T	AUG	SER/N			F	-2		]						
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					Ē			SM				D to M	D to VD	
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					F			1						
				007.0.00.0.45		-3								
				SPT 3.00 - 3.45 11, 14, 18 N=32				:						
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								1						
					[		∴` <b> </b> ``:	:						
					F		:.: <b> </b> :∴		3 70.					
							┝╍╌╵┥╌╴	1	3.70m	DACITE: grey, low strength, highly we	eathered.			WEATHERED ROCK
	н-vн				ŀ		· + • -			medium grained		D to M		
¥		1				-4	+ • -	+	4.00m					
										TERMINATED AT 4.00 m EOH: Refusal at 4m (on possible dat	cite)			
					F					EXCAVATION: Gemco 210B with 12 TC Bit auger	20mm diameter			
										STABILITY: Stable				
					Γ					BACKFILL: Arisings compacted and layers at the surface 0.00-4.0m				
					F					GROUNDWATER: Not Encountered PHOTOS: Yes	I			
										INSITU TESTING: ADDITIONAL NOTES:				
					F					, Somoral NOTED.				
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	THOD				ENETRATION				IELD T		SAMPLES	alize to the		
ΕX	Ri	pper	or buck	et VE	E Very Easy (No F Easy	Resistan	ce)		РІ- Р-	Standard Penetration Test Hand/Pocket Penetrometer	B - Bulk D - Distu	urbed sa	mple	S - Soft
R	Ha	and au ush tub		F	Firm			D	CP -	Dynamic Cone Penetrometer	ES - Envir	ronment		e F - Firm
HA	N So	onic dri	Iling		Hard Very Hard (Refu	usal)				Perth Sand Penetrometer		man tul	เป	VSt - Very Stiff
HA PT SO		r hamn	ner on sam	npler W	ATER				IC - BT -	Moisture Content Plate Bearing Test	MOISTURE			H - Hard
HA PT							<b>.</b>				D - Dry			RELATIVE DENSITY
HA PT SO AH PS AS	Pe Sh	nort sp	iral auc	jer	Water Le	evel on	Date	1	/IP -	Borehole Impression Test	M - Moist	t		\/I \/on/Looo-
HA PT SO AH PS AS AD/ AD/	Pe Sh V So T So	nort sp blid flig blid flig	iral aug ht aug ht aug	er: V-Bit er: TC-Bit	shown		Date	P	ID -	Photoionisation Detector	W - Wet			VL - Very Loose L - Loose
HA PT SO AH PS AD/ AD/ HF/	Pe Sh /V So /T So A Ho	nort sp blid flig blid flig bllow fl	iral aug ht auge ht auge ight au	er: V-Bit er: TC-Bit ger	shown water infl	low	Date	P	ID -	Photoionisation Detector Vane Shear; P=Peak,	W - Wet PL - Plast LL - Liqui	tic limit id limit		L - Loose MD - Medium Dense
HA PT SO AH PS AS AD/ AD/	Pe Sh V So T So A Ho S W	nort sp blid flig blid flig bllow fl	iral aug ht auge ht auge ight au re drillir	er: V-Bit er: TC-Bit ger	shown	low	Date	P	ID -	Photoionisation Detector	W - Wet PL - Plast LL - Liqui	tic limit	itent	L - Loose MD - Medium Dense
HA PT SO AH PS AD/ AD/ HF/ WB RR	Pe Sh V So T So A Ho S W Ro	hort sp blid flig blid flig blow fl blow fl ashbor bck roll	iral aug ht aug ht aug ight au re drillir er	er: V-Bit er: TC-Bit ger	shown water infl	low tflow		P V	ID - S -	Photoionisation Detector Vane Shear; P=Peak,	W - Wet PL - Plast LL - Liqui w - Moist	tic limit id limit	itent	L - Loose MD - Medium Dense D - Dense
										HOLE LOG SHEE				
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	Q	PRO	SC						Ho	ole No: BH312				
n:			CSC, Nr. Hume NSW				Job No: 50520049	00	0	Sheet: 1 of				
							Mounting: Trailer		-	ctor: GE Drilling				
				nplete	d: 17/*	1/20	Loaged By: JIA			ed By: DR				
ng										<b>,</b>				
.5				Ē		5		terietie						
, aciad	Rillero I	Water	Sample or Field Test	Depth (	Graphic Log	Classificatio	colour, secondary and minor compon ROCK TYPE, grain size and type, col	lour, lour,	Consistency Relative Density	STRUCTURE & Other Observations				
				-		ML	medium sand, frequent rootlets (<2mm)	e to	S to F	TOPSOIL				
				-		CI- CH		/, trace	F to St	ALLUVIUM				
			SPT 1.50 - 1.95 m 6, 8, 8 N=16	- 		SM		grey, trace	MD	-				
		ed at 4.1m		-2		CI- CH	1.90m Silty CLAY: medium to high plasticity, dark grey/black, trace fine sand 2.40m		St					
GER	2/NM	GW encounte	SPT 3.00 - 3.45 m 8, 11, 14 N=25	- 3		CI-CH	Sitty CLAY: medium to high plasticity, brow medium to coarse sand		) St to VSt					
4			SPT 4.50 - 4.74 m 12, 20/90mm HB N=R	- 4		+ + + + +	4.10m DACITE: yellow brown, very low strength, weathered, medium grained	highly M to W		WEATHERED ROCK				
	<u> </u>			-	+ • -	H	EXCAVATION: Gemco 210B with 120mn TC Bit auger STABILITY: Stable	n diameter ked in						
tipper land ush onic ir har ercus hort olid f olid f olid f	r auge drilli mme ssior spira light light flight oore	er ng n sam al auge t auge t auge ht au drillir	pler er v-C-Bit ger v-D-Bit ger	No Resistar Refusal) Level on		S H D P N P	PT     -     Standard Penetration Test     I       P     -     Hand/Pocket Penetrometer     I       CP     -     Dynamic Cone Penetrometer     I       SP     -     Perth Sand Penetrometer     I       C     -     Moisture Content     I       BT     -     Plate Bearing Test     I       ID     -     Photoionisation Detector     I       S     -     Vane Shear; P=Peak,     I	B - Bulk disturb D - Disturbed s ES - Environmen U - Thin wall tu <b>MOISTURE</b> D - Dry M - Moist W - Wet PL - Plastic limit L - Liquid limit	ample tal sampl be 'undisi	e S - Soft F - Firm				
	GER GER	SER/NW	E: 55H 698 E: Gemco Diameter: arted: 17/1 g builder B B B C C C C C C C C C C C C C	Some o 210B         Diameter: AUGER/NMLC         arted: 17/1/20 Date Con         g       Sampling & Testing         g       Sampling & Testing         g       Sampling & Testing         g       Sample or Field Test         g       SPT 1.50 - 1.95 m 6, 8, 8 N=16         GER/NMLG       SPT 1.50 - 1.95 m 6, 8, 8 N=16         g       SPT 3.00 - 3.45 m 8, 11, 14 N=25         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R         g       SPT 4.50 - 4.74 m 12, 20/90mm HB N=R	Image: Some control in the system of the	Image: SSH 698108 6081588         E: Gemco 210B         Diameter: AUGER/NMLC         arted: 17/1/20       Date Completed: 17/7         g       Sampling & Testing         g: 0       Sample or Field Test         g: 0       Sample or Field Test         g: 0       SPT 1.50 - 1.95 m 6, 8, 8 N=16         g: 0       SPT 1.50 - 1.95 m 6, 8, 8 N=16         g: 0       SPT 3.00 - 3.45 m 8, 11, 14 N=25         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R         g: 0       SPT 4.50 - 4.74 m 12, 2090mm HB N=R	SSH 698108 6081588         e: Genco 210B         Diameter: AUGER/NMLC         arted: 17/1/20       Date Completed: 17/1/20         g       Sampling & Testing         B       Sampling & Testing         B       Sample or         Field Test       D         G       Sample or         Field Test       D         G       SPT 1.50 - 1.95 m         6, 8, 8 N=16       SM         SPT 3.00 - 3.45 m       -2         SPT 4.50 - 4.74 m       -4         SPT 4.50 - 4.74 m       -4         SPT 4.50 - 4.74 m       -5         SPT 4.50 - 4.74 m       -5	1: 55H 698108 6081588       Angle from Horizontal: 9         2: 60mco 2108       Mounting: Trailer         Dimetor: AUCERWILC       Iteged By: JIA         3       Sample or Field Test       9         3       Sample or Field Test       9       9         3       Sample or Field Test       9       9         4       9       0.00000000000000000000000000000000000	2: 55H 688108 6081588 Angle from Horizontal: 90° Mounting: Trailer Diameter: AUCEPINMLC recei: 17/1/20 Date Completed: 17/1/20 Logged By: JA  g g g g g g g g g g g g g g g g g g	Ex       Series       Concernation       Surface       Surface       Surface         Ex       Concernation       Contract       Contract       Contract       Contract         Image: Final or Contract       Sampling & Tealing       Contract       Contract       Contract         Image: Final or Contract       Sampling & Tealing       Image: Final or Contract       Contract       Contract         Image: Final or Contract       Sampling & Tealing       Image: Final or Contract       Image: Final or Contract       Contract       Contract         Image: Final or Contract       Sampling & Tealing       Image: Final or Contract       Image: Final or C				

lien roje oca		(	QPRC QPRC QPRC		NSW				Job No: 50520049		Но	Sheet: 1 o
				189 6081596					Angle from Horizontal: 90°		Surfac	e Elevation:
lig T	ype	: Ge	emco	210B					Mounting: Trailer		Driller	: JB
asir	ng D	iam	eter:	AUGER/NML	с				-		Contra	ctor: GE Drilling
ata	Star	rted:	15/1	/20	Date Co	omplete	d: 15/1	1/20	Logged By: MET		Check	ed By: DR
Dr	rilling			Sampling &	Testing				Material Description			
Method	Resistance	Casing	Water	Sample or Field Test	DCF (blow per 100 m	Depth (ui	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
		<b>A</b>			136      R     			SM	Silty SAND: fine to coarse grained, light greyish brown	D	D	TOPSOIL
						-   _   _   _ 1		sc	0.70m Silty Clayey SAND: fine to medium grained, grey, medium plasticity clay	D	MD to D	ALLUVIUM
	E-F AUG	ER/N	MLC	SPT 1.50 - 1.95 n 12, 11, 13 N=24		-   -   -   -   -2   -   -   -   -		sc	1.10m Clayey SAND: fine to coarse grained, grey mottled orangish brown, medium plasticity clay, occasional relic organic material	D	MD	
	1-VH					-3	· · · · ·	GP	2.90m DACITE: greyish green	D		WEATHERED ROCK
						-   -   -   -   -   -   -   -   -   -			EOH: Refusal at 3.1m (on possible rock) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Ansings compacted and tracked in layers at the surface 0.00-3.1m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.15m) ADDITIONAL NOTES:			
METI EX R HA PT SON AH PS AD/V AD/T HFA WB	Exc Rip Har Pus Air Per Sho / Sol Hol	per nd aug sh tub nic dri hamm rcussio ort spi id fligi id fligi llow fli	e Iling her on sam ral aug nt auge	et VE F H VH ver er: V-Bit er: TC-Bit ger	Easy Firm Hard Very Hard TER Wate show wate	y (No Resistan y (Refusal) er Level or		S H D M P M	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     U     Th       SP     Perth Sand Penetrometer     U     Th       IC     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dr       ID     Photoionisation Detector     M     Wc       ID     Photoionisation Detector     V     Plate	sturbed sa vironmen in wall tu : vist	tal sampl be 'undis'	e S - Soft F - Firm

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					1311				Job No: 50520049		C. mfo o	- Elevetion	Sheet: 1 of
				270 6081598					Angle from Horizontal: 90°			e Elevation:	
				210B					Mounting: Trailer		Driller:	-	
	-			AUGER/NMLC								ctor: GE Dri	lling
Data	a Sta	rted:	15/1	/20 Da	ate Comp	lete	d: 15/1	1/20	Logged By: MET		Checke	ed By: DR	
[	Drilling			Sampling & Te	esting				Material Description				
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 100 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density		RUCTURE Observations
A		4						SM	Silty SAND: fine to coarse grained, light orangish	D	D to VD	TOPSOIL	
								SM	0.20m grey Silty SAND: fine to coarse grained, light yellowish orangish grey 0.70m	D	MD to D	ALLUVIUM	
						· 1		. SP	SAND: fine to coarse grained, brown mottled yellowish brown, trace silt	D	MD to D		
			d at 2.7m	SPT 1.50 - 1.95 m 5, 6, 10 N=16	R       -		/ /	•	Clayey SAND: fine to coarse grained, brown mottled orangish brown and yellowish brown, medium to high plasticity clay 1.20m: increase in moisture content	м	_	RESIDUAL SOIL	
	E-F	ER/N	GW encountered			-2		sc		м	MD		
				SPT 3.00 - 3.45 m 8, 15, 16 N=31		-3		sc	2.70m Clayey SAND: fine to coarse grained, yellowish brown, grey and brown, medium plasticity clay	M to W	D		
	н-үн					- 4	+ · + - · + · + + · +	· SP	3.60m DACITE: greyish green 4.10m	м		WEATHERED RO	оск
•						-5			TERMINATED AT 4.10 m EOH: Refusal at 4.1m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.1m GROUNDWATER: Encountered at 2.7m PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-1.39m) ADDITIONAL NOTES:				
						- 6							
						-7							
ME EX HA PT SOH SOH AD/ HF/ WB RR	Rip Ha Pu Air Pe Sh V Sol V Sol	per nd aug sh tub nic dril hamm ccussic ort spir id fligh id fligh low fli ishbor	e ling ler on sam ral aug nt auge nt auge ght au e drillir	et VE F H VH ler er: V-Bit er: TC-Bit ger	TRATION Very Easy (No R Easy Firm Hard Very Hard (Refus ER Water Lev shown water inflo	<sup>sal)</sup> vel on ow		S H D P M P I P	P     Hand/Pocket Penetrometer     D     - Dist       CP     Dynamic Cone Penetrometer     U     - Thir       SP     Perth Sand Penetrometer     U     - Thir       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     - Dry       ID     Photoionisation Detector     W     Wei       S     Vane Shear; P=Peak,     Plate     Plate	turbed sa rironment n wall tub st st t	tal sampl be 'undist	e VS S urbed' St VSt H <b>REL</b> VL L D	CONSISTENCY - Very Soft - Soft - Firm - Very Stiff - Very Stiff - Hard ATIVE DENSITY - Very Loose - Loose - Loose - Medium Dens - Medium Dens
	Ko	ck rolle	15	1				1				VD	<ul> <li>Very Dense</li> </ul>

roj	nt: ect: ation	(	QPR( QPR( QPR(	C CSC CSC, Nr. Hum	ie NSW				Job No: 50520049		Но	Sheet: 1 o
				193 6081535					Angle from Horizontal: 90°		Surfac	e Elevation:
Rig	Туре	: Ge	emco	210B					Mounting: Trailer		Driller	
-				AUGER/NM	LC					(	Contra	ctor: GE Drilling
	a Sta				Date Cor	nplete	d: 15/1	1/20	Logged By: MET			ed By: DR
[	Drilling	]		Sampling	& Testing				Material Descriptior	ı		
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 100 mm	Dept (i	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
		Â				2		SM	Silty SAND: fine to coarse grained, light grey localy light orangish grey, with fine to medium, sub-angular to sub-rounded gravel, frequent rootlets (<2mm) 0.30m	D	MD	TOPSOIL
					НВ               			sc	Sitty Clayey SAND: fine to coarse grained, grey, medium plasticity clay	D	MD	ALLUVIUM
						- - -1			Clayey SAND: fine to medium grained, greyish brown, medium to high plasticity clay	D to M		
				SPT 1.50 - 1.95 10, 18, 22 N=40		-		sc	1.20m: dark greyish brown with trace gravels fine to coarse, sub-angular to sub-rounded	м	D	
	ξīū	ER/N	GW encontrutered at 2.1m	SPT 3.00 - 3.45 0, 0, 2 N=2	m	-2 - - - - - - 3 -			2.10m SAND: fine to coarse grained, grey, with high plasticity clay			
				SPT 4.50 - 4.82		- - - 4 -		SP		W	VL	
¥	VH	<b>•</b>		1, 9, 15/20mm N=R		- 5 - -		GP	4.70m 4.80m DACITE: greyish green TERMINATED AT 4.80 m EOH: Refusal at 4.80 (on possible rock) EXCAVATION: Gemco 210B with 120nm diameter TC Bit auger STABLITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.8m GROUNDWATER: Encountered at 2.1m PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.27m) ADDITIONAL NOTES:	M		ROCK
ME EX R HA P S A B D A D A D A D A D A D A D A D A D A	Rip Ha Pu N So Air Pe Sh V So (V So (T So A Ho S Wa	oper nd au sh tub nic dri hamn rcussi ort spi lid flig lid flig llow fl	e Illing her on sam ral aug ht aug ht aug ght au ght au	et vi E F H Vi vi ver er: V-Bit er: TC-Bit ger	Easy Firm Hard	No Resistar Refusal) Level or i		S ⊢ □ ₽ ₽ ₽	P     Hand/Pocket Penetrometer     D     - D       CP     Dynamic Cone Penetrometer     U     - T       SP     Perth Sand Penetrometer     U     - T       IC     Moisture Content     D     - D       BT     Plate Bearing Test     D     - D       ID     Photoionisation Detector     W     - W       ID     Photoionisation Detector     W     - W       S     Vane Shear; P=Peak,     L     - L	ulk disturb isturbed sa nvironmen hin wall tul E ry loist	ample ital sampl be 'undis'	e S - Soft F - Firm

		C	arc	Ino						В	ORE	EHOLE LOG SHEET
Clier Proje Loca	ect:		QPR( QPR(		NSW				Job No. 50520040		Но	ole No: BH316
				102 6081485	1377				Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of 1 e Elevation:
				210B					Mounting: Trailer		Driller	
				AUGER/NMLC	•				Mounting. Trailer		-	ctor: GE Drilling
	-		: 15/1		ate Com	nloto	d. 15/1	1/20	Logged By: MET			ed By: DR
			. 13/	-		piete	u. 13/	1/20			SHECK	
	Drilling	]	-	Sampling & T	esting				Material Description	1		
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 100 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
		•						ѕм	Silty SAND: fine to coarse grained, light grey locally light orangish grey, frequent rootlets (<2mm)	D	D to VD	TOPSOIL
				D 0.50 - 0.70 m		-		sc	0.40m Sitty Clayey SAND: fine to coarse grained, brown, medium plasticity clay	M ( <pl)< td=""><td>St</td><td>ALLUVIUM</td></pl)<>	St	ALLUVIUM
				D 0.90 - 1.10 m				sc	0.80m Silty Clayey SAND: fine to medium grained, light brown, medium to high plasticity clay	M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
AD/T	E-F AUG	BER/N	<sup>ъ́д</sup> MLC	SPT 1.50 - 1.95 m 4, 5, 7 N=12		2		CI- CH	Silty CLAY: medium to high plasticity, brown locally orangish brown and grey, with fine to medium sand, interbedded sandy clay and clayey sand layers 1.20-2.10m: becoming moist with occasional fine to colarse, angular to sub-rounded gravels	M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
				SPT 3.00 - 3.45 m 5, 11, 30 N=41		- 3		SP	2.50m SAND: fine to coarse grained, grey mottled orangish brown, with medium to high plasticity clay 3.40m	м	D	
	н						+ + +	GP	DACITE: blueish green mottled green	м		WEATHERED ROCK
*		<b>↓</b>							3.70m TERMINATED AT 3.70 m EOH: Refusal at 3.7m (on possible dacite) EXCAVATION: Genco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-3.7m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.5m) ADDITIONAL NOTES:			
EX R PT SOT AH PS AD/ AD/ HFA WB RR	Rip Ha Pu N So Air Pe Sh V So T So A Ho Wa Ro er to exp	oper nd au sh tub nic dr hamr rcussi ort sp lid flig lid flig llow fl ashbo ck roll	ner Illing on san iral aug ht aug ht aug ight au re drilli er	et VE F H VH VH er er: V-Bit er: TC-Bit ger	ETRATION Very Easy Firm Hard Very Hard (Ro ER Shown water Ir ◀ water o	<sup>efusal)</sup> _evel or nflow	n Date	S H □ P ≥ P P ≥ V	P     Hand/Pocket Penetrometer     D     Director       CP     Dynamic Cone Penetrometer     ES     Er       CP     Perth Sand Penetrometer     U     Th       CP     Perth Sand Penetrometer     U     Th       ST     Plate Bearing Test     D     D     Director       IP     Borehole Impression Test     M     M     M       D     Photoionisation Detector     W     W     W       Q     Vane Shear, P=Peak,     PL     Plate	y bist	ample tal sampl be 'undist	le F - Firm

lient: roject .ocatio	t:	G	) PRC ) PRC		NSW				Job No: 50520049		Но	Sheet: 1 of
ositio	on:	55H	698	200 6081482					Angle from Horizontal: 90°		Surfac	e Elevation:
Rig Ty	pe:	Ge	mco	210B					Mounting: Trailer	I	Driller:	: JB
asing	g Di	iame	eter:	AUGER/NML	2					(	Contra	ctor: GE Drilling
Data S	star	ted:	15/1	/20	Date Cor	nplete	d: 15/1	1/20	Logged By: MET	(	Checke	ed By: DR
Drill	ling			Sampling &	Festing				Material Description			
Method Resistance		Casing	Water	Sample or Field Test	DCP (blows per 100 mm	Dept (i	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
		1				2 		GM	FILL: Silty Sandy GRAVEL: fine to coarse, sub-angular to angular, light yellowish grey locally light reddish brown, fine to coarse sand, frequent 0.30m_rootets (<2mm)	D	VD	FILL
					HB			СІ	Sandy Sity CLAY: medium plasticity, light greyish brown, fine to medium sand, occasional rootlets (<2mm)	D	F to St	ALLUVIUM
						- 1			0.70-0.9m: increase in moisture content, becoming greyish brown CLAY: medium to high plasticity, dark grey, with silt,	M ( <pl)< td=""><td></td><td>_</td></pl)<>		_
				SPT 1.50 - 1.95 m 4, 8, 11 N=19		-		CI-	with fine to medium sand	M ( <pl)< td=""><td></td><td></td></pl)<>		
E-I	-F	ER/NI	noojuntered at 2.6m	D 1.80 - 2.20 m				CH	1.80-2.60m: increase in moisture content	M (=PL)	F to St	
			GW e	SPT 3.00 - 3.45 m 0, 1, 2 N=3		- 3		SP	2.60m SAND: fine to coarse grained, grey, interbedded sand and clayey sand layers	w	VL to L	
						- 4			4.20m Gravelly SAND: fine to coarse grained, greyish green locally mottled green, fine to coarse, angular to sub-angular gravel, with medium plasticity clay		D to VD	WEATHERED ROCK
	·			SPT 4.50 - 4.75 m 6, 14/100mm HB		L				"		
	H_	*		0,		5 -		GP	4.70m A.75m DACITE: blueish green mottled green TERMINATED AT 4.75 m EOH: Refusal at 4.75m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.75m GROUNDWATER: Encountered at 2.6m PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.28m) ADDITIONAL NOTES:	M		ROCK
R HA PT SON AH PS AS AD/V AD/T HFA	Exca Ripp Han Pus Son Air h Perc Sho Solid Solid Holl	ber d aug h tube ic drill amm cussio cussio rt spir d fligh d fligh ow fliq	e ing er n sam al aug t auge	et VE F H VH Pler WA er X- sr: V-Bit sr: TC-Bit ger	Very Easy (1 Easy Firm Hard Very Hard (f TER Water shown water	No Resistar Refusal) Level on		S H D P M P I P	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     U     Thi       SP     Perth Sand Penetrometer     U     Thi       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     D       ID     Protoionisation Detector     M     Moisture Weight Amount       S     Vane Shear "EPerak     PL     Plate	/ ist	ample tal sampl	e S - Soft F - Firm

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	ation			CSC, Nr. H	ume NS	W				Job No: 50520049			Sheet: 1 of
Posi	tion	: 55H	1 698	281 60814	79					Angle from Horizontal: 90°			e Elevation:
-				210B						Mounting: Trailer		Driller:	
	-			AUGER/N									ctor: GE Drilling
Data	a Sta	rted	: 15/1				plete	d: 15/1	/20	Logged By: MET	(	Checke	ed By: DR
	Drilling	1		Samplir	ng & Testi	ng				Material Description			
Method	Resistance	Casing	Water	Sample Field Te	or ( est 10	DCP blows per )0 mm) 3 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•		•					+		sм	Silty SAND: fine to medium grained, grey, frequent rootlets (<2mm)	D	VSt	TOPSOIL
							-	/ /		0.30m Clayey SAND: fine to coarse grained, grey, medium plasticity clay	D		ALLUVIUM
									SC	0.8-1.2m: increase in moisture content, becoming darker grey	м	D	
				SPT 1.50 - 1 3, 5, 7 N=12			-		sc	Clayey SAND: fine to coarse grained, dark grey mottled grey and light grey locally light grey mottled dark grey, medium plasticity clay	м	MD	
	E-F		rred at 2.9m		i		-2			2.30m			
- T/DA	AUG	ER/N	GW encounte	D 2.40 - 2.80			-		sc	Clayey SAND: fine to coarse grained, grey mottled light grey and brown, medium plasticity clay 2.90m	м	MD to D	
				SPT 3.00 - 3 3, 3, 4 N=7	.45 m       		-3		CI- CH	Sandy CLAY: medium to high plasticity, dark grey mottled light grey and brown, fine to coarse sand, interbedded sandy clay and clayey sand layers	M (■PL) and W	F	-
					1		F			3.70m SAND: fine to coarse grained, greenish grey mottled light green, with medium plasticity clay			RESIDUAL SOIL
							-4		SP		w	MD to D	
V	H-VH	V		SPT 4.50 - 4 10, 17, 17 N	.95 m =34     		-	+ + +	GP	4.65m DACITE: extremely weathered, greyish green 4.95m	м		WEATHERED ROCK
							-5			TERMINATED AT 4.95 m EOH: Refusal at 4.95m (on possible dacite) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.95m GROUNDWATER: Encountered at 2.9m PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.4m) ADDITIONAL NOTES:			
ME EX HA PT O AH PS AD/ AD/ HF	Rip Ha Pu: N Sol Air Pei Sh V Sol T Sol	oper nd au sh tub nic dri hamn rcussi ort sp lid flig lid flig	ie Iling ner on sam iral aug ht aug	ipler ler er: V-Bit er: TC-Bit	E Eas F Firm H Har VH Ver	y Easy (No y d y Hard (Re Water L shown water in	efusal) .evel or iflow		S H D M P M	P     Hand/Pocket Penetrometer     D     Director       CP     Dynamic Cone Penetrometer     U     - Th       SP     Perth Sand Penetrometer     U     - Th       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     - Dr       IP     Borehole Impression Test     M     - Mu       ID     - Photoinisation Detector     W     - With State S	y bist et astic limit	ample tal sampl	le S - Soft turbed' St - Stiff VSt - Very Stiff H - Hard <b>RELATIVE DENSITY</b> VL - Very Loose L - Loose MD - Medium Dens
WB RR		ashboi ck roll	e drillin er	ng		water o	uttiow				juid limit bisture cor	ntent	D - Dense VD - Very Dense

Client:		QPR	0								
Project:		QPR		NSW				Job No. 50500040		ПС	ble No: BH31
			208 6081441	11377				Job No: 50520049 Angle from Horizontal: 90°		Surface	Sheet: 1 o e Elevation:
Rig Type								Mounting: Trailer		Driller:	
			AUGER/NML	:				mounting. Tranel		-	ctor: GE Drilling
Data Sta					mplete	d: 15/ <sup>,</sup>	1/20	Logged By: MET			ed By: DR
Drillin			Sampling &				-	Material Description			
	Ī	-		DCP	Ê			· · ·			
Method Resistance	Casing	Water	Sample or Field Test	(blow per 100 mi	s (m Depth (	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
<b>A</b>	•			1 1			sм	Sitty SAND: fine to medium grained, grey, frequent rootlets (<2mm)	D	MD to D	TOPSOIL
				liii				0.20m rooters (<2mm) Silty SAND: fine to medium grained, dark grey, trace			ALLUVIUM
				R	Ë.			medium plasticity clay			
							SM		D	D to VD	
					¦ F						
					! -						
					¦  .			0.90m Clayey SAND: fine to medium grained, dark			
						1.1	1	brownish grey, medium plasticity clay			
E-F					! <b> </b> -		1				
					¦ [		1				
			SPT 1.50 - 1.95 m	-iii	i [	1.	]				
		_	4, 7, 9 N=16		! <b> </b>		sc		м	MD	
		ncountered at 2.4m			¦ L	1.					
		ed at			i						
		unter			-2	1.1	,				
auc	GER/I	NML6				1:1:					
		GW				<i></i>		2.40m			
					!	1.1.	1	2.40m Clayey SAND: fine to coarse grained, grey mottled	М		
					¦	/. /.	>	orangish brown and orange, medium plasticity clay		]	
				liii	¦	<i></i>					
					ļĒ	· · · · · · · · · · · · · · · · · · ·					
			SPT 3.00 - 3.45 m		-3	<i></i>					
			2, 2, 3 N=5		i	//					
F-H					ļĒ		SC		w	L	
				-	¦		1				
							1				
						/./.	]				
					;	1.					
					4	1.1		4.00m			
,							f GP	DACITE: extremely weathered, greyish green 4.20m	м		WEATHERED ROCK
<u> </u>		1		++++	<u>+</u>	<u>+ · +</u>	1	TERMINATED AT 4.20 m		1	
				i i i				EOH: Refusal at 4.2m (on possible rock) EXCAVATION: Gemco 210B with 120mm diameter			
					1			TC Bit auger STABILITY: Stable			
					1 I I			BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-4.2m			
					1-			GROUNDWATER: Encountered at 2.4m PHOTOS: Yes			
					1			INSITU TESTING: DCP to refusal (0.00-0.35m) ADDITIONAL NOTES:			
					1						
				liii							
					11						
					1 I I I I I I I I I I I I I I I I I I I						
				111	. L						
					¦						
METHOD	)	-	PEN	ETRATIO	N		F	ELD TESTS SAMPLES	1	1	SOIL CONSISTENCY
	xcavat ipper	or buck	v		(No Resista	nce)	S H		k disturb turbed sa	ed sampl	e VS - Very Soft S - Soft
HA Ha	and au ush tu		E F	Easy Firm			D	CP - Dynamic Cone Penetrometer	vironmen	tal sample be 'undist	e F - Firm
SON So	onic dı	rilling	H VH	Hard Very Hard	(Refusal)			SP - Perth Sand Penetrometer	יי ייימוו נעו	รร นานเรเ	VSt - Very Stiff
PS Pe		ion san				_		C - Moisture Content MOISTURE BT - Plate Bearing Test D - Dry	,		H - Hard RELATIVE DENSITY
AS Sh AD/V So	olid flig		er: V-Bit	∠ Wate show	r Level or n	n Date	IN	IP - Borehole Impression Test M - Mo D - Photoionisation Detector W - We	ist		VL - Very Loose
		ght aug	er: TC-Bit	— water				S - Vane Shear: P=Peak PL - Pla	stic limit		L - Loose MD - Medium Den
AD/T So HFA Ho	ollow f										
AD/T So HFA Ho WB W	ollow f	ore drilli		- water	outflow				uid limit isture cor	ntent	D - Dense VD - Very Dense

	~			lno'						E		EHOLE LOG SHEE
Client Projec	ct:	Ċ	2PRC	CSC							H	ole No: BH32
Locati	-			CSC, Nr. Hume N 111 6081403	1510				Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of e Elevation:
Rig Ty									Mounting: Trailer		Driller:	
	-			AUGER/NMLC					Mounting. Trailer		-	ctor: GE Drilling
Data S	-				ate Con	plete	d: 15/1	/20	Logged By: MET			ed By: DR
	lling			Sampling & Te					Material Description			
	Ť			g		- -		_	······································			
Method	Kesistance	Casing	Water	Sample or Field Test	DCP (blows per 100 mm		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
					R	-		GP	FILL: Sandy GRAVEL: fine to coarse, sub-rounded to sub-angular, light grey, fine to coarse sand	D	VD	FILL
						-			0.60m			ALLUVIUM
						- 1		СІ	Sandy CLAY: medium plasticity, light brown, fine to coarse sand	D	MD to D	
				SPT 1.50 - 1.95 m 7, 12, 18 N=30		-	/ /		Clayey SAND: fine to medium grained, brown mottled grey and orange, medium plasticity clay 1.60-2.50m: increase in moisture content			-
E	-F					- 2 -		sc		D to M	MD to D	
						-			2.50m Clayey SAND: fine to medium grained, dark brown and grey, medium plasticity clay 2.50-3.80m: increase in moisture content			-
	4UGI	ER/NI	ALC	SPT 3.00 - 3.45 m 5, 13, 12 N=25		3 - -		sc		м	MD	
					Liii	-	1.		2.90m			
F	-н			SPT 4.50 - 4.95 m 11, 16, 26 N=42		- -4 - - - - - - 5 -		sc	3.80m Clayey Gravelly SAND: fine to coarse grained, dark brown and grey, fine to coarse, sub-angular to sub-rounded gravel, medium plasticity clay	м	D to VD	RESIDUAL SOIL
				SPT 6.00 - 6.28 m 10, 30/130mm HB N=R		- - - 6 -			6.40m TERMINATED AT 6.40 m			
						- - - - -			EOH: Refusal at 6.4m (on possible rock) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-6.4m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.16m) ADDITIONAL NOTES:			
METH EX R HA PT SON AH PS AS AD/V	Exc Rip Han Pus Son Air h Pero Sho Soli	per d aug h tub ic dril namm cussic rt spir d fligh	e ling er on sam al aug it auge	et VE E F H VH VH er Sr: V-Bit S				S H P M P	P - Hand/Pocket Penetrometer D - Dis CP Dynamic Cone Penetrometer ES - En	y bist	ample tal sampl	le S - Soft turbed' F - Firm St - Stiff VSt - Very Stiff H - Hard <b>RELATIVE DENSITY</b> VL - Very Loose
AD/T HFA WB RR	Holl Was	ow flig	ght au e drillir	er: TC-Bit ger ng	— water i ◀ water o			V	S - Vane Shear; P=Peak, B=Peadual (uncorrected k/Pa)	astic limit Juid limit Disture col	ntent	L - Loose MD - Medium Dens D - Dense VD - Very Dense

	nt: ect: ation	(	QPRO QPRO QPRO		NSW				Job No: 50520049		Но	DIe No: BH32 Sheet: 1 of
				186 6081385					Angle from Horizontal: 90°		Surface	e Elevation:
Rig	Type	: Ge	mco	210B					Mounting: Trailer		Driller:	JB
-				AUGER/NMLC	;					(	Contra	ctor: GE Drilling
Data	a Sta	rted:	15/1	/20 D	ate Con	plete	d: 15/′	1/20	Logged By: MET			ed By: DR
[	Drilling	1		Sampling & T	esting				Material Description			
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 100 mm	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
A		•			1 3 6 12 R			о sm	Silty SAND: fine to medium grained, light grey, frequent rootlets (<2mm)	D	VD	TOPSOIL
						-		,	0.40m Clayey Silty SAND: fine to coarse grained, brown mottled light grey and orangish brown, medium plasticity clay	D		ALLUVIUM
						1 -		SC	1.00-1.40m: increase in moisture content, darkening in colour 1.40m	м	MD to D	
				SPT 1.50 - 1.95 m 9, 12, 14 N=26 D 1.80 - 2.30 m	-           -           -           -	- - -2		CL	Sandy CLAY: low plasticity, light greyish brown mottled orangish brown, fine to medium sand	D to M	MD to D	
	E-F	iER/N	pproximately 5.0m			- - - -3		SP	2.40m Clayey SAND: fine to medium grained, dark brown mottled orangish brown and grey, medium plasticity clay	D to M	D to VD	
- TOT -	AUG	ier/N	Possible GW ftom a	SPT 3.00 - 3.38 m 23, 23, 14/75mm HB N=R		-			3.20m Clayey Gravelly SAND: fine to coarse grained, grey mottled brown and orangish brown, fine to medium, sub-angular to sub-rounded gravel, medium plasticity clay			RESIDUAL SOIL
				SPT 4.50 - 4.95 m 3, 8, 13 N=21		4 - -		SC	4.2-5.0m: trace gravels	D to M	MD to D	
							+ · - - · + + · -	+	5.00m DACITE: extremely weathered, grey mottled yellowish brown and brown			WEATHERED ROCK
	F-H			SPT 6.00 - 6.30 m 18, 25 HB N=R		- - -6		+ GP + -		M to W		
						- - - - - -	<u>+ • + ·</u>		6.40m TERMINATED AT 6.40 m EOH: Refusal at 6.4m (on possible rock) EXCAVATION: Gemco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-6.4m GROUNDWATER: Encountered possibly at 5.0m PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.09m) ADDITIONAL NOTES:			
ME EX R HAT SO H PS AD AD HAT SO H PS AD AD HAT SO H PS AD AD HAT WE	Rip Ha Pu: N Sol Air Pei Sh V Sol T Sol A Ho	pper nd aug sh tub nic dril hamm rcussio ort spi lid fligl lid fligl llow fli	e ling er on sam ral aug nt auge	et VE E F H VH VH er er: V-Bit er: TC-Bit ger	ETRATION Very Easy (N Easy Firm Hard Very Hard (R	efusal) Level or nflow		S H D P N I	P     Hand/Pocket Penetrometer     D     Dis       CP     Dynamic Cone Penetrometer     ES     En       SP     Perth Sand Penetrometer     U     Thi       GT     Plate Bearing Test     D     Dry       IP     Borehole Impression Test     D     Dry       Q     Photoionisation Detector     W     We       Q     Vane Shear; P=Peak,     L     LL	turbed sa vironmen n wall tul v ist	tal samplo be 'undist	e S - Soft F - Firm

lient: roject ocatio	:t:	C	QPRC QPRC QPRC		NSW				Job No: 50520049		Но	Sheet: 1 of
				282 6081366					Angle from Horizontal: 90°	9	Surfac	e Elevation:
lig Ty	-								Mounting: Trailer		Driller:	
				AUGER/NMLC	:							ctor: GE Drilling
ata S	-				ate Com	olete	d: 15/1	1/20	Logged By: MET			ed By: DR
Drilli				Sampling & T					Material Description			
				Gamping & T			· · · ·					
Resistance		Casing	Water	Sample or Field Test	DCP (blows per 100 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
		•						SM	0.10m Silty SAND: fine to medium grained, light grey,	D	VD	TOPSOIL
					R	-		ML	Vrequent rootlets (<2mm) Sandy SILT: low plasticity, light brown, fine to coarse sand	D	MD to D	ALLUVIUM
						-	/ /	, sc	Clayey SAND: fine to coarse grained, yellowish <u>0.60m</u> brown mottled light grey, medium top high plasticity clay	м	MD to D	
						-		СІ	Sandy CLAY: medium plasticity, greyish brown mottled grey, fine to medium sand	M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
	ŧŪĠE	R/NI	NLC	SPT 1.50 - 1.95 m 5, 8, 13 N=21				SC	1.10m Clayey SAND: fine to medium grained, greyish brown mottled brown, medium plasticity clay	м	MD	
	<u>H</u>	¥				- - - 3 -		GP,	2.70m 2.72m DACITE: greyish green TERMINATED AT 2.72 m EOH: Refusal at 2.7m (on possible rock) EXCAVATION: Genco 210B with 120mm diameter TC Bit auger STABILITY: Stable BACKFILL: Arisings compacted and tracked in layers at the surface 0.00-2.7m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.09m) ADDITIONAL NOTES:			ROCK
						- - - - - - 5 -						
R HA PT SON AH PS AS AD/V AD/T HFA	Exca Ripp Hand Push Soni Air h Perc Solic Solic Solic Hollo	er d aug c dril amm ussic t spir f fligh f fligh ow flig	e ling er on sam al aug it auge	t VE F H VH Pler WAT er r: V-Bit r: TC-Bit	LIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	<sup>fusal)</sup> evel or flow		S H D P N P	CP     Dynamic Cone Penetrometer     ES     - Env       SP     Perth Sand Penetrometer     U     - Thir       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     - Dry       IP     Borehole Impression Test     M     - Moisture       D     Photoionisation Detector     W     - Wet       S     Vane Shear; P=Peak,     PL     - Plate	urbed sa ironment n wall tub st stc limit	imple tal sampl be 'undist	e S - Soft F - Firm

	ect:	Ċ	) PRC	SC									H	ole No: TP1
	ation	: <b>(</b>	PRC	SC, Nr. Hum	e NSV	v				Job No: 50	520049			Sheet: 1 o
				382 6081937							Horizontal: 90°			e Elevation:
				CAT Excavat							Method: 300mm			
				sions: 2.00n	1 LON	IG AN	ND 0.	40m W	/IDE					ctor: AJD C&D
	-		ed: 1	5/1/20						Logged By:			Checke	ed By: DR
Ex	cavati	on		Sampling &	Testir	ng					Material Descri	ption		
INIGUIOO	Resistance	Stability	Water	Sample or Field Test	(t 10	DCP plows per 0 mm) 3 6 12	Depth (m)	Graphic Log	Classification	colour, secondary a ROCK TYPE, grain fabric & texture, s	or particle characterist ind minor components size and type, colour, trength, weathering, nd structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
									SM	trade fine out angul	arse grained, light brown, r gravel, frequent rootlets		D to VD	TOPSOIL
					R		+		>	(<2mm)	· ·			ALLUVIUM
					i	iii.	L			Sandy SILT: low plas medium sand	icity, light brown, fine to			
				D 0.20 - 0.30 m	<u> </u>		Γ		ML			D	VSt to H	
							-							
										0.40m				
		a	Dry		I.		ſ			Silty SAND: fine to co	arse grained, brown			]
i	E-F	Stable	L				-0.5		SM			Diali	MD to D	
		õ							- SIVI					
							ſ			0.65m				
				D 0.70 - 0.80 m	_  i	III.	ŀ	X/X//	1	Silty CLAY: medium p red and orange	lasticity, dark brown mottle	ed		
				0.70 - 0.80 M					1	i ca ana orange				
							ſ		СІ			M ( <pl)< td=""><td>St to VSt</td><td></td></pl)<>	St to VSt	
					i		ŀ	¥/X//	1					
					1			¥/X//.	1	1.00m				
+						+++	-1.0-		1	TERMINATED AT 1.	00 m			
							L			EOH: Terminated at EXCAVATION: CAT	.00m (target depth) 305C Excavator with 300ı	mm		
										standard tooth bucke				
						iii.	F			STABILITY: Stable BACKFILL: Arisings	compacted in layers with			
						iii.				nominal bucket press surface 0.00-1.00m	ure and tracked in at the			
							F			GROUNDWATER: N	ot Encountered			
							L			PHOTOS: Yes INSITU TESTING: D	CP to refusal (0.00-0.10m	1)		
										ADDITIONAL NOTE	S:	,		
							- 1.5							
					- Li	iii.								
					1		F							
							Ļ							
							-							
							L							
					1		Ĩ.							
							-2.0							
							t							
							ŀ							
						iii.								
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/IE1	THOD			PF			I	1	F	ELD TESTS	SAM	PLES	1	SOIL CONSISTENCY
ΞX	Exe	cavator	bucke				Resistar	nce)	s	PT - Standard Penetrati	on Test B	- Bulk disturb		le VS - Very Soft
R HA	Rip Ha	oper nd aug	er	E	Easy	/		,				<ul> <li>Disturbed s</li> <li>Environmen</li> </ul>		e S - Soft F - Firm
т	Pu	sh tub	Э	н	Hard		afueal)			CP - Dynamic Cone Per CP - Perth Sand Penetro		- Thin wall tu		turbed' St - Stiff
SOI AH	Air	nic dril hamm	er	VH		Hard (Re	nusal)		N			TURE		VSt - Very Stiff H - Hard
PS AS	Pe	rcussic ort spii	n sam			Vator	avel ar	Date	P	BT - Plate Bearing Test		- Dry		RELATIVE DENSITY
۸D/	V Sol	lid fligh	t auge	er: V-Bit		Vater L hown	evel or	Date	II P		n Test M	- Moist - Wet		VL - Very Loose
AD/ HF/	N Ho	llow flig	ght aug	er: TC-Bit ger	• v	vater in			V V		ak. PL	<ul> <li>Plastic limit</li> </ul>		L - Loose MD - Medium Der
		abbor	é drillir	a .	- <b>v</b>	vater ou	utflow		1	B-Boodual (upoor	,	<ul> <li>Liquid limit</li> </ul>		D - Dense
VB RR	Wa Ro	ck rolle	er	9	•	valor of	uniow			R=Resdual (uncorr	ected KPa) w	<ul> <li>Moisture col</li> </ul>	ntent	VD - Very Dense

	D			Ino									ST PIT LOG SHEET
	nt: ect: atior	(	QPRC QPRC		ime NS\	N				Job No: 50520049		H	ole No: TP102 Sheet: 1 of 1
				836 60818						Angle from Horizontal: 90°		Surfac	e Elevation:
				CAT Exca	-					Excavation Method: 300mm Star			
				isions: 2.1			ח חו	40m W					ctor: AJD C&D
				5/1/20			10 0.			Logged By: JIA			ed By: DR
	cavat		<u></u>		ng & Testi	20	<u> </u>					onecke	Su by. Dit
				Sampin			Ê.		5	Material Description			
Method	Resistance	Stability	Water	Sample Field Te	or est 10	blows per 10 mm) 3 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
									ML	Sandy SILT: low plasticity, light brown, fine to course sand, trace fine, sub-angular gravel, frequent rootlets (<2mm)	D	F to St	TOPSOIL
					 		-		SM	Silty SAND: fine to coarse grained, light brown/white	D	D to VD	ALLUVIUM
EX	E-F	Stable	Dry	D 0.40 - 0.50			- - 0.5 - -		CI- CH	0.40m Silty CLAY: medium to high plasticity, dark grey mottled orange, with medium to coarse sand	D to M	St to VSt	
							- 			1.00m EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.18m) ADDITIONAL NOTES:			
ME EX R HA PT OI AB AD/ AD/ HVB R	Rij Ha Pu N Sc Air Pe St V Sc V Sc V Sc V Sc V Sc V Sc V Sc V Sc	cavato pper and aug ish tub pnic dril hammercussion nort spi plid flig plid flig plid flig pliow fli	e lling on sam ral auge nt auge ght auge ght auge	pler er er: V-Bit er: TC-Bit ger	PENETRA VE Ven E Eas F Fin H Hard VH Ven WATER	/ Easy (No y 1	efusal) .evel or flow		S H D P M P I P	IP     -     Hand/Pocket Penetrometer       ICP     Dynamic Cone Penetrometer       SP     -       Perth Sand Penetrometer       IC     -       Moisture Content       BT     -       Plate Bearing Test       ID     -       ID     -       Photoionisation Detector       S     -       Vane Shear; P=Peak,       LL	/ bist	ample tal sampl be 'undist	e S - Soft F - Firm

			lno'										ST PIT LOG SHEE
lient: roject	t:	QPR( QPR(	SC									H	ole No: TP10
ocatio			CSC, Nr. 908 6081		NSW					Job No: 50520049		Surfaa	Sheet: 1 of e Elevation:
			CAT Exc							Angle from Horizontal: 90° Excavation Method: 300mm S			
			sions:			G AN	ID 0.	40m W	/IDE				ctor: AJD C&D
			5/1/20							Logged By: JIA		Checke	ed By: DR
Excava	ation		Sam	pling & T	esting					Material Descripti	on		
Resistance	Stability	Water		ple or Test	(blo p 100	CP ows er mm) 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
									ML	Sandy SILT: low plasticity, light brown, fine to	D	F to St	TOPSOIL
			D 0.20 - 0	0.30 m	             		-		ML	0.10m coarse sand, frequent rootlets (<2mm) Sandy SILT: low plasticity, light brown, fine to medium sand	D	St to VSt	ALLUVIUM
						ΙÌ.	-			0.40m			-
5 E-F	E Stable	Dry					-0.5		SM	Silty SAND: fine to coarse grained, brown 0.50m	D	MD to D	
	Sta		D 0.50 - 0	0.60 m			-		Cŀ	Silty CLAY: medium to high plasticity, dark grey	D	St to VSt	
							- - - - - - - - - - - - - - - - - - -			EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.22m) ADDITIONAL NOTES:			
R F HA F PT F SON S AH A PS F AS S AD/V S AD/T S HFA F	Excavato Ripper Hand au Push tub Sonic dr Air hamr Percussi Short sp Solid flig	ger lling ner on sam ral aug ht aug ht aug ght au ght au	ipler jer er: V-Bit er: TC-Bit ger	PENI VE EF H VH WAT	Easy Firm Hard Very H ER Z W: sh	asy (No ard (Re ater Lu own iter inf	evel on flow		S F C P M	CP -     Dynamic Cone Penetrometer     ES -       SP -     Perth Sand Penetrometer     U -       C -     Moisture Content     MOISTL       BT -     Plate Bearing Test     D -       IP -     Borehole Impression Test     M -       D -     Photoionisation Detector     W -       S -     Vane Shear; P=Peak,     L -	Bulk disturk Disturbed s Environmer Thin wall tu	ample ntal sampl be 'undist	e S - Soft F - Firm

		) (	Cal	ra	lno									ΤE	ST PIT LOG SHEET
	ent: ject: atio		QP	PRC			51/1					lab No: 50520040		Η	ole No: TP104
					63 60819		544					Job No: 50520049 Angle from Horizontal: 90°		Curfaa	Sheet: 1 of 1 e Elevation:
		-			CAT Exca							Excavation Method: 300mm Sta			
					sions: 2.		אר	ς ΔN	ח חו	40m W					ctor: AJD C&D
					5/1/20							Logged By: JIA			ed By: DR
				1. 1		ing & Tes	ting					Material Description		Onecki	
			_	ł	Gampi		-		(						
Method	Resistance	Stability	6	Water	Sample Field T		(blo pr 100	CP ows er mm) 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
4											ML	Sandy SILT: low plasticity, brown, fine to medium sand, frequent rootlets (<2mm)	D	F to St	TOPSOIL
									-			0.1011			ALLUVIUM
				-	D 0.20 - 0.3	i0 m			-		ML	Sandy SILT: low plasticity, brown, fine to coarse sand	D	St to VSt	
				Dry					-			0.45m			
— EX-	E-F	Stable							- 0.5		зм	Silty SAND: fine to coarse grained, brown mottled orange 0.60m	D	MD to D	
					D 0.60 - 0.7	'0 m			_			Silty CLAY: medium to high plasticity, grey/dark grey			
									_		CI-		D	F to St	
									_		СН				
V		+	+				+ F		-1.0-		1	1.00m TERMINATED AT 1.00 m			
								1.1.1	-			EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket			
							11		-			STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the			
							ii	ii	-			surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes			
							ii	ii Ti	-			INSITU TESTING: DCP to termination (0.00-1.00m) ADDITIONAL NOTES:			
									- 1.5						
								ΪÌ	_						
									-						
									-						
								11	-2.0						
								11	-						
									-						
								11	-						
							 	1.1	-						
								ii.	-2.5						
								[ ]							
							11		_						
								ΪÌ	-						
ME		 D				PENET					   F	ELD TESTS SAMPLES			SOIL CONSISTENCY
EX R HA PT SC		Excava Ripper Hand a Push t Sonic	auger ube		ıt	VE V E E F F H H	ery Ea asy irm ard		Resistar fusal)	nce)	S F C	PT - Standard Penetration Test B - Bu P - Hand/Pocket Penetrometer D - Di CR Duramia Care Banatameter ES - En	sturbed saven	ed sampl ample ital sampl be 'undist	le VS - Very Soft S - Soft e F - Firm
AH PS AS	I A S P	Air har Percus Short	nmer sion s	- samj		WATEF	2			Data	N P	C - Moisture Content MOISTURE BT - Plate Bearing Test D - Dr	y		H - Hard
AD AD	)/V S )/T S	Solid f Solid f	light a light a	auge auge	r: V-Bit r: TC-Bit	$\geq$	sho	ater Lo own Iter inf	evel on flow	Date	P	1P - Borehole Impression Test         M - Mo           ID - Photoionisation Detector         W - Wi	bist		VL - Very Loose L - Loose
HF WE RF	вV	Hollow Washt Rock r	ore d	t aug Irillin	ger g	•		iter ou				B=Bendual (uppermented (Ba) LL - Lic	juid limit pisture co	ntent	MD - Medium Dense D - Dense VD - Very Dense
					or details of escriptions					CAF	RDI	NO (NSW/ACT) PTY LTD			

Clie Proj	ent: ject:	(	QPR( QPR(	CSC						H	ole No: TP10
Loc	atior	n: (	QPRO	CSC, Nr. Hume NSW				Job No: 50520049			Sheet: 1 of
				965 6081812				Angle from Horizontal: 90°			e Elevation:
				CAT Excavator		40		Excavation Method: 300mm Star			
				nsions: 2.00m LONG / 15/1/20	AND U.	40m W	IDE				ctor: AJD C&D
			eu:					Logged By: JIA		Checke	ed By: DR
EX	cavati	on		Sampling & Testing	_			Material Description	1	-	
Method	Resistance	Stability	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
1							ML	Sandy SILT: low plasticity, brown, fine to coarse sand	D	F to St	TOPSOIL
					-		sм	Sitty SAND: fine to coarse grained, brown, trace medium to coarse, sub-rounded gravel 0.25m	D	MD to D	ALLUVIUM
				D 0.30 - 0.40 m	_		СІ	Sitty CLAY: medium plasticity, dark brown/grey mottled orange, trace fine sand	D	St to VSt	
Ĵ		ole	Dry					0.50m			
<u>а</u> 	E-F	Stable		D 0.50 - 0.60 m	0.5	VXII.		Silty CLAY: medium to high plasticity, dark grey, trace fine to medium sand			
							CI- CH	uace nne to medium sand	D	St to VSt	
					- 1.5 1.5 2.0 			EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP not undertaken ADDITIONAL NOTES:			
ME E R H A T S A H S A S A D A D A D F W R R	Rip Ha Pu N So Air Pe Sh /V So /T So A Ho 3 Wi	cavato oper ind aug ish tub onic dril recussion ind fligh ilid fligh ilid fligh ilid shbor ock rollo	ger e lling her on san ral aug nt aug ght au ght au	ppler per pr: V-Bit ger tr: V-Bit tr: V	(No Resistar (Refusal) r Level or n inflow		SH DP P P	P     Hand/Pocket Penetrometer     D     D     ES       CP     Dynamic Cone Penetrometer     U     - Th       SP     Perth Sand Penetrometer     U     - Th       C     Moisture Content     MOISTURE       3T     Plate Bearing Test     D     - Dr       IP     Borehole Impression Test     M     - Mk       D     Photoionisation Detector     W     - Wk       S     Vane Shear, P=Peak,     L     - Lic	sturbed sa ivironmen in wall tu s y pist	ital sampl be 'undist	e S - Soft F - Firm

C	D	C	arc	Ino								TE	ST PIT	LOG SHEET
Clie	ent: ject:		QPR( QPR(									Hol	e No:	TP105A
	atio				lume NSV	V				Job No: 50520049				Sheet: 1 of 1
Pos	itior	n: 55⊦	l 697	948 60817	728					Angle from Horizontal: 90°	9	Surfac	e Elevation	:
				CAT Exca						Excavation Method: 300mm Star				
					.10m LON	g an	ID 0.	40m W	/IDE				ctor: AJD	C&D
				6/1/20		-				Logged By: JIA		Спеске	ed By: DR	
E	kcava I	tion	-	Sampi	ing & Testin	•				Material Description				
Method	Resistance	Stability	Water	Sample Field T	e or Test 100	OCP lows per ) mm) 3 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	& Oth	TRUCTURE er Observations
A									sм	Silty SAND: fine to coarse grained, light brown, frequent rootlets (<2mm)	D	MD to D	TOPSOIL	
					R		-		SM	0.12m Silty SAND: fine to coarse grained, brown	D	D to VD	ALLUVIUM	
			~	D 0.30 - 0.4			-		ML	0.30m Sandy SILT: low plasticity, brown, fine to medium sand	D to M ( <pl)< td=""><td>St to VSt</td><td></td><td></td></pl)<>	St to VSt		
EX-	E-F	Stable	DIY	D 0.70 - 0.8	0 m		0.5 - -		CI- CH	0.50m Silty CLAY: medium to high plasticity, dark brown mottled orange, trace fine sand	M ( <pl)< td=""><td>St to VSt</td><td></td><td>-</td></pl)<>	St to VSt		-
							- 1.0 - -			1.00m TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.13m) ADDITIONAL NOTES:				
							- 1.5 - - - - 2.0 -							-
ME EX R H P S C H S C S C	R H P N S I A	xcavato ipper and au ush tub onic dri ir hamm ercussio	ger e Iling ter on sam	npler	PENETRA VE Very E Easy F Firm H Hard VH Very WATER	I         I         I           I         I         I	fusal)		S H D P N P	P     - Hand/Pocket Penetrometer     D     - Dis       CP     - Dynamic Cone Penetrometer     U     - Thi       SP     - Perth Sand Penetrometer     U     - Thi       C     Moisture Content     MOISTURE       BT     - Plate Bearing Test     D     - Dr	sturbed sa vironmen in wall tul :	ed sampi ampie tal sampi be 'undist	e V: s e F urbed' St V: H	- Soft - Firm - Stiff St - Very Stiff
AS AD AD HF WE RF	/V S /T S A H B W		ht auge ht auge ght au re drillir	er: V-Bit er: TC-Bit ger	si • w	/ater Lo hown rater inf rater ou	flow	Date		MP - Borehole Impression Test     M - Mo       ID - Photoionisation Detector     W - We       S - Vane Shear; P=Peak,     PL - Pla       R=Peodusi (upogranted kPo)     LL - Liq	bist	ntent	VI L M D VI	- Very Loose - Loose D - Medium Dense - Dense
Ref	er to ex previatio	planator ns and b	/ notes f asis of c	or details of lescriptions				CAF	RDI	NO (NSW/ACT) PTY LTD				

	D	C	arc	Ino								ΤE	ST PIT LOG SHEET
Clie Proj		(	QPR( QPR( QPR(		ume NSW	,				lob No: 50520040		Η	ole No: TP106
				039 60817						Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of 1 e Elevation:
				CAT Exca	-					Excavation Method: 300mm Sta			
				isions: 2.		G AN		40m W					ictor: AJD C&D
				5/1/20			0 0.			Logged By: JIA			ed By: DR
	cavat				ng & Testing					Material Description		oncon	
/			-	Jampin		-					1	1	
Method	Resistance	Stability	Water	Sample Field To	e or p est 100	CP ows per mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
A									SM	Silty SAND: fine to coarse grained, brown, frequent rootlets (<2mm)	D	MD to D	TOPSOIL
						· ··L				0.10m Toblets (<2/111) Silty SAND: fine to coarse grained, brown, trace			ALLUVIUM
				D 0.30 - 0.40	0 m				SM	0.30m Clayey SILT: low plasticity, dark brown/grey, trace	D	D to VD	-
				2 0.00 0.11				ŊŊ	1	fine sand			
— EX —	E-F	Stable	Dry				-0.5		ML	0.60m	D	VSt	
				D 0.70 - 0.80	0 m               	-			CI- CH	Silty CLAY: medium to high plasticity, dark grey, with fine to medium sand	D to M	VSt	
						11-	- -1.0			1.00m TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket			
										STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.00m)			
							- 1.5			ADDITIONAL NOTES:			
						11							
							-2.0						
							-2.5						
ME	THOD			 	11	     - 	-		F	ELD TESTS SAMPLES			SOIL CONSISTENCY
EX R HA PT SC AH PS AD AD HF WE RR	E) Ri Pr Si Ai Pr Si V Si V V Si V V Si W W	kcavato pper and augush tub onic dri r hamm ercussio nort spi olid fligi	ger lling her on sam ral aug ht aug ght aug ght au	npler Jer er: V-Bit er: TC-Bit ger	VE Very E E Easy F Firm H Hard VH Very H WATER W Sh	Tasy (No F Hard (Refu later Le nown ater infl ater out	<sup>usal)</sup> evel on		S H D P N P	PT     - Standard Penetration Test     B     - B       P     - Hand/Pocket Penetrometer     D     - D       CP     - Dynamic Cone Penetrometer     U     - TI       CP     - Perth Sand Penetrometer     U     - TI       CP     - Moisture Content     D     - D       AT     - Plate Bearing Test     D     - D       IP     - Borehole Impression Test     M     - M       C     - Vane Shear, P=Peak,     PL     - PL	ulk disturb isturbed s nvironmen nin wall tu E ry oist	ample tal sampl be 'undis	le VS - Very Soft S - Soft turbed' St - Stiff VSt - Stiff H - Hard <b>RELATVE DENSITY</b> VL - Very Loose L - Loose MD - Medium Dense D - Dense
Ref	er to ex	planator	/ notes i	or details of lescriptions				CAF		IO (NSW/ACT) PTY LTD			VD - Very Dense

lie	nt:	(	QPRO	;								LJ.	No. TD10
Proj	ect: ation	(	<b>QPR</b>		e NSV	,				Job No: 50520049			ole No: TP10 Sheet: 1 of
				130 6081547		-				Angle from Horizontal: 90°		Surfac	e Elevation:
				CAT Excava	or					Excavation Method: 300mm Sta			
				nsions: 1.80		G AN	ND 0.	40m W	/IDE	DIRECTION : 090°	(	Contra	ctor: AJD C&D
)ate	Exc	cavat	ed: 1	5/1/20						Logged By: JIA	(	Checke	ed By: DR
Exc	avati	on		Sampling 8	& Testin	g				Material Description			
Method	Resistance	Stability	Water	Sample or Field Test	(b) 100	OCP lows per ) mm) 3 6 12	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
<b>A</b>									sм	Silty SAND: fine to coarse grained, brown, frequent	D	L to MD	TOPSOIL
							-	0.00		0.08m rootlets (<2mm) Sandy GRAVEL: fine to medium, light brown		MD to D	ALLUVIUM
					R		1	·····	Givi	0.18m			-
				D 0.20 - 0.30 m						Silty CLAY: medium to high plasticity, dark grey, trace fine to medium sand			
					- i		-						
							-		CI- CH		D	St to VSt	
<u> </u>	<b>- -</b>	ble	Dry										
<u>ы</u>   	E-F	Stable			i i		-0.5	VXII.					
							F	<i>[//[//</i>	1	0.60m Silty SAND: fine to medium grained, grey mottled			-
							L		SM	0.70m white	D	D to MD	
					i			VXII.		Silty CLAY: medium to high plasticity, dark grey, with fine to medium sand			
				D 0.80 - 1.00 m			F	VXII	CI-		DtoM	St to VSt	
					li		-		СН		DIOM	51 10 VSI	
						ÌÌÌ		<u> </u>		1.00m			
							-1.0-		1	TERMINATED AT 1.00 m			
					li		ŀ			EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth buyet			
							L			standard tooth bucket STABILITY: Stable BACKETI - Ariging gampagted in laware with			
										BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the			
					l i	i i i	-			surface 0.00-1.00m GROUNDWATER: Not Encountered			
							L			PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.15m)			
										ADDITIONAL NOTES:			
					l i	i i i	- 1.5						
							-						
					i	i i i	-						
							-						
						i i i	Ī						
							-2.0						
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					i		-2.5						
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							F						
							ſ						
	HOD						1			ELD TESTS SAMPLES			
EX	Ex	cavato	r buck		ENETRA		o Resistar	nce)		PT - Standard Penetration Test B - Bu	ılk disturb		
R HA	Rip	oper Ind aug		E	Easy Easy Firm	y (IN	au	,	н	P - Hand/Pocket Penetrometer D - Dis CP Dynamic Cone Penetrometer ES - En	sturbed sanvironment	ample	e S - Soft F - Firm
PT SON	Pu	ish tub nic dril	e	H	Hard	Hard (Re	efusal)				in wall tub		
AH PS	Air	hamm	ner						N	C - Moisture Content MOISTURE			H - Hard
AS	Sh	ort spi	ral aug	er	$\bigtriangledown$ w		_evel or	Date		BT - Plate Bearing Test D - Dr IP - Borehole Impression Test M - Mo	oist		RELATIVE DENSITY VL - Very Loose
AD/	T So	lid flig	nt aug	er: V-Bit er: TC-Bit		nown ater in	nflow		P	D - Photoionisation Detector W - W			L - Loose
HFA WB	Wa	llow fli ashbor	e drilli	yer ng	•	ater o				B=Beadual (uppercented (Ba) LL - Lic	quid limit pisture cor	ntent	MD - Medium Dens D - Dense
RR	Ro	ck roll	er						1	· · · · · · · · · · · · · · · · · · ·			VD - Very Dense

		) C	arc	Ino							TE	ST PIT LOG SHEET
Clie Proj Loc	ject	:	QPR( QPR( OPR(		ume NSW				lab No. 50520040		Η	ole No: TP108
				240 60815					Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of 1 e Elevation:
				CAT Exca					Excavation Method: 300mm Sta			
					80m LONG		40m W					ctor: AJD C&D
				15/1/20		/			Logged By: JIA			ed By: DR
	kcava				ng & Testing				Material Description			<b>,</b>
Method	Resistance	Stability	Water	Sample	or DCF	/s Ę	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour,	Moisture Condition	Consistency Relative Density	STRUCTURE
Me	Resi	Sta	Š	Field Te	est 100 m	12	E E G		fabric & texture, strength, weathering, defects and structure Sandy SILT: low plasticity, brown, fine to medium			& Other Observations
T								ML	0.10m sand	D	F to St	
				D 0.20 - 0.30	0 m         0 m         0			ML	Sandy SILT: low plasticity, brown, fine to medium sand	D	St to VSt	ALLUVIUM
						j	1.1.	sc	Clayey SAND: fine to coarse grained, dark <sub>0.40m</sub> grey/black, medium plasticity clay	D to M	MD to D	-
— EX —	E-F	Stable	Dry			- 0.5			Silty CLAY: medium to high plasticity, grey/black, with fine sand			-
				D 0.80 - 1.00	) m	i I		CI- CH	0.8m: Becoming brown mottled yellow	D to M	F to St	
•						-   -   -   -   -   -   -   -   -   -			1.00m TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target depth) EOCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-0.18m) ADDITIONAL NOTES:			
ME EX HA PT SC AH PS AD AD HF WE RR	F PN S PN S F S V/T S S V/T S S V/T S S V/T S S V/T S	Excavate Ripper Hand au Push tul Sonic dr Air hami Percuss Short sp Solid flig	uger be mer ion san piral aug pht aug pht aug light au pre drilli	npler jer er: V-Bit er: TC-Bit ger	E Easy F Firm H Hard VH Very Hard WATER Wate show wate	/ (No Resistar I (Refusal) er Level on		S H D P M P	P     Hand/Pocket Penetrometer     D     -D       CP     Dynamic Cone Penetrometer     U     -TI       SP     Perth Sand Penetrometer     U     -TI       IC     Moisture Content     MOISTUR       BT     Plate Bearing Test     D     -D       ID     Photoionisation Detector     M     -M       Vane Shear; P=Peak,     PL     -W       Penedual (VDR)     LL     -Li	ulk disturb isturbed si nvironmen hin wall tu E ry loist	ample tal sampl be 'undist	e S - Soft F - Firm
Ref	er to e	explanato	ry notes	for details of lescriptions			CAF		NO (NSW/ACT) PTY LTD			

C		) C	arc	Ino								ΤE	ST PIT LOG SHEET
	ent: ject: atio	: (	QPR( QPR(			S/W/						Η	ole No: TP109
				173 6081		500				Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of 1 e Elevation:
										Excavation Method: 300mm Sta			
				CAT Exc nsions: 1				40m \M					ctor: AJD C&D
				5/1/20	1.90m L		ND U.	40111 99	IUE				ed By: DR
	-		eu.							Logged By: JIA		CHECK	eu by. DR
E	kcava	ition	-	Samp	oling & Tes	sting	_			Material Description		-	
Method	Resistance	Stability	Water	Samp Field	<b>-</b> ·	DCP (blows per 100 mm	Dept (i	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
1							-		ML	Sandy SILT: low plasticity, brown, fine to coarse sand, frequent rootlets (<2mm) 0.12m	D	F to St	TOPSOIL
				D 0.20 - 0.	30 m		<u></u>		ML	Sandy SILT: low to medium plasticity, brown, fine to coarse sand	D	St to VSt	ALLUVIUM
										0.30m Sitty SAND: fine to coarse grained, brown mottled			-
- EX	E-F	Stable	Dry				-0.5		SM	orange	D	MD to D	
										0.60m Silty CLAY: medium to high plasticity, dark grey/black, trace fine to medium sand			
							······································		CI- CH		D to M ( <pl)< td=""><td>VSt</td><td></td></pl)<>	VSt	
<b>.</b>							- - - - - - - - -			1.00m TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.00m) ADDITIONAL NOTES:			
							2.0						
							-						
ME EX R HA PT SCH PS AD AD HF WE R	F F F N N F S N N F S S N V T S S S S S S S S S S S S S S S S S S	Excavato Ripper Iand au Push tub Sonic dri Sonic dri Sonic dri Short sp Solid flig	ger lling her on sam ral aug ht aug ght au ght au e drillin	ipler jer er: V-Bit er: TC-Bit ger	VE V E F H H VH V WATER	asy irm łard ′ery Hard (F <b>२</b>	No Resistar Refusal) Level on inflow		S H D P N I N	P     Hand/Pocket Penetrometer     D     - Dir       CP     Dynamic Cone Penetrometer     ES     - Tr       SP     Perth Sand Penetrometer     U     - Tr       IC     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     D       ID     Photoionisation Detector     M     M       Vane Shear, P=Peak,     Vane Shear, P=Peak,     L     - Lic	y pist	ample tal sampl be 'undist	le F - Firm
				or details of escriptions	1			CAR		NO (NSW/ACT) PTY LTD			I

		) C	arc	Ino									TE	ST PIT LOG SHEET
Clie Pro	ject	:	QPR QPR	CSC									Η	ole No: TP110
Loc				CSC, Nr.		NSW					Job No: 50520049		<b></b> f	Sheet: 1 of 1
				256 608	-						Angle from Horizontal: 90° Excavation Method: 300mm Star			e Elevation:
				CAT Ex				0 4	0m W	חו				actor: AJD C&D
				15/1/20	2.00111			0.4			Logged By: JIA			ed By: DR
	cava		100.		pling & T	ostina					Material Description			
			-	Carri				.		-				
Method	Resistance	Stability	Water		ple or I Test	DC (blov pe 100 n	ns sw r Depth Um)		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
A								Ś		ML	Sandy SILT: low plasticity, brown, fine to coarse sand, frequent rootlets (<2mm)	D	S to F	TOPSOIL
				D 0.30 - 0	0.40 m					ML	0.12m Clayey SILT: low to medium plasticity, dark brown, trace fine sand	D	St to VSt	ALLUVIUM
—— EX —	E-F	Stable	Dry					5			0.40m Silty CLAY: high plasticity, dark grey, trace fine sand			
				0.70 - 0.8	80 m					СН	1.00m	M ( <pl)< td=""><td>St to VSt</td><td>t</td></pl)<>	St to VSt	t
							-             -	D			EOH: Terminated at 1.00m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.00m) ADDITIONAL NOTES:			
ME EX HA PT SCH PS AD AD HF WE RR	F F SA PS SS F A V	Excavato Ripper Hand au Push tul Sonic dr Nir hamr Percuss Short sp Solid flig	iger be illing mer ion san biral aug ght aug ght aug light au bre drilli	npler ger er: V-Bit er: TC-Bit ger	VE F H VH	Easy Firm Hard Very Har ER Wat show wate	sy (No Resis rd (Refusal) ter Level	on [		S H D M N I	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     U     Th       SP     Perth Sand Penetrometer     U     Th       IC     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dr       ID     Photoionisation Detector     M     Wc       ID     Photoionisation Detector     V     Plate	y bist	ample tal sampl be 'undist	Ie S - Soft F - Firm
Ref	er to e	explanato	ry notes	for details of lescriptions				(	CAR		NO (NSW/ACT) PTY LTD			

(		D	C	arc	lno'						TE	ST PIT LOG SHEET
	Clie Proi	nt: ect:		2 PRO							Η	ole No: TP201
I	-00	atior	n: (	PRO	CSC, Nr. Hume NSW				Job No: 50520049			Sheet: 1 of 1
					873 6081657 CAT Excavator				Angle from Horizontal: 90° Excavation Method: 300mm Sta			e Elevation:
					isions: 2.30m LONG A	ND 0.	40m W	IDE				ctor: AJD C&D
1	Date	e Exc	avat	ed: 1	6/1/20				Logged By: JIA		Checke	ed By: DR
	Ex	cavati	on		Sampling & Testing				Material Description			
	Method	Resistance	Stability	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	•							ML	Sandy SILT: low plasticity, light brown, fine to medium sand, frequent rootlets (<2mm) 0.13m	D	S to F	TOPSOIL
					D 0.20 - 0.30 m	+		ML	Sandy SILT: low to medium plasticity, light brown, fine to medium sand	D	F to St	ALLUVIUM -
			0	Dıy	D 0.60 - 0.70 m	-0.5			0.50m Silty CLAY: medium plasticity, dark brown, with fine sand			
	EX-	E-F	Stable			-				D to M		-
						- 1.0 - -		CI		( <pl)< td=""><td>St to VSt</td><td>-</td></pl)<>	St to VSt	-
						-			1.50m			-
						-			TERMINATED AT 1.50 m EOH: Terminated at 1.50m (target depth) EXCAVATION: CAT 305C Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.50m			-
naiyei nov						-			GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP not undertaken ADDITIONAL NOTES: Proposed service line			-
10.10.00.01						- 2.0						-
0.50 03.00						-						-
awiiigriidaa io												-
20.0L0						-						-
10070049_FC						-						-
	EX R HA PT SO APS AD AD AD HF R R	Riµ Ha Pu N Sco Air Pe Sh VV Sco /T Sco A Hco 3 Wa Rco	cavato oper ind aug ish tub inic dril hic tub inic dril recussion inic dril inic dril recussion inic dril inic dril	ger e ling er on sam ral augo nt augo ght au ght au e drillin er	pler er er cr. V-Bit ger ↓ V-U to V-Bit ger ↓ V-U to V-Bit ger ↓ V-U to V-Bit ↓ V-U ver ↓ V-U ver ↓ V-U ver ↓ V-U ver ↓ Ver ↓	No Resistar Refusal) Level on nflow	Date	S F F F V	P     Hand/Pocket Penetrometer     D     - DI       CP     Dynamic Cone Penetrometer     ES     - EI       CP     Perth Sand Penetrometer     U     - TI       SP     Path Sand Penetrometer     D     - DI       SP     Path Sand Penetrometer     MOISTURI       T     Plate Bearing Test     D     - DI       IP     Borehole Impression Test     M     M       D     Photoionisation Detector     W     W       S     Vane Shear, P=Peak,     L     - Pi	ulk disturb sturbed sa wironmen nin wall tul Sy pist	ample tal sampl be 'undist	e S - Soft F - Firm

	ect:	0	2PRO	SC							Η	ole No: TP20
	ation			•	Hume NSW				Job No: 50520049	••		Sheet: 1 of
				967 6081					Angle from Horizontal: 90			e Elevation:
				CAT Exc	avator 2.10m LONG A		40		Excavation Method: 300n DIRECTION : 090°	nm Standard		ucket Ictor: AJD C&D
				6/1/20			40111 1	NDE	Logged By: JIA			ed By: DR
	cavati		eu.		ling & Testing				Material De	acription	CHECK	
	Javau			Janip		-						
Method	Resistance	Stability	Water		Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characte colour, secondary and minor compone ROCK TYPE, grain size and type, colo fabric & texture, strength, weathering defects and structure	our, structure	Consistency Relative Density	STRUCTURE & Other Observations
								ML	Sandy SILT: low plasticity, brown, fine to co sand, frequent rootlets (<2mm) 0.12m	parse D	S to F	TOPSOIL
						-		sм	Silty SAND: fine to coarse grained, brown	D	L to MD	ALLUVIUM
				D 0.30 - 0.	40 m	+			Sandy SILT: low plasticity, yellow brown, fir	ne sand		-
						-0.5		ML		D to N	I St to VSt	
EX	E-F	Stable	Dry	D 0.80 - 0.	90 m	-			0.70m Silty CLAY: medium to high plasticity, grey, sand	with fine		_
						- 1.0		CI- CH	1.0m: becoming orange brown	M ( <pi< td=""><td>.) St to VSt</td><td></td></pi<>	.) St to VSt	
						- 1.5			1.50m TERMINATED AT 1.50 m EOH: Terminated at 1.50m (target depth)			
									EXCAVATION: CAT 305C Excavator with standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers w nominal bucket pressure and tracked in at surface 0.00-1.50m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP not undertaken ADDITIONAL NOTES: Proposed service I	vith the		
						- 2.0						
						- 2.5						
						-						
					1							
EX R HA PT SOI AH PS AD/ AD/ HFA	Rip Ha Pu So Air Pe Sh V So T So A Ho	lid fligh Ilow fli	ger e ling ler on sam ral aug nt aug nt aug ght au	ppler ler er: V-Bit er: TC-Bit ger	PENETRATION VE Very Easy (I E Easy F Firm H Hard VH Very Hard (F WATER WATER Water	No Resista Refusal) Level or		S H D P N I	PT     -     Standard Penetration Test     B       P     -     Hand/Pocket Penetrometer     D       CP     -     Dynamic Cone Penetrometer     D       CP     -     Pth Sand Penetrometer     D       C1     -     Moisture Content     M       C3T     -     Plate Bearing Test     D       C9     -     Pthotoinisation Detector     W       C9     -     Vane Shear; P=Peak,     P	<ul> <li>Disturbed</li> <li>Environme</li> <li>Thin wall t</li> <li>MOISTURE</li> <li>D - Dry</li> <li>Moist</li> <li>W - Wet</li> <li>Plastic limi</li> </ul>	sample ntal sampl ube 'undis t	le S - Soft turbed' St - Stiff VSt - Stiff H - Hard <b>RELATIVE DENSITY</b> VL - Very Loose L - Loose MD - Medium Dens
WB RR	Wa	ashbor ck rolle	ë drillir er	or details of		outflow			R=Resdual (uncorrected kPa)	L - Liquid limit v - Moisture c		D - Dense VD - Very Dense

Proj	nt: ect:	(	2PR( 2PR(	CSC									Η	ole No: TP20
	atior			CSC, Nr. Hu						No: 50520049				Sheet: 1 o
				130 608160						gle from Horizon				e Elevation:
				CAT Exca						cavation Method:	300mm Star	ndard t	ooth b	ucket
xc	avati	ion D	ime	nsions: 2.1	0m LONG A	ND 0.	40m W	/IDE	DIRECTI	ON : 090°			Contra	ctor: AJD C&D
ate	e Exe	cavat	ed: 1	6/1/20					Lo	gged By: JIA		0	Check	ed By: DR
Ex	cavat	ion		Samplin	g & Testing					Mate	erial Description			
Method	Resistance	Stability	Water		mple or ld Test	Depth (m)	Graphic Log	Classification	colour, ROCK	E, plasticity or particle secondary and minor of TYPE, grain size and ty s & texture, strength, we defects and structur	components ype, colour, eathering,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
<b>A</b>								ы С	Silty SA rootlets	ND: fine to coarse grained		D	L to MD	TOPSOIL
						Ĺ			0.13m Silty CL	AY: medium to high plastic ck, trace fine sand	city, dark			ALLUVIUM
				D 0.30 - 0.40	m	+			gi e yi bid					
						-0.5		CI- CH				M ( <pl)< td=""><td>F to St</td><td></td></pl)<>	F to St	
EX	E-F	Stable	Dry			-				creasing sand content				
		St		D 0.80 - 0.90	m	+				CLAY: medium to high plas oarse sand	sticity, dark grey,			
						- 1.0		CI- CH	1.10m			M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
						-			Silty SA	ND: fine to coarse grained yellow, trace fine sub-rou	d, brown mottled nded gravel			
				D 1.40 - 1.50	m	ļ		SM				м	MD to D	
									EOH: T	IATED AT 1.50 m erminated at 1.50m (targe				
						-			standar STABIL BACKF nominal surface	ATION: CAT 305C Excav i tooth bucket ITY: Stable LL: Arisings compacted in bucket pressure and traci 0.00-1.50m IDWATER: Not Encounte S; Yes	n layers with ked in at the			
										TESTING: DCP not unde DNAL NOTES: Proposed				
						-								
						-								
						- 2.5								
						-								
EX R HA PT SO AH PS	Ri Ha Pu N So Air Pe	cavato pper and aug ish tub nic dril hamm ercussio	ger e Iling ter on san	npler	PENETRATION VE Very Easy ( E Easy F Firm H Hard VH Very Hard ( WATER	(No Resistance) SPT HP DCP (Refusal) PSP MC			P - Hand/F CP - Dynam SP - Perth S	rd Penetration Test ocket Penetrometer ic Cone Penetrometer and Penetrometer e Content earing Test	D - Dis ES - En U - Th MOISTURE	in wall tub	ample al sampl	le S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard
AS AD AD HF WE RR	Sh /V So /T So A Ho S W	ort spi lid fligl	ral aug nt aug nt aug ght au e drilli	ger er: V-Bit er: TC-Bit ger		י Level on Date IMP - י PID - inflow VS -			IP - Boreho D - Photoio S - Vane S	le Impression Test nisation Detector hear; P=Peak, dual (uncorrected kPa)	LL - Liq	ist	itent	RELATIVE DENSITY       VL     - Very Loose       L     - Loose       MD     - Medium Den       D     - Dense       VD     - Very Dense

Clie		(	2 PRC									ST PIT LOG SHEE
	ect: ation			SC, Nr. Hu	me NSW				Job No: 50520049		••	Sheet: 1 of
Posi	tion	: 55H	697	931 608163	3				Angle from Horizontal: 90°	:	Surfac	e Elevation:
Mac	hine	Туре	e: 5t		ator				Excavation Method: 300mm Sta	ndard t	ooth b	ucket
Exca	avati	on D	imen	sions: 1.9	0m LONG A	ND 0.	40m W	IDE	DIRECTION : 090°	(	Contra	ctor: AJD C&D
Date	e Exc	avat	ed: 1	6/1/20					Logged By: MET	(	Checke	ed By: DR
Ex	cavati	on		Samplin	g & Testing				Material Description	ı		
Method	Resistance	Stability	Water	Sample Field Te		Dept (r	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
						-		SM	Silty SAND: fine to coarse grained, light grey, trace fine to medium, sub-rounded to angular gravel, frequent rootlets (<2mm)	D	D to VD	TOPSOIL
									).22m			
						-		SM	Silty SAND: fine to medium grained, light yellowish grey	D to M	MD to D	ALLUVIUM
EX	E-F	Stable	Dry	B 0.60 - 0.80	m	- 0.5		SM	3.50m Sitty SAND: fine to coarse grained, orangish brown mottled grey and brown, with medium plasticity clay, trace fine to medium, sub-rounded gravel	D	MD to D	
v						- 1.0			1.30m			
						- 2.0			TERMINATED AT 1.30 m EOH; Terminated at 1.30m (target strata, natural) EXCAVATION: CAT 305C CK 51 Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.30m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: 2 x DCP, firstly to refusal (0.00-0.60m), secondly to termination (0.20-1.60m) ADDITIONAL NOTES: No ripper required			
						- - 2.5 -						
EX R HA PT SOI AH PS AS	Rip Ha Pu N So Air Pe Sh	cavator oper nd aug sh tub nic dril hamm rcussic ort spii	jer e ling er on sam ral aug	pler er	PENETRATION           VE         Very Easy (           E         Easy           F         Firm           H         Hard           VH         Very Hard (           WATER         Water	I No Resistar Refusal) Level or		SF HF DC PS MC	P     Hand/Pocket Penetrometer     D     -     D       CP     Dynamic Cone Penetrometer     ES     -     E       P     Perth Sand Penetrometer     U     -     TI       C     Moisture Content     MOISTUR       T     Plate Bearing Test     D     -     D	ulk disturb isturbed sa nvironmen nin wall tul E	ample tal sampl	e S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY
AD/ AD/ HF <i>I</i> WB RR	T So A Ho Wa	lid fligh lid fligh llow flig ashbor ck rolle	nt auge ght aug e drillin		shown water	n inflow		PII	D - Photoionisation Detector - Vane Shear; P=Peak, P=Peadual (uncorrected kBe)	/et lastic limit quid limit oisture cor	ntent	VL - Very Loose L - Loose MD - Medium Dens D - Dense VD - Very Dense

Clie	nt:		arc QPR(	dnoʻ									ST PIT LOG SHEE
Proj	nt: ect: atior	(	<b>QPR</b>			v				lah Nay 50500040		H	ole No: TP402
				002 60816		v				Job No: 50520049 Angle from Horizontal: 90°		Surfac	Sheet: 1 of e Elevation:
				CAT Exca						Excavation Method: 300mm Star			
				nsions: 1.				40m W	/IDE				ctor: AJD C&D
				16/1/20						Logged By: MET			ed By: DR
Ex	cavat	ion		Samplir	ng & Testin	g				Material Description			•
Method	Resistance	Stability	Water	Sample Field Te	or (b	)CP lows per ) mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•						3 6 12				FILL: Sandy GRAVEL: fine to coarse, sub-rounded to sub-angular, light yellowish brownish grey, fine to			FILL
	E-F				R  	; <del>     </del>       	-		GP	coarse sand, with medium plasticity clay, occasional rootlets (<2mm) 0.20m	D	VD	ALLUVIUM
	H-VH		Dıy						SM	Silty SAND: fine to coarse grained, light yellowish brown and brown, with medium plasticity clay	D	D	
EX-		Stable	Δ	B 0.60 - 0.80	) m		- 0.5		•	0.60m Silty SAND: fine to coarse grained, orangish brown mottled grey and brown, with medium plasticity clay, trace fine to medium, sub-rounded gravel			-
	F-H						- 1.0		SM		D	D to VD	
¥							1.5 			1.10m EQH: Terminated at 1.10m (target strata, natural) EXCAVATION: CAT 305C CK 51 Excavator with 300mm standard tooth bucket and ripper STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.10m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: 2 x DCP, firstly to refusal (0.00-0.11m), secondly to termination (0.60-1.0m) ADDITIONAL NOTES: Ripper required (0.20-0.60m)			
ME EX HA PT SOI AB AD/ AD/ HF/ WB R	Rij Ha Pu N Sc Air St St St St St St St St Wi St Wi St Wi St Wi St Wi St Wi St St St St St St St St St St St St St	cavato pper and aug ish tub nic dril hamm rcussio nort spi lid fligl	ger e lling ner on sam ral aug nt aug ght au ght au	npler jer er: V-Bit er: TC-Bit ger	E Easy F Firm H Hard VH Very WATER WATER	Easy (No Hard (Re	.evel on flow		S H D P M	P     Hand/Pocket Penetrometer     D     D is       CP     Dynamic Cone Penetrometer     U     Thi       SP     Perth Sand Penetrometer     U     Thi       C     Moisture Content     MOISTURE       ST     Plate Bearing Test     D     D       P     Borehole Impression Test     M     Moisture       D     Photoionisation Detector     W     We       S     Vane Shear; P=Peak,     L     L	sturbed sa vironmen in wall tul : vist	tal sampl be 'undis'	le F - Firm
	er to exp	planatory	/ notes t	for details of descriptions				CAF		IO (NSW/ACT) PTY LTD			

		C	arc	Ino				TEST PIT LOG SHEET Hole No: TP403								
Clie Proj Loca	ect:	C	QPR( QPR( QPR(		Hume	NSW	,				Job No: 50520040		H	ole No: TP4		
				112 608		1011					Job No: 50520049 Angle from Horizontal: 90°		Surface	e Elevation:	01 1	
				CAT Ex		r					Excavation Method: 300mm					
				sions:			G AN	ND 0.	40m W	IDE				actor: AJD C&D		
				6/1/20							Logged By: MET			ed By: DR		
Ex	cavati	on		Sam	npling & T	Testino	3				Material Descr					
	e				1 5 **	D	CP	(L	0	tion	SOIL TYPE, plasticity or particle characteris		<sup>co</sup>			
Method	Resistance	Stability	Water		nple or d Test	100	ows ber mm) 3 6 12	Depth (m)	Graphic Log	Classification	colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure		Consistency Relative Density			
						     		-		sc	Clayey Silty SAND: fine to coarse grained, gre medium plasticity clay, frequent rootlets (<2mn	ey, n) D	D to VD	TOPSOIL		
EX-	F	Stable	Dry	B 0.60 - (	0.80 m	- R		- 0.5		sc	0.20m Clayey Silty SAND: fine to coarse grained, gre medium plasticity clay	ry, D	MD to D	ALLUVIUM		
								-		sc	0.90m Clayey Silty SAND: fine to coarse grained, dar 1.00m grey locally orangish brown, medium plasticity (	rk D	D to VD	-	-	
								- 1.5 - 1.5 2.0 2.5 			EOH: Terminated at 1.30m (target strata, natu EXCAVATION: CAT 305C CK 5t Excavator w 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.30m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: 2 x DCP, to refusal (0.00-0. and 0.40-0.79m) ADDITIONAL NOTES: No ripper required	ith				
ME EX R HA PT OI AH PS AD/ AD/ HFA RR	Riµ Ha Pu N Sc Air Pe Sh V Sc T Sc A Hc Wi		ger e ling ler on sam ral auge nt auge nt auge ght au e drillir	ipler ler er: V-Bit er: TC-Bit ger		Easy Firm Hard Very H TER W Sh wa	Easy (No Hard (Re	evel on flow		S F F M F	PT     -     Standard Penetration Test     B       P     -     Hand/Pocket Penetrometer     D       CP     -     Dynamic Cone Penetrometer     U       SP     -     Perth Sand Penetrometer     U       IC     -     Moisture Content     MOIS       BT     -     Plate Bearing Test     D       ID     -     Photoionisation Detector     W       S     -     Vane Shear; P=Peak,     L	PLES - Bulk disturb - Disturbed s - Environmen - Thin wall tu STURE - Dry - Moist - Wet - Plastic limit - Liqui limit - Moisture co	ample tal sample be 'undist	Ie S - Soft F - Firm	<b>Y</b> e Dense	
Refe	r to exp	planatory	notes f	or details of escriptions					CAF		NO (NSW/ACT) PTY LTD			, 5010		

	D	C	arc	Ino								TE	ST PIT LOG SHEET
	ent: ject: atio	(	QPR( QPR(		umo N	SW/				Job No. 50500040		H	ole No: TP404
				070 60815		500				Job No: 50520049 Angle from Horizontal: 90°		Surface	Sheet: 1 of 1 e Elevation:
				CAT Exca						Excavation Method: 300mm Star			
				nsions: 1.9				40m V	VIDE				ctor: AJD C&D
				16/1/20						Logged By: MET			ed By: DR
	cavat			Samplin	na & Tes	tina				Material Description		eneene	
Method	Resistance	Stability	Water	Sample Field Te	or	DCP (blows per 100 mm	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
2	Re	S				1 3 6 12	<b>´</b>	<b>0</b>	Clas	defects and structure Silty SAND: fine to coarse grained, light grey, trace	20	ů	TOPSOIL
Ī	E-F						-		sм	fine to medium, sub-rounded to angular gravel, frequent rootlets (<2mm)	D	D to VD	
							-		SM	Sitty SAND: fine to coarse grained, light yellowish brown and brown, with medium plasticity clay	D	D to VD	ALLUVIUM
							-		.  .	0.40m Silty SAND: fine to coarse grained, dark grey locally mottled orangish brown, with medium plasticity clay			
EX-	H-VH	Stable	20	B 0.60 - 0.80	m		- 0.5 - -		SM		D	MD to D	
V							- 1.0		·/ ·/ ·/ ·	1.10m TERMINATED AT 1.10 m EOH: Terminated at 1.10m (target strata, natural) EXCAVATION: CAT 305C CK 5t Excavator with			
							- - - 1.5			300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.10m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.30-1.20m) ADDITIONAL NOTES: No riipper required			
							- - 2.0						
							- - 2.5						
							-						
EX R HA PT SC AF SC AD SC AD HF WE	Ri Ha DN So N So N So Sh VV So VV So VT So A Ho 3 W	kcavato pper and augush tub pnic dri r hammercussion nort spi blid flig blid flig blow fli ashbor	ger e lling ner on sam ral aug nt aug ght au ght au	npler Jer er: V-Bit er: TC-Bit ger	VE V EF EF H H VH V WATEF	RATION ery Easy (f asy irm ard ery Hard (F	Level or nflow		S F F N F	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     ES     En       SP     Perth Sand Penetrometer     U     Thi       CF     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dry       ID     Photoionisation Detector     M     Mo       ID     Photoionisation Detector     W     We       R     Pandural (uncarrented kDo)     LL     Lit	sturbed sa vironmen in wall tu : vist	tal sample be 'undist	e S - Soft turbed' S - Firm St - Stiff VSt - Very Stiff H - Hard <b>RELATIVE DENSITY</b> VL - Very Loose L - Loose MD - Medium Dense D - Dense
	er to ex		/ notes f	for details of lescriptions				CAF		NO (NSW/ACT) PTY LTD			VD - Very Dense

		C	arc	Ino								TE	ST PIT LOG SHEET
Clie Proj		C	QPR( QPR( QPR(		lume N	sw				Job No: 50520049		He	ole No: TP405
				169 60810		544				Angle from Horizontal: 90°		Surface	Sheet: 1 of 1 e Elevation:
				CAT Exca						Excavation Method: 300mm Sta			
				nsions: 1				40m W					ctor: AJD C&D
				6/1/20						Logged By: MET			ed By: DR
	cavati				ing & Tes	stina				Material Description			<b>,</b>
Method	Resistance	Stability	Water	Sample Field T		DCP (blows per 100 mn	ept	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
1	E-F						2		ਹ sc	Clayey Silty SAND: fine to coarse grained, grey, medium plasticity clay, frequent rootlets (<2mm)	D	D	TOPSOIL
	E-F							×.,	·	0.20m Clayey Silty SAND: fine to coarse grained, dark grey, medium plasticity clay			ALLUVIUM
EX-	H-VH	Stable	Dry	B 0.60 - 0.8	0 m		- 0.5 - -		sc		D	MD to D	
							-		sc	0.90m Clayey Sity SAND: fine to coarse grained, dark grey locally orangish brown, medium plasticity clay	D	D	
-						<del>   </del>		- :- :-		TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target strata, natural)			
							- - - - - - - - - - - - - - - - - - -			300mm standard tooth bucket and ripper STABILITY: stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-1.00m) ADDITIONAL NOTES: Ripper required (0.20-1.00m)			
ME EX HA PTO AH PS AD/ HF/ WB RR	Rip Ha Pu N So Air Pe Sh V So T So A Ho		ger e ling er on sam ral aug nt aug nt aug ght au e drillin	ipler ler er: V-Bit er: TC-Bit ger	VE V EF EF H H VH V WATEI	Easy Firm Hard /ery Hard ( <b>R</b>	I No Resistar Refusal) Level on inflow		S H D P N I	P     Hand/Pocket Penetrometer     D     - Director       CP     Dynamic Cone Penetrometer     ES     - Ei       SP     Perth Sand Penetrometer     U     - Tr       C     Moisture Content     D     - Director       BT     Plate Bearing Test     D     - Director       IP     Borehole Impression Test     M     M       ID     Photoionisation Detector     W     W       Vane Shear, P=Peak,     PL     - Pi	ulk disturb sturbed sa nvironmen nin wall tu y oist	ample tal sample be 'undist	e F - Firm
Refe	er to exp	lanatory	notes f	or details of escriptions				CAF		NO (NSW/ACT) PTY LTD			

	2	C	arc	Ino								TE	ST PIT LOG SHEET
Clier Proje Loca	ect:	C	QPR( QPR( QPR(		-lume NS	w				Job No: 50520049		He	ole No: TP406 Sheet: 1 of 1
				229 6081						Angle from Horizontal: 90°		Surface	e Elevation:
				CAT Exc						Excavation Method: 300mm Star			
				nsions: 1		NG AI	ND 0.	40m W	/IDE				ctor: AJD C&D
				6/1/20				-		Logged By: MET			ed By: DR
Exc	cavati	on		Samp	ling & Testi	ing				Material Description			•
Method	Resistance	Stability	Water	Sampl Field	le or (	DCP (blows per 00 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
-	Re				1	3 6 12			Cla	defects and structure		Ŭ	TOPSOIL
	E-F				ļ		-		ѕм	SAND: light greyish brown, frequent rootlets (<2mm)	D	VD	
		le	Dry		Í					0.20m Clayey SAND: fine to coarse grained, light yellowish grey, medium plasticity clay, with silt, frequent rootlets (<2mm)			ALLUVIUM
EX	H-VH	Stable		B 0.60 - 0.8	30 m		- 0.5 - -	/ /	SC	0.80m	D	VD	
							-		SP	SAND: fine to coarse grained, light yellowish brown, with medium plasticity clay, with silt	D	VD	
							- 1.5			EOH: Terminated at 1.00m (target strata, natural) EXCAVATION: CAT 305C CK 51 Excavator with 300mm standard tooth bucket and ripper STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-0.38m) ADDITIONAL NOTES: Ripper required (0.20-1.00m)			
MET EX R HA PT SOT AH PS AD/ HFA WB RR	Rip Ha Pu N So Air Pe Sh V So T So A Ho Wa		ger e ling ier on sam ral aug nt aug ght au ght au	npler jer er: V-Bit er: TC-Bit ger	E Eas F Firm H Har VH Ver WATER	y Easy (Ni sy n d y Hard (Re	_evel on		S H D P N I	P     Hand/Pocket Penetrometer     D     Dis       CP     Dynamic Cone Penetrometer     ES     En       SP     Perth Sand Penetrometer     U     Thi       GE     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dry       IP     Borehole Impression Test     M     Mo       ID     Photoionisation Detector     W     We       S     Vane Shear; P=Peak,     L     LI	turbed sa vironmen in wall tul / ist	tal sample be 'undisti	e S - Soft F - Firm
Refe	r to exp	planatory	notes f	or details of lescriptions				CAF		NO (NSW/ACT) PTY LTD			

C	D	C	arc	Ino									ΤE	ST PIT LOG SHEET
Clie Proj	ect:	0	2PRC	SC									Η	ole No: TP407
Loca				CSC, Nr.   285 6081		1211					Job No: 50520049		C	Sheet: 1 of 1 e Elevation:
											Angle from Horizontal: 90° Excavation Method: 300mm Sta			
				CAT Exc isions: 1		ONG	2 ^ N	ח חו	40m W					ctor: AJD C&D
				6/1/20	1.30111 L	.0110		U U.	40111 44		Logged By: MET			ed By: DR
	cavati				oling & Te	etina					Material Descriptio		oncon	
	ouvau			Camp				(		-				
Method	Resistance	Stability	Water	Samp Field		100		Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•											Clayey Silty SAND: fine to coarse grained, grey, medium plasticity clay, frequent rootlets (<2mm)			TOPSOIL
								-		sc		D	D	
- EX	E-F	Stable	Dry				100000	- 			0.35m Clayey Silty SAND: fine to coarse grained, grey, medium plasticity clay			ALLUVIUM
				B 0.60 - 0.	.80 m			-		SC	0.80m	D	D	
Ţ								- - 1 0		sc	Clayey Silty SAND: fine to coarse grained, dark grey locally orangish brown, medium plasticity clay 1.00m	D	D	
								- - - - - - - - - - - - - - - - - - -			TERMINATED AT 1.00 m EOH: Terminated at 1.00m (target strata, natural) EXCAVATION: CAT 305C CK 5t Excavator with 300mm standard tooth bucket STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to refusal (0.00-1.00m) ADDITIONAL NOTES: No ripper required			
ME EX HA PT OI AP SOI AD AD/ HFA WB RR	Riµ Pu N Sc Air Pe Sh V Sc T Sc A Hc Wi		ger e ling ler on sam ral auge nt auge nt auge ght au e drillir	pler er er: V-Bit er: TC-Bit ger	VE E F H VH	Easy Firm Hard Very Ha ER Wa sho	asy (No ard (Re ater Li own iter inf	evel on flow		S H D P N I	P     Hand/Pocket Penetrometer     D     ES       CP     Dynamic Cone Penetrometer     U     T       SP     Perth Sand Penetrometer     U     T       C     Moisture Content     MOISTUR       BT     Plate Bearing Test     D     C       IP     Borehole Impression Test     M     M       ID     Photoionisation Detector     W     V       S     Vane Shear; P=Peak,     PL     E	Bulk disturb Disturbed si Environmen Thin wall tu RE Dry Aoist	ample tal sampl be 'undis	e S - Soft F - Firm
Refe	er to exp	planatory	notes f	or details of escriptions					CAF		NO (NSW/ACT) PTY LTD			

				Ino									ST PIT LOG SHEET
Clie Proje Loca		Ċ	QPR( QPR( QPR(		ume NSV	/				Job No: 50520049		Η	ole No: TP408 Sheet: 1 of 1
				111 60814						Angle from Horizontal: 90°		Surfac	e Elevation:
				CAT Exca						Excavation Method: 300mm Star			
				nsions: 1.9		G AN	ND 0.4	40m W	IDE				ctor: AJD C&D
				6/1/20		-		-		Logged By: MET			ed By: DR
Exc	cavati	on		Samplir	ng & Testin	g				Material Description			
Method	Resistance	Stability	Water	Sample Field Te	or (b est 100	)CP lows per ) mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	E-F					🛱	-		SM	Sitty SAND: fine to coarse grained, light grey locally light orangish grey, frequent rootlets (<2mm)	D	VD	TOPSOIL
EX-	H-VH	Stable	Dry	B 0.60 - 0.80	) m		- 		sc	0.30m Sitty Clayey SAND: fine to coarse grained, brown, medium plasticity clay	D	D to VD	ALLUVIUM
							- - 1.0		sc	0.80m Silty Clayey SAND: fine to medium grained, light brown, medium to high plasticity clay 1.00m	D	D to VD	-
							1.5 1.5 			EOH: Terminated at 1.00m (target strata, natural) EXCAVATION: CAT 305C CK 51 Excavator with 300mm standard tooth bucket and ripper STABILITY: Stable BACKFILL: Arisings compacted in layers with nominal bucket pressure and tracked in at the surface 0.00-1.00m GROUNDWATER: Not Encountered PHOTOS: Yes INSITU TESTING: DCP to termination (0.00-0.18m) ADDITIONAL NOTES: Ripper required (0.30-1.00m)			
MET EX R HA PT SOT AH PS AD/ HFA WB RR	Rip Ha Pu N So Air Pe Sh V So T So A Ho Wa		ger e ling er on sam ral aug nt aug nt aug ght au e drillin	npler jer er: V-Bit er: TC-Bit ger	E Easy F Firm H Hard VH Very WATER	Easy (No Hard (Re	evel on flow		S H P M P IN	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     ES     En       SP     Perth Sand Penetrometer     U     Thi       IC     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dry       ID     Photoionisation Detector     M     Mo       ID     Photoionisation Detector     W     We       Re-Bedruid (uncerrented IPD)     LL     Lit	turbed sa vironmen in wall tul / ist	tal sampl	e S - Soft F - Firm
	r to exp	lanatory	notes f	for details of lescriptions				CAF		NO (NSW/ACT) PTY LTD			

Queanbeyan Palerang Regional Sports Complex

## APPENDIX



## LABORATORY REPORTS





**Construction Sciences Pty Ltd** ABN: 74 128 806 735

Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

## **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1	
Client Address:	2/14-16 Wormald Street, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting complex		Lot Number:		
Location:	HUME		Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT		Client Reference/s:	50520049	
Area Description:			Report Date / Page:	10/02/2020	Page 1 of 6
Test Procedures:	AS1289.3.6.1				
Sample Number	455/S/89613		Sampl	e Location	
Sampling Method	Tested As Received	Client Sup	plied	BH321	
Date Sampled	17/01/2020			1.8-2.3m	
Sampled By	Client Sampled				
Date Tested	31/01/2020				

Material Type

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum				PAF	RTIC	LE S	IZE	DI	STRI	BUTI	ON	GRAP	н		
9.5		100		1	.00 -	1								-	-	-		-
6.7		100			1	-						-	-					
4.75		100		1.0	90 -				-	/								
2.36		98			80 -		- 0	/										
1.18		96			00 -		/											
0.600		92			70 -	-	-											
0.425		90		2.1		-												
0.300		87		(%)	60 -													
0.150		81		Bu														
0.075		73		t Pass	50 -													-
				Percent Passing (%)	40 -													
					30 -													
				16	20 -												_	_
					10 -	-												
					0 -	1												
						- 0.075	0110	0.150	0.300	0.423	0 4 30	0.600	1.18		2.36	4.75	6.7	2.0
						-						Sieves	Size (n	nm)				

Remarks

Material Source

Not Specified

Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number:

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455

1 mar	
11000	
10	

Not Supplied (Not Supplied)



**Construction Sciences Pty Ltd** ABN: 74 128 806 735

Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

## **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1	
Client Address:	2/14-16 Wormald Street, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting complex		Lot Number:		
Location:	HUME		Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT		Client Reference/s:	50520049	
Area Description:			Report Date / Page:	10/02/2020	Page 2 of 6
Test Procedures:	AS1289.3.6.1				
Sample Number	455/S/89619		Sampl	e Location	
Sampling Method	Tested As Received	Client Sup	plied	TP406	
Date Sampled	17/01/2020			0.6-0.8m	
Sampled By	Client Sampled				

laterial Source	Not Specifie	ed		Material Type Not Supplied (Not Supplied)
AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum	PARTICLE SIZE DISTRIBUTION GRAPH
26.5		100		100
19.0		100		
13.2		100		90
9.5		100		80
6.7		99		00
4.75		99		70
2.36		96		
1.18		89	1.00	£ 60 -
0.600		78		2
0.425		73		60
0.300		66	-	
0.150		55		2 40
0.075		46	c	D
				30 -
				20 -
				10 -

0

0.075

0.150

0.425

0.600

1.18

AS Sieve Size (mm)

2.36

Remarks

Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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1/	
King	
11	
10.00	

9.5

26.5 19.0 13.2

4.75

Approved Signatory: Kevin Spicer Form ID: W9Rep Rev 2




Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

#### **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1				
Client Address:	2/14-16 Wormald Street, Symonston		Project Number:	455/P/137				
Project:	QPRC - Sporting complex		Lot Number:					
Location:	HUME		Internal Test Request:	455/T/13942				
Supplied To:	Cardno ACT Cl		Client Reference/s:	50520049				
Area Description:			Report Date / Page:	10/02/2020	Page 3 of 6			
Test Procedures:	AS1289.3.6.1							
Sample Number	455/S/89891		Sample Location					
Sampling Method	Tested As Received	Client Sup	plied	TP101				
Date Sampled	17/01/2020		0.2-0.3m					

Sampling Method	Tested As Received	Client Supplied	TP101
Date Sampled	17/01/2020		0.2-0.3m
Sampled By	Client Sampled		
Date Tested	10/02/2020		
Material Source	Not Supplied	Material Type	Not Supplied (Not Supplied)

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum			PARTIC	CLE SI	ZE	DIST	RIBUTI	ON GF	RAPH			
13.2		100		100	1						1	-		-	-
9.5		100			-					/					
6.7		100		90	-				1	/					
4.75		100		80	1			3	1						
2.36		99		00	-			/							
1.18		93		70	1		/								
0.600		84		1.0	-	1	-								
0.425		78		8 60	1	1									
0.300		74		Ē	1	/									
0.150		62		SE 50	11	<u> </u>								_	_
0.075		45		Percent Passing (%) 40 20 10 0	0.075	0.150	0,300	0.425 A	0,600 Sie	1118 ve Size (n		4.75	6,7	F 9.5	F 13.2

Remarks

NA'

Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number:

1986
455



Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

#### **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1				
Client Address:	2/14-16 Wormald Street, Symonston		Project Number:	455/P/137				
Project:	QPRC - Sporting complex		Lot Number:					
Location:	HUME	HUME In		455/T/13942				
Supplied To:	Cardno ACT C		Client Reference/s:	50520049				
Area Description:			Report Date / Page:	10/02/2020	Page 4 of 6			
Test Procedures:	AS1289.3.6.1							
Sample Number	455/S/89892		Sampl	e Location				
Sampling Method	Tested As Received	Client Sup	plied	TP101				
Date Sampled	17/01/2020	17/01/2020		0.7-0.8m				
Sampled By	Client Sampled							

Material Type

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum				PARTI	CLE S	IZE	DIST	RIBUT	FION G	RAPH			
13.2		100			100 ]			-	-		-		-	-	-	-
9.5		100			-	-	-									
6.7		100			90 -											
4.75		100			80 -											
2.36		100			00 -											
1.18		99			70 -											
0.600		98		1	10											
0.425		98		(%)	60 -	-										
0.300		97		bu	-											
0.150		96		SSE	50 -											_
0.075		92		t b												
				Percent Passing (%)	40 -	-										-
				Ъ	1											
					30 -											
					20 -											
					10 -											
					10 -											
					0 1											
						0.075	0.150	0.300	0.425	0.600	1.18	2.36	Crt	6,7	9.5	10.2
											ve Size	(mm)				

Remarks

Date Tested

Material Source

10/02/2020

Not Supplied

Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number:

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455

1 los		
10.00		

Approved Signatory: Kevin Spicer Form ID: W9Rep Rev 2

Not Supplied (Not Supplied)



Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

#### **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1					
Client Address:	2/14-16 Wormald Street, Symonston	2/14-16 Wormald Street, Symonston Project Number:							
Project:	QPRC - Sporting complex		Lot Number:	ot Number:					
Location:	HUME Ir		Internal Test Request:	455/T/13942					
Supplied To:	Cardno ACT	ardno ACT C		50520049					
Area Description:			Report Date / Page:	10/02/2020	Page 5 of 6				
Test Procedures:	AS1289.3.6.1								
Sample Number	455/S/89895	Sample Location							
Sampling Method	Tested As Received	Client Sup							
_		1							

Tested As Received	Client Supplied	TP105A
17/01/2020		0.3-0.4m
Client Sampled		
10/02/2020		
Not Supplied	Material Type	Not Supplied (Not Supplied)
	17/01/2020 Client Sampled 10/02/2020	17/01/2020 Client Sampled 10/02/2020

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum				PAR	TICL	E SIZ	ZE D	ISTR	IBU	TION	GRAF	ΥH			
19.0		100		1	100 -	1							1	_	-	-	-	
13.2		100			~~	-						/						
9.5		100			90 -	-					/							
6.7		100		1.1	80 -					1								
4.75		99			00 -	-				/								
2.36		98			70 -			_	/									
1.18		92		20.1		-	1.0	/										
0.600		82		(%)	60 -													
0.425		76		Bu		-												
0.300		71		SS6	50 -	1												_
0.150		63		t b	1	-												
0.075		57		Percent Passing (%)	40 -	-												-
				d		1												
				1.5	30 -	-												
						1												
				10	20 -													-
						-												
					10 -	-												
					0 -	0	0			0 0	1.1.1.1	17	N	+	. o	9		
						0.075	0.150		0.425	0.600		1.18	2.36	4.75	10.1	9 5	13.2	19.0
							~					Size	(mm)					

Remarks

Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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Approved Signatory: Kevin Spicer Form ID: W9Rep Rev 2





Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

#### **PARTICLE SIZE DISTRIBUTION REPORT**

Client:	Cardno ACT		Report Number:	455/R/22202-1	
Client Address:	2/14-16 Wormald Street, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting complex		Lot Number:		
Location:	HUME		Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT		Client Reference/s:	50520049	
Area Description:			Report Date / Page:	10/02/2020	Page 6 of 6
Test Procedures:	AS1289.3.6.1				
Sample Number	455/S/89899		Sampl	e Location	
Sampling Method	Tested As Received	Client Sup	plied	BH306	
Date Sampled	17/01/2020			6.0-6.45m	

oumphing mounou			Chorn Cupplicu	Bricco	
Date Sampled	17/01/2020			6.0-6.45m	
Sampled By	Client Sampled				
Date Tested	10/02/2020				
Material Source	Not Supplied		Material Type Not Su	pplied (Not Supplied)	
	Specification Percent	Specification	PARTICLES	ZE DISTRIBUTION GRAPH	
AS Sieve (mm)			FARTICLE 3	ZE DISTRIBUTION GRAFH	

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum			PART	TICLE	SIZ	E DI	STRIB	UTIO	N GF	RAPH	4			
19.0 13.2 9.5 6.7 4.75 2.36 1.18 0.600 0.425 0.300 0.150 0.075		100 88 85 78 74 63 46 33 28 24 17 13	Waximum	100 90 80 70 60 50 40 30 20 10 0	0.075	- 0.150	unero -	0.425		1.18	ze (mn	- 35	4.75	6.7	2.6	13.2	19.0

Remarks

Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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#### Unit 3/180 Gladstone Street, Fyshwick ACT 2609

# **ATTERBERG LIMITS REPORT**

Client:	Cardno ACT			Report Number:	455/R/22235-1				
Client Address:	2/14-16 Wormald Street, Symonston			Project Number:	455/P/137				
Project:	QPRC - Sporting co	mplex		Lot Number:					
Location:	HUME			Internal Test Request:	455/T/13942				
Supplied To:	Cardno ACT			Client Reference/s:	50520049				
Area Description:				Report Date / Page:	11/02/2020	Page 1 of 6			
Test Procedures:	AS1289.3.1.2, AS 12	289.3.3.1, AS1289.3.2.1, AS12	289.2.1.1						
Sample Number	455/S/89613			Sample	e Location				
Sampling Method	Tested As Received		Client Sup	Supplied BH321					
Date Sampled	17/01/2020			1.8-2.3m					
Sampled By	Client Sampled								
Date Tested	10/02/2020								
Att. Drying Method	Oven Dried		Material S	rial Source Not Specified					
Atterberg Preparation	Dry Sieved		Material T	terial Type Not Supplied (Not Supplied)					
Material Description	(CI) Silty SLAY								
		Atterberg L	imits Resul	ts					
Atterberg Limit		Specification Minimum		Test Result	Specifica	tion Maximum			
Liquid Limit (%)				30					
Plastic Limit (%)				18					
Plasticity Index (%)				12					
Linear Shrinkage (%)									
Linear Shrinkage Defe	ects:								

Remarks

NATA

Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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#### Unit 3/180 Gladstone Street, Fyshwick ACT 2609

# **ATTERBERG LIMITS REPORT**

Client:	Cardno ACT			Report Number:	455/R/22235-1			
Client Address:	2/14-16 Wormald Street, Symonston			Project Number:	455/P/137			
Project:	QPRC - Sporting co	mplex		Lot Number:				
Location:	HUME			Internal Test Request:	455/T/13942			
Supplied To:	Cardno ACT			Client Reference/s:	50520049			
Area Description:				Report Date / Page:	11/02/2020	Page 2 of 6		
Test Procedures:	AS1289.3.1.2, AS 12	289.3.3.1, AS1289.3.2.1, AS12	289.2.1.1					
Sample Number	455/S/89619			Sample	e Location			
Sampling Method	Tested As Received		Client Sup	Client Supplied TP406				
Date Sampled	17/01/2020			0.6-0.8m				
Sampled By	Client Sampled							
Date Tested	10/02/2020							
Att. Drying Method	Oven Dried		Material S	erial Source Not Specified				
Atterberg Preparation	Dry Sieved		Material T	erial Type Not Supplied (Not Supplied)				
Material Description	Gravelly Silty Sand							
		Atterberg L	imits Resul	ts				
Atterberg Limit		Specification Minimum		Test Result	Specifica	tion Maximum		
Liquid Limit (%)				19				
Plastic Limit (%)				16				
Plasticity Index (%)				3				
Linear Shrinkage (%)								
Linear Shrinkage Defe	ects:							

Remarks

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#### Unit 3/180 Gladstone Street, Fyshwick ACT 2609

<b>ATTERBERG</b>	LIMITS	REPORT
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Client:	Cardno ACT			Report Number:	455/R/22235-1	
Client Address:	2/14-16 Wormald St	reet, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting co	mplex		Lot Number:		
Location:	HUME			Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT			Client Reference/s:	50520049	
Area Description:				Report Date / Page:	11/02/2020	Page 3 of 6
Test Procedures:	AS1289.3.1.2, AS 12	289.3.3.1, AS1289.3.2.1, AS12	289.2.1.1			
Sample Number	455/S/89891			Sample	e Location	
Sampling Method	Tested As Received		Client Sup	plied	TP101	
Date Sampled	17/01/2020				0.2-0.3m	
Sampled By	Client Sampled					
Date Tested	10/02/2020					
Att. Drying Method	Oven Dried		Material S	ource Not Supplied		
Atterberg Preparation	Dry Sieved		Material T	ype Not Supplied (No	t Supplied)	
Material Description	Silty SAND					
		Atterberg L	imits Result	S		
Atterberg Limit		Specification Minimum		Test Result	Specificat	ion Maximum
Liquid Limit (%)				22		
Plastic Limit (%)				21		
Plasticity Index (%)				1		
Linear Shrinkage (%)						
Linear Shrinkage Defe	ects:					

Remarks

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#### Unit 3/180 Gladstone Street, Fyshwick ACT 2609

<b>ATTERBERG</b>	LIMITS	REPORT
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Client:	Cardno ACT			Report Number:	455/R/22235-1	
Client Address:	2/14-16 Wormald St	reet, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting co	mplex		Lot Number:		
Location:	HUME			Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT			Client Reference/s:	50520049	
Area Description:				Report Date / Page:	11/02/2020	Page 4 of 6
Test Procedures:	AS1289.3.1.2, AS 12	289.3.3.1, AS1289.3.2.1, AS12	289.2.1.1			
Sample Number	455/S/89892			Sample	e Location	
Sampling Method	Tested As Received		Client Sup	plied	TP101	
Date Sampled	17/01/2020				0.7-0.8m	
Sampled By	Client Sampled					
Date Tested	10/02/2020					
Att. Drying Method	Oven Dried		Material S	ource Not Supplied		
Atterberg Preparation	Dry Sieved		Material T	ype Not Supplied (Not	t Supplied)	
Material Description	Silty CLAY					
		Atterberg L	imits Resul	ts		
Atterberg Limit		Specification Minimum		Test Result	Specifica	tion Maximum
Liquid Limit (%)				33		
Plastic Limit (%)				27		
Plasticity Index (%)				6		
Linear Shrinkage (%)						
Linear Shrinkage Defe	ects:					

Remarks

NATA

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Unit 3/180 Gladstone Street, Fyshwick ACT 2609

# **ATTERBERG LIMITS REPORT**

Client:	Cardno ACT			Report Number:	455/R/22235-1	
Client Address:	2/14-16 Wormald St	reet, Symonston		Project Number:	455/P/137	
Project:	QPRC - Sporting co	mplex		Lot Number:		
Location:	HUME			Internal Test Request:	455/T/13942	
Supplied To:	Cardno ACT			Client Reference/s:	50520049	
Area Description:				Report Date / Page:	11/02/2020	Page 5 of 6
Test Procedures:	AS1289.3.1.2, AS 12	289.3.3.1, AS1289.3.2.1, AS12	289.2.1.1			
Sample Number	455/S/89895			Sample	e Location	
Sampling Method	Tested As Received		Client Sup	plied	TP105A	
Date Sampled	17/01/2020				0.3-0.4m	
Sampled By	Client Sampled					
Date Tested	10/02/2020					
Att. Drying Method	Oven Dried		Material S	ource Not Supplied		
Atterberg Preparation	Dry Sieved		Material T	/pe Not Supplied (No	t Supplied)	
Material Description	Sandy Silty CLAY					
		Atterberg L	imits Result	S		
Atterberg Limit		Specification Minimum		Test Result	Specifi	cation Maximum
Liquid Limit (%)				25		
Plastic Limit (%)				18		
Plasticity Index (%)				7		
Linear Shrinkage (%)						
Linear Shrinkage Defe	ects:					

Remarks

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#### Unit 3/180 Gladstone Street, Fyshwick ACT 2609

<b>ATTERBERG</b>	LIMITS	REPORT
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Client: 0	Cardno ACT			Report Number:	455/R/22235-1	
Client Address: 2	2/14-16 Wormald Str	reet, Symonston		Project Number:	455/P/137	
Project: 0	QPRC - Sporting cor	mplex		Lot Number:		
Location:	HUME			Internal Test Request:	455/T/13942	
Supplied To: 0	Cardno ACT			Client Reference/s:	50520049	
Area Description:				Report Date / Page:	11/02/2020	Page 6 of 6
Test Procedures: AS1289.3.1.2, AS 1289.3.3.1, AS1289.3.2.1, AS1289.2.1.1						
Sample Number 4	455/S/89899			Sample	e Location	
Sampling Method	Tested As Received		Client Sup	t Supplied BH306		
Date Sampled	17/01/2020		6.0-6.45m			
Sampled By 0	Client Sampled					
Date Tested 1	10/02/2020					
Att. Drying Method	Oven Dried		Material Source Not Supplied			
Atterberg Preparation	Dry Sieved		Material Ty	Type Not Supplied (Not Supplied)		
Material Description 0	Gravelly SAND					
		Atterberg Li	imits Result	S		
Atterberg Limit		Specification Minimum		Test Result	Specificat	tion Maximum
Liquid Limit (%)				28		
Plastic Limit (%)				20		
Plasticity Index (%)				8		
Lincer Shrinkage (9/)						
Linear Shrinkage (%)						

Remarks

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Oak Flats NSW 2529

Laboratory: Wollongong Laboratory Phone: 02 4257 4458 Fax: 02 4257 4463 Email: wollongong@constructionsciences.net

# **SHRINK SWELL INDEX**

Client:	Construction Sc	iences Fyshwick		Report Number:	10848/R/18282-1	
Client Address:	Unit 3/180 Glad	stone Street, Fyshwick		Project Number:	10848/P/25	
Project:	Inter BU testing			Lot Number:		
Location:	Fyshwick NSW			Internal Test Request:	10848/T/11295	
Supplied To:	Construction Sc	iences Fyshwick		Client Reference/s:		
Area Description:				Report Date / Page:	13/02/2020	Page 1 of 6
Test Procedures:	AS1289.7.1.1, A	S1289.2.1.1	Client Sam	ple ID	TP102	
Sample Number	10848/S/50464				0.4-0.5m	
Sampling Method	Tested As Rece	ived			455/S/89893	
Date Sampled	17/01/2020				QPRC- Sporting Complex	
Sampled By	Client Sampled Material Sc		Source -			
Date Tested	11/02/2020		Material Ty	/pe -		
Soil Description:		(CH) Silty CLAY Black high plas	sticity			
Cracking / Crumbling Estimated Inert Inclus		nil 0.00	Swoll Pro	Soak Moisture Content (	%) 20.4	
Shrinkage Moisture C		19.8		-Soak Moisture Content		
Shrinkage Strain (	[%)	1.6	Ch:	nk / Swoll Index	, nn	
Swell Strain (%)		0.1			c 0.9	

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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# **SHRINK SWELL INDEX**

Client:	Construction Sc	iences Fyshwick		Report Number:	10848/R/18282-1	
Client Address:	Unit 3/180 Glad	stone Street, Fyshwick		Project Number:	10848/P/25	
Project:	Inter BU testing			Lot Number:		
Location:	Fyshwick NSW			Internal Test Request:	10848/T/11295	
Supplied To:	Construction Sc	iences Fyshwick		Client Reference/s:		
Area Description:				Report Date / Page:	13/02/2020	Page 2 of 6
Test Procedures:	AS1289.7.1.1, A	AS1289.2.1.1	Client Sam	nple ID	TP104	
Sample Number	10848/S/50465				0.2-0.3m	
Sampling Method	Tested As Rece	eived			455/S/89894	
Date Sampled	17/01/2020				QPRC- Sporting Complex	
Sampled By	<b>Client Sampled</b>		Material Se	ource -		
Date Tested	11/02/2020		Material T	/ре -		
Soil Description:		(CL) Sandy CLAY Brown low	plasticty			
Cracking / Crumbling	:	Nil				
Estimated Inert Inclus	sions (%):	0.00	Swell Pre-	Soak Moisture Content (	(%) 17.1	
Shrinkage Moisture C	Content (%):	17.7	Swell Post	-Soak Moisture Content	(%) 17.0	
Shrinkage Strain	(%)	1.4	(L.	ink / Swall Inday	, 0.0	
Swell Strain (%)		0.0		ink / Swell Index	c 0.8	

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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Oak Flats NSW 2529

Laboratory: Wollongong Laboratory Phone: 02 4257 4458 Fax: 02 4257 4463 Email: wollongong@constructionsciences.net

# **SHRINK SWELL INDEX**

Client:	Construction So	ciences Fyshwick		Report Number:	10848/R/18282-1	
Client Address:	Unit 3/180 Glad	lstone Street, Fyshwick		Project Number:	10848/P/25	
Project:	Inter BU testing			Lot Number:		
Location:	Fyshwick NSW			Internal Test Request:	10848/T/11295	
Supplied To:	Construction So	ciences Fyshwick		Client Reference/s:		
Area Description:				Report Date / Page:	13/02/2020	Page 3 of 6
Test Procedures:	AS1289.7.1.1, /	AS1289.2.1.1	Client Sam	nple ID	TP107	
Sample Number	10848/S/50467				0.2-0.3m	
Sampling Method	Tested As Rece	eived			455/S/89896	
Date Sampled	17/01/2020				QPRC- Sporting Complex	
Sampled By	Client Sampled		Material So	ource -		
Date Tested	11/02/2020		Material Ty	/ре -		
Soil Description:		(CH) Silty CLAY black high pl	asticity			
Cracking / Crumbling		Nil				
Estimated Inert Inclus	. ,	0.00		Soak Moisture Content (	. ,	
Shrinkage Moisture (	Content (%):	17.2	Swell Post	-Soak Moisture Content	: (%) 19.6	
Shrinkage Strain	(%)	2.8	Ch	ala / Carall Index	. 10	
Swell Strain (%)		0.0	Snr	ink / Swell Index	( 1.5	

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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Oak Flats NSW 2529

Laboratory: Wollongong Laboratory Phone: 02 4257 4458 Fax: 02 4257 4463 Email: wollongong@constructionsciences.net

# **SHRINK SWELL INDEX**

Client:	Construction Scie	nces Fyshwick		Report Number:	10848/R/18282-1	
Client Address:	Unit 3/180 Gladst	one Street, Fyshwick		Project Number:	10848/P/25	
Project:	Inter BU testing			Lot Number:		
Location:	Fyshwick NSW			Internal Test Request:	10848/T/11295	
Supplied To:	Construction Scie	nces Fyshwick		Client Reference/s:		
Area Description:				Report Date / Page:	13/02/2020	Page 4 of 6
Test Procedures:	AS1289.7.1.1, AS	61289.2.1.1	Client Sam	ple ID	TP110	
Sample Number	10848/S/50469				0.7-0.8m	
Sampling Method	Tested As Receiv	red			455/S/89898	
Date Sampled	17/01/2020				QPRC- Sporting Complex	
Sampled By	Client Sampled Material So		ource -			
Date Tested	11/02/2020		Material Ty	vpe -		
Soil Description: Cracking / Crumbling		(CH) Silty CLAY high plasticity b	olack			
Estimated Inert Inclus		0.00	Swell Pre-	Soak Moisture Content (	%) 17.8	
Shrinkage Moisture C		18.3		-Soak Moisture Content		
Shrinkage Strain (	(%)	1.7	CL	ale / Curall Index	. 10	
Swell Strain (%)		0.0	SULI	nk / Swell Index	k 1.0	

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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# **SHRINK SWELL INDEX**

Client:	Construction So	ciences Fyshwick		Report Number:	10848/R/18282-1					
Client Address:	Unit 3/180 Glad	stone Street, Fyshwick		Project Number:	10848/P/25					
Project:	Inter BU testing			Lot Number:						
Location:	Fyshwick NSW			Internal Test Request:	est Request: 10848/T/11295					
Supplied To:	Construction So	ciences Fyshwick		Client Reference/s:						
Area Description:	ption:			Report Date / Page:	13/02/2020	Page 5 of 6				
Test Procedures:	Procedures: AS1289.7.1.1, AS1289.2.1.1 Clien			nple ID	BH307					
Sample Number	10848/S/50470			4.5-4.95m						
Sampling Method	Tested As Received				455/S/89900					
Date Sampled	17/01/2020				QPRC- Sporting Complex					
Sampled By	<b>Client Sampled</b>		Material Source -							
Date Tested	11/02/2020		Material Type -							
Soil Description:		(CI) Sandy CLAY low plasticity	light brown							
Cracking / Crumbling	:	Nil								
Estimated Inert Inclus	sions (%):	0.00	Swell Pre-Soak Moisture Content (%) 22.4							
Shrinkage Moisture Content (%): 21.8			Swell Post-Soak Moisture Content (%) 24.2							
Shrinkage Strain (	Shrinkage Strain (%) 2.2									
Swell Strain (%) 0.0			— Shrink / Swell Index 1.2							

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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Accreditation Number: Corporate Site Number:

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Oak Flats NSW 2529

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# **SHRINK SWELL INDEX**

Client:	Construction S	ciences Fyshwick		Report Number:	10848/R/18282-1					
Client Address:	Unit 3/180 Gladstone Street, Fyshwick			Project Number:	umber: 10848/P/25					
Project:	Inter BU testin	g		Lot Number:						
Location:	Fyshwick NSW	1		Internal Test Request:	est: 10848/T/11295					
Supplied To:	Construction S	ciences Fyshwick		Client Reference/s:						
Area Description:	scription:			Report Date / Page:	13/02/2020	Page 6 of 6				
Test Procedures:	est Procedures: AS1289.7.1.1, AS1289.2.1.1			ple ID	BH309					
Sample Number	10848/S/50471			3.0-3.45m						
Sampling Method	Tested As Rec	eived			455/S/89901					
Date Sampled	17/01/2020				QPRC- Sporting Complex					
Sampled By	Client Sample	ł	Material So	Material Source -						
Date Tested	11/02/2020		Material Ty	Material Type -						
Soil Description:		(CI) Sandy CLAY medium	l/low plasticity brow	/n						
Cracking / Crumbling	:	Nil								
Estimated Inert Inclu	sions (%):	0.00	Swell Pre-	Swell Pre-Soak Moisture Content (%) 21.3						
Shrinkage Moisture Content (%): 22.5			Swell Post	Swell Post-Soak Moisture Content (%) 22.0						
Shrinkage Strain (%) 4.0		Char								
Swell Strain (%) 0.0			SNri	nk / Swell Index	x 2.2					

Remarks

Shrink/Swell Samples Remoulded And Moisture Added Before Compaction Results apply to the sample/s as received.



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Accreditation Number: Corporate Site Number:

1986
10848



Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

## **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT					Report Number: 455/R/22234-1						
Client Address:	2/14-16 Wormald Street, Symonston				Project Number: 455/P/137							
Project:	QPRC - Sporti	ng complex				Lot N	umbe	r:				
Location:	HUME					Intern	al Te	st Red	quest	455/T/13942		
Supplied To:	Cardno ACT					Client				50520049		
Area Description:						Repo				11/02/2020	Page 2	1 of 8
•						Керо	n Dai	с/га	iye.	11/02/2020		1010
Test Procedures	,	AS1289.5.1.1, AS1	289.2.1.1	1								
Sample Number	455/S/89614							:	Samp	le Location		
Sampling Method	Tested As Rec	eived		Client	Supp	lied				TP401		
Date Sampled	17/01/2020									0.6-0.8m		
Sampled By	Client Sampleo	b										
Date Tested	8/02/2020											
Material Source	Not Specified			Materi	al Lin	nit Sta	rt			-		
Material Type	Not Supplied (Not Supplied)			Material Limit End -								
Client Reference	-			Compa	active	e Effor	t			Standard		
Material Description	Silty Sand											
Maximum Dry Density	(t/m³):	1.76				CBF		VETR	ATIC	ON PLOT		
Optimum Moisture Cor	ntent (%):	16.0										
Field Moisture Content	t (%):	13.6										
Sample Percent Overs	size (%)	0.0	3000 -	11							/	
Oversize Included / Ex	cluded	Excluded	2700								/	_
Target Density Ratio (	%):	95										
Target Moisture Ratio	(%):	100	2400 -									
Placement Dry Density	y (t/m³):	1.69	2100	260					/			_
Placement Dry Density	y Ratio (%):	96.0	- 1000					/				
Placement Moisture C	ontent (%):	15.4	Ê 1800				/					
Placement Moisture R	atio (%):	96.0	(2) 1800 peo 1500	_		/			_			_
Test Condition / Soaki	ng Period:	Soaked / 4 Days	-	100	1							
CBR Surcharge (kg)		4.5	1200 -		/							
Dry Density After Soak	< (t/m³):	1.68	900 -	/			-					_
Total Curing Time (hrs		n/a	600 -	/								
Liquid Limit Method		n/a	000 -	/								
Moisture (top 30mm) A	After Soak (%)	79.5	300							-		-
Moisture (remainder) A	After Soak (%)	18.7	0 V									
CBR Swell (%):		0.5		n indiandrau	N S	ω ω	4 5 5	S S Dislow	6.5	2	E.	
Minimum CBR Specific	cation (%):	-	i i	л іл	G	U.	ы			Ui .	12.5	
CBR Value @ 2.5mm	(%):	10						Pene	etrati	on (mm)		

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

# **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT				Repo	ort Numb	er:	455/R/22234-1	
Client Address:	2/14-16 Wormald Street, Symonston			Proje	Project Number: 455/P/137				
Project:	QPRC - Sporti	ng complex			Lot N	umber:			
Location:	HUME	0			Interr	nal Test	Request	: 455/T/13942	
							•		
Supplied To:	Cardno ACT					t Refere		50520049	/ /
Area Description:					Repo	rt Date /	Page:	11/02/2020	Page 2 of 8
Test Procedures	AS1289.6.1.1,	AS1289.5.1.1, AS1	289.2.1.1	-					
Sample Number	455/S/89615						Samp	ole Location	
Sampling Method	Tested As Rec	eived		Client Su	oplied			TP402	
Date Sampled	17/01/2020							0.6-0.8m	
Sampled By	Client Sample	t							
Date Tested	8/02/2020								
Material Source	Not Specified			Material L	imit Sta	rt		-	
Material Type	Not Supplied (	Not Supplied)		Material L	imit End	b		-	
Client Reference	-			Compacti	ve Effor	t		Standard	
Material Description	Gravelly Silty S	Sand							
Maximum Dry Density	(t/m³):	1.87			CBI	R PENE	TRATIC	ON PLOT	_
Optimum Moisture Cor	ntent (%):	12.0							
Field Moisture Content	t (%):	8.0	2700					1.	
Sample Percent Overs	size (%)	0.0	2700						/
Oversize Included / Ex	cluded	Excluded	2400			*			/
Target Density Ratio (	%):	95						/	
Target Moisture Ratio		100	2100 -					/	
Placement Dry Density	y (t/m³):	1.77	1800 -						
Placement Dry Density	y Ratio (%):	94.5					/		
Placement Moisture C	ontent (%):	12.0	(N) 1500			/	/		
Placement Moisture R	atio (%):	99.0	Loa		1				
Test Condition / Soaking	ng Period:	Soaked / 4 Days	1200 -		/		1		
CBR Surcharge (kg)		4.5	900 -	1	/				
Dry Density After Soak	κ (t/m³):	1.76		/					
Total Curing Time (hrs	;)	n/a	600 -	/					
Liquid Limit Method		n/a	200	/					
Moisture (top 30mm) A	After Soak (%)	17.1	300						
Moisture (remainder) A	After Soak (%)	14.2	0 1	noporprospor	TOTPTOTTO	manne	openpropa	1001	
CBR Swell (%):		0.5	C U	5 5	ι ω 1 υ	4.5	<b>л</b> б 5 5	7.5	12.5
Minimum CBR Specific		-							ίπ
CBR Value @ 5.0mm	(%):	8				f	enetrati	on (mm)	

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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Accreditation Number: Corporate Site Number:

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Address:

Fyshwick ACT 2609

Laboratory: Fyshwick Laboratory 02 6285 5314 Phone: Fax: Email: Canberra@constructionsciences.net

# **CALIFORNIA BEARING RATIO REPORT**

		CALII UKN										
Client:	Cardno ACT					Report Number: 455/R/22234-1						
Client Address:	2/14-16 Wormald Street, Symonston			Project Number: 455/P/137								
Project:	QPRC - Sporti	ng complex				Lot N	lumbe	er:				
Location:	HUME					Inter	nal Te	est Re	equest	: 455/T/13942		
Supplied To:	Cardno ACT					Clier	nt Refe	erence	e/s:	50520049		
Area Description:						Repo	ort Da	te / Pa	ade:	11/02/2020		Page 3 of 8
•	404000 0 4 4		000.0.4.4									- 0
Test Procedures Sample Number	AS1289.6.1.1, 455/S/89616	AS1289.5.1.1, AS1	289.2.1.1						Some			
•		a i va d		Client	C	ار مرا			Sam	ble Location		
Sampling Method	Tested As Rec	ceived		Client	Supp	blied				TP403		
Date Sampled	17/01/2020									0.6-0.8m		
Sampled By	Client Sampled	b										
Date Tested	8/02/2020											
Material Source	Not Specified			Mater	ial Lir	nit Sta	art			-		
Material Type	Not Supplied (Not Supplied)			Mater	Material Limit End -							
Client Reference	-	- Compac			active	e Effo	rt			Standard		
Material Description	Silty CLAY											
Maximum Dry Density	(t/m³):	1.79				CB	R PE	NETE	RATIO	ON PLOT		
Optimum Moisture Cor	ntent (%):	11.0	000									
Field Moisture Content	t (%):	6.4	900									
Sample Percent Overs	size (%)	0.0	800								/	
Oversize Included / Ex	cluded	Excluded										
Target Density Ratio (	%):	95	700 -			_						
Target Moisture Ratio	(%):	100						/				
Placement Dry Density	/ (t/m³):	1.70	600 -			1						
Placement Dry Density	/ Ratio (%):	95.0			1							
Placement Moisture Co	ontent (%):	10.1	(N) peol		1							
Placement Moisture Ra	atio (%):	91.0	400 -	/								
Test Condition / Soakir	ng Period:	Soaked / 4 Days	1 100	/								
CBR Surcharge (kg)		4.5	300 -	/	-							-
Dry Density After Soak	k (t/m³):	1.68		/								
Total Curing Time (hrs	)	n/a	200 -	/	+					-		+
Liquid Limit Method		n/a										
Moisture (top 30mm) A	After Soak (%)	19.4	100 -									*
Moisture (remainder) A	After Soak (%)	18.4	0 L									1
CBR Swell (%):		1.0		⊃ ⊢ hudualaul	10	La La	4	U. Turdura	dinahara dinahara	<b>7</b>		÷
Minimum CBR Specific	cation (%):	-	c i	n ùn	2.5	3.5	4 5	55	ίΛ	ίn		12.5
CBR Value @ 2.5mm		3.5						Pen	etratio	on (mm)		

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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# **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT					Dono	et Nhur	mhor		455	/R/22234-1	1	
-						-		nber:					
Client Address:	2/14-16 Worma	ald Street, Symonst	on			Proje	ct Nu	mber:		455/	P/137		
Project:	QPRC - Sporti	ng complex				Lot N	umbe	er:					
Location:	HUME					Interr	nal Te	st Red	quest	: 455/	T/13942		
Supplied To:	Cardno ACT					Clien	t Refe	erence	e/s:	505	20049		
Area Description:						Repo	rt Dat	e / Pa	ige:	11/0	2/2020		Page 4 of 8
Test Procedures	AS1289.6.1.1,	AS1289.5.1.1, AS1	289.2.1.1										
Sample Number	455/S/89617								Samp	le Loc	ation		
Sampling Method	Tested As Rec	eived		Client	Supp	olied				TP40	4		
Date Sampled	17/01/2020									0.6-0	.8m		
Sampled By	Client Sampleo	Ł											
Date Tested	8/02/2020												
Material Source	Not Specified			Mater	ial Lir	nit Sta	rt			-			
Material Type	Not Supplied (	Not Supplied)		Mater	ial Lir	nit End	t			-			
Client Reference	-			Comp	activ	e Effor	t			Stan	dard		
Material Description	Silty CLAY												
Maximum Dry Density	(t/m³):	1.73				CB	RPEN	VETR	ATIO	ON PL	от		
Optimum Moisture Cor	ntent (%):	17.0	_			- 00		2007			-		
Field Moisture Content	t (%):	16.9	1000										
Sample Percent Overs	size (%)	0.0						ПП				-	-
Oversize Included / Ex	cluded	Excluded	900 -								/		
Target Density Ratio (	%):	95	800 -						-	-	-		-
Target Moisture Ratio	(%):	100			11	1	-	-					
Placement Dry Density	/ (t/m³):	1.64	700 -			/							
Placement Dry Density	/ Ratio (%):	95.0	- 600		1				_				
Placement Moisture C	ontent (%):	17.5	5		/								
Placement Moisture R	atio (%):	101.5	B 500 -	1			1						-
Test Condition / Soaking	ng Period:	Soaked / 4 Days	400	1		-							
CBR Surcharge (kg)		4.5		/									
Dry Density After Soak		1.62	300 -	/									
Total Curing Time (hrs	)	n/a	200										
Liquid Limit Method		n/a											
Moisture (top 30mm) A		23.7	100										
Moisture (remainder) A	After Soak (%)	20.7	0 1	nopropro	hanne		quantar	motor	quagar				
CBR Swell (%):		1.5	c b	1 5	N U	ω σ	4.5	UT UT	6.5	7.5			12.5
Minimum CBR Specific	. ,	-			01	01	51						ίπ
CBR Value @ 2.5mm	(%):	4.5						Pen	etrati	on (mr	n)		

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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02 6285 5314 Phone: Canberra@constructionsciences.net

Laboratory: Fyshwick Laboratory

## **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT						Repo	ort Nu	ımber	:	455/R/22234	-1	
Client Address:	2/14-16 Worma	ald Street, Symonst	on				Proje	ect Nu	ımber	:	455/P/137		
Project:	QPRC - Sporti	na complex					L ot N	lumb	er:				
	HUME	ng complex									H 455/T/12042		
										equest			
Supplied To:	Cardno ACT						Clier	nt Ref	erenc	e/s:	50520049		
Area Description:							Repo	ort Da	ite / P	age:	11/02/2020		Page 5 of 8
Test Procedures	AS1289.6.1.1,	AS1289.5.1.1, AS1	289.2.1.1										
Sample Number	455/S/89618									Sam	ple Location		
Sampling Method	Tested As Rec	eived		С	lient S	upp	lied				TP405		
Date Sampled	17/01/2020										0.6-0.8m		
Sampled By	Client Sampled	Ł											
Date Tested	8/02/2020												
Material Source	Not Specified			N	lateria	l Lin	nit Sta	art			-		
Material Type	Not Supplied (I	Not Supplied)		Ν	lateria	l Lin	nit En	d			-		
Client Reference	-			С	ompa	ctive	e Effo	rt			Standard		
Material Description	gravely sand												
Maximum Dry Density (	[t/m³):	1.45					CB	R PE	NET	RATI	ON PLOT		
Optimum Moisture Con	tent (%):	15.5	500										
Field Moisture Content	(%):	-	500 -										
Sample Percent Oversiz	ze (%)	0.0	450 -	-							_		/
Oversize Included / Exc	cluded	-										/	
Target Density Ratio (%	ó):	95	400 -										
Target Moisture Ratio (	-	100	350 -						-	-		-	_
Placement Dry Density		1.39					1	-					
Placement Dry Density		96.0	- <sup>300</sup> -		1	1	-		1				
Placement Moisture Co	ntent (%):	16.1	(N) peor		1						_		
Placement Moisture Ra		103.0	Loa		1								
Test Condition / Soakin	g Period:	Soaked / 4 Days	200 -		/						-	-	
CBR Surcharge (kg)		9.0	150 -	/									
Dry Density After Soak		1.32	100	1									
Total Curing Time (hrs)		n/a	100 -	1									
Liquid Limit Method		n/a	50 -	1									
Moisture (top 30mm) Af		33.3	50 -										-
Moisture (remainder) At	tter Soak (%)	30.0	0 ]	arthudu	alarihu	لمنبله	mahan	Linutio	dundun	Jinden	4 <del>004 i</del>	1 1	
CBR Swell (%):		5.0		0.5	15	2	ω σ	4 5	сī Сī	6.5	75		12.5
Minimum CBR Specific		-							Pen	etrati	on (mm)		01
CBR Value @ 2.5mm (	(%):	2.0							ren	cuau	ou franty		

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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## **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT					Repo	rt Nun	nber:		455/R/22234-1	
Client Address:	2/14-16 Worma	ald Street, Symonst	on			Proje	ct Nur	nber:		455/P/137	
Project:	QPRC - Sporti	ng complex				Lot N	umbe	r:			
Location:	HUME					Intern	al Tes	st Ree	quest	455/T/13942	
Supplied To:	Cardno ACT					Client	Refe	rence	e/s:	50520049	
Area Description:						Repo	rt Date	e / Pa	ade:	11/02/2020	Page 6 of
	101000 0 1 1		000.0.4.4					- ,	.9		5
Test Procedures		AS1289.5.1.1, AS1	289.2.1.1								
Sample Number	455/S/89619								Samp	le Location	
Sampling Method	Tested As Rec	eived		Client S	Supp	lied				TP406	
Date Sampled	17/01/2020									0.6-0.8m	
Sampled By	Client Sampleo	Ł									
Date Tested	8/02/2020										
Material Source	Not Specified			Materia	l Lim	nit Sta	rt			-	
Material Type	Not Supplied (	Not Supplied)		Materia	l Lim	nit Enc	1			-	
Client Reference	-			Compa	ctive	Effor	t			Standard	
Material Description	Gravelly Silty S	Sand									
Maximum Dry Density	(t/m³):	1.93				CBF		ETR	ATIC	ON PLOT	
Optimum Moisture Cor	ntent (%):	10.0	2200								
Field Moisture Content	t (%):	4.0	3300								
Sample Percent Overs	ize (%)	0.0	3000								/
Oversize Included / Ex	cluded	Excluded	2700	44.4	-				-	1 m l	/
Target Density Ratio (	%):	95	2700								
Target Moisture Ratio	(%):	100	2400		+					/	
Placement Dry Density	/ (t/m³):	1.85	2100		_						
Placement Dry Density	/ Ratio (%):	96.0							/		
Placement Moisture Co	ontent (%):	10.6	2 1800 -					/			
Placement Moisture Ra	atio (%):	105.0	(N) 1800				/			1. A	
Test Condition / Soaking	ng Period:	Soaked / 4 Days	- 1			/					
CBR Surcharge (kg)		4.5	1200		/						
Dry Density After Soak	x (t/m³):	1.85	900 -	/							
Total Curing Time (hrs	)	n/a	600	/							
Liquid Limit Method		n/a	600	/							
Moisture (top 30mm) A	After Soak (%)	15.0	300		-						
Moisture (remainder) A		12.2	0 V								
CBR Swell (%):		0.0		) ∺ ualaultault	12	ω σ	4.	2.2 1010101	6.5	7.5 5	5
Minimum CBR Specific	cation (%):	-	Ù	n in	G	Ċ1	ίπ	G	ί.	UI .	12.5
CBR Value @ 2.5mm		8						Pen	etrati	on (mm)	

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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#### **CALIFORNIA BEARING RATIO REPORT**

							1						
Client:	Cardno ACT						Repo	ort Nu	mber	:	455/R/22234-1		
Client Address:	2/14-16 Worm	ald Street, Symonst	on				Project Number: 455/P/137						
Project:	QPRC - Sporti	ng complex					Lot N	lumbe	er:				
Location:	HUME						Inter	nal Te	est Re	equest	:: 455/T/13942		
Supplied To:	Cardno ACT						Clier	nt Ref	erenc	e/s:	50520049		
Area Description:							Repo	ort Da	te / P	age:	11/02/2020		Page 7 of 8
Test Procedures	AS1289.6.1.1,	AS1289.5.1.1, AS1	289.2.1.1										
Sample Number	455/S/89620									Sam	ole Location		
Sampling Method	Tested As Rec	eived		C	Client	Supp	olied				TP407		
Date Sampled	17/01/2020										0.6-0.8m		
Sampled By	Client Sample	b											
Date Tested	8/02/2020												
Material Source	Not Specified			Ν	/lateri	al Lir	nit Sta	art			-		
Material Type	Not Supplied (	Not Supplied)		N	/lateri	al Lir	nit En	d			-		
Client Reference	-			C	Compa	active	e Effo	rt			Standard		
Material Description	Clayey Silt			•									
Maximum Dry Density	(t/m³):	1.49					CB	R PF	NETE	RATIO	ON PLOT		
Optimum Moisture Co	ntent (%):	18.5											
Field Moisture Conten	t (%):	11.0	400 -			-							
Sample Percent Overs	size (%)	0.0										/	-
Oversize Included / Ex	cluded	Excluded	350 -			-						/	
Target Density Ratio (	-	95	-										
Target Moisture Ratio		100	300 -			-					/		
Placement Dry Density	y (t/m³):	1.43					1						
Placement Dry Density		95.5	250 -				/						
Placement Moisture C	ontent (%):	17.4	(N) peol			1							
Placement Moisture R		95.0	peo1		1	/							
Test Condition / Soaki	ng Period:	Soaked / 4 Days	150 -		/								
CBR Surcharge (kg)		4.5	150 -		/	1							
Dry Density After Soal	k (t/m³):	1.38	100 -	/									
Total Curing Time (hrs	s)	n/a	100	/									
Liquid Limit Method		n/a	50 -	1		-					-		
Moisture (top 30mm) A	After Soak (%)	31.8		/		11							
Moisture (remainder)	After Soak (%)	29.4	01		rojorip		mann	Tuntun	progree	1.000			
CBR Swell (%):		3.0		0.5	1.5	N S	ω σ	4 5	UT UT	6.5	7.5		12.5
Minimum CBR Specifi		-		91			51	51					in
CBR Value @ 2.5mm	(%):	1.5							Pen	etrati	on (mm)		

Remarks

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Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

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#### **CALIFORNIA BEARING RATIO REPORT**

Client:	Cardno ACT					Repo	ort Nu	mber:		455/R/22234-1		
Client Address:	2/14-16 Worma	ald Street, Symonst	on			Proje	ect Nu	Imber	:	455/P/137		
Project:	QPRC - Sporting complex					Lot N	lumbe	ər:				
Location:	HUME					Inter	nal Te	est Re	quest	:: 455/T/13942		
Supplied To:	Cardno ACT					Client Reference/s: 50520049						
Area Description:					Repo	ort Da	te / Pa	age:	11/02/2020		Page 8 of 8	
Test Procedures	AS1289.6.1.1,	AS1289.5.1.1, AS1	289.2.1.1			1						
Sample Number	455/S/89621								Sam	ole Location		
Sampling Method	Tested As Rec	eived		Clien	t Sup	olied				TP408		
	17/01/2020									0.6-0.8m		
·	Client Sampled	b										
Date Tested	8/02/2020											
Material Source				Mate	rial Li	mit Sta	art			-		
Material Type	Not Supplied (Not Supplied)			Mate	rial Li	mit En	ıd			-		
Client Reference	-			Com	oactiv	e Effo	rt			Standard		
Material Description	Clayey Silt											
Maximum Dry Density (	(t/m³):	1.68				CB	R PF	NETR	RATI	ON PLOT		
Optimum Moisture Con	tent (%):	16.5	240 -									
Field Moisture Content	(%):	10.0	900							-		
Sample Percent Oversi	ze (%)	0.0	800								/	/
Oversize Included / Exc		Excluded									/	
Target Density Ratio (%		95	700 -	*	-							
Target Moisture Ratio (	-	100										
Placement Dry Density		1.61	600 -						/			
Placement Dry Density		96.0	- F00				-					
Placement Moisture Co	. ,	17.2	(N) 500			/						
Placement Moisture Ra		103.5	S 400 -		1							
Test Condition / Soakin	g Period:	Soaked / 4 Days			/							
CBR Surcharge (kg)		4.5	300 -	/							-	_
Dry Density After Soak		1.56		/								
Total Curing Time (hrs)		n/a	200	1								
Liquid Limit Method		n/a	100 -	/								
Moisture (top 30mm) At		25.0	100									
Moisture (remainder) A	fter Soak (%)	20.7	0 1	minum	hundred	quan		hudua	Internet	mint	1 1 1	_
CBR Swell (%):		2.5		0.5	25	ω σ	4 10	5 U	6.5	7.5		12.5
Minimum CBR Specific	. ,	-		10.021								S.
CBR Value @ 2.5mm (	(%):	3.0						Pen	etrati	on (mm)		

Remarks

ΝΔΤΔ

Sample S/13942 Shear failure recorded Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number:

1986
455

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Address: Unit 1, 140 Industrial Road

Oak Flats NSW 2529

 Laboratory
 Wollongong Laboratory

 Phone:
 02 4257 4458

 Fax:
 02 4257 4463

 Email:
 wollongong@constructionsciences.net

# **EMERSON CLASS NUMBER REPORT**

Area Description:				Report Date / Page:	18/02/2020	Page 1 of 2
Supplied To:	Supplied To: Construction Sciences Fyshwick			Client Reference/s:		
Location:	Fyshwick NSW			Internal Test Request:	10848/T/11295	
Project:	Inter BU te	sting		Lot Number:		
Client Address:	Unit 3/180 Gladstone Street, Fyshwick			Project Number:	10848/P/25	
Client:	Construction Sciences Fyshwick			Report Number:	10848/R/18372-1	

Test Procedures:	AS1289.3.8.1			
Sample Number	10848/S/50462	10848/S/50463	10848/S/50465	10848/S/50466
ID / Client ID	455/S/89619	455/S/89891	455/S/89894	455/S/89895
Lot Number	-	-	-	-
Date / Time Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Date Tested	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Material Source	-	-	-	-
Material Type	-	-	-	-
Sampling Method	Tested As Received	Tested As Received	Tested As Received	Tested As Received
Water Type	Distilled	distilled	distilled	distilled
Water Temperature (C°)	22	22	22	22
Client Sample ID	TP406	TP101	TP104	TP105A
	0.6-0.8m	0.2-0.3m	0.2-0.3m	0.3-0.4m
	455/S/89619	455/S/89891	455/S/89894	455/S/89895
	QPRC- Sporting Complex	QPRC- Sporting Complex	QPRC- Sporting Complex	QPRC- Sporting Complex
Soil Description	-	-	(CL) Sandy CLAY Brown low plast	-
Emerson Class Number	6	8	5	2

Remarks

Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number: 1986 10848

Approved Signatory: Tim Mathie Form ID: W34Rep Rev 2



Address: Unit 1, 140 Industrial Road

Oak Flats NSW 2529

Laboratory:Wollongong LaboratoryPhone:02 4257 4458Fax:02 4257 4463Email:wollongong@constructionsciences.net

# **EMERSON CLASS NUMBER REPORT**

Client:	Construction Sciences Fyshwick	Report Number:	10848/R/18372-1	
Client Address:	Unit 3/180 Gladstone Street, Fyshwick	Project Number:	10848/P/25	
Project:	Inter BU testing	Lot Number:		
Location:	Fyshwick NSW	Internal Test Request:	10848/T/11295	
Supplied To:	Construction Sciences Fyshwick	Client Reference/s:		
Area Description:		Report Date / Page:	18/02/2020	Page 2 of 2
Test Procedures:	AS1289.3.8.1			

Test Procedures:	AS1289.3.8.1	
Sample Number	10848/S/50467	10848/S/50468
ID / Client ID	455/S/89896	455/S/89897
Lot Number	-	-
Date / Time Sampled	17/01/2020	17/01/2020
Date Tested	17/02/2020	17/02/2020
Material Source	-	-
Material Type	-	-
Sampling Method	Tested As Received	Tested As Received
Water Type	distilled	distilled
Water Temperature (C°)	22	22
Client Sample ID	TP107	TP110
	0.2-0.3m	0.3-0.4m
	455/S/89896	455/S/89897
	QPRC- Sporting Complex	QPRC- Sporting Complex
Soil Description	(CH) Silty CLAY black high plastici	-
Emerson Class Number	5	4

Remarks

Results apply to the sample/s as received.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: Corporate Site Number:

1986 10848

Approved Signatory: Tim Mathie Form ID: W34Rep Rev 2



#### **CERTIFICATE OF ANALYSIS**

Work Order	CA2000580	Page	: 1 of 4	
Client		Laboratory	: ALS Water Resources Gro	ир
Contact	: Mr Matthew Thorogood	Contact	: Client Services	
Address	PO Box 40 Fyshwick Canberra ACT 2609	Address	: 16B Lithgow Street Fyshwid	ck ACT Australia 2609
Telephone	:	Telephone	: +61 2 6202 5404	
Project	: 50520049	Date Samples Received	: 22-Jan-2020 15:00	MILLO.
Order number	:	Date Analysis Commenced	: 04-Feb-2020	attention of the
C-O-C number	:	Issue Date	: 12-Feb-2020 16:23	
Sampler	:			Hac-MRA NATA
Site				
Quote number	:			Accreditation No. 992
No. of samples received	: 8			Accredited for compliance with
No. of samples analysed	: 8			ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

#### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Geetha Ramasundara	Chemistry Teamleader	Inorganics, Fyshwick, ACT

Page	: 2 of 4
Work Order	: CA2000580
Client	: CARDNO
Project	50520049



#### **General Comments**

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

• For samples collected by ALS WRG, sampling was carried out in accordance with Procedure EN67

Page	: 3 of 4
Work Order	: CA2000580
Client	: CARDNO
Project	: 50520049



#### Analytical Results

Sub-Matrix: SOLID		Clie	ent sample ID					
(Matrix: SOLID)				BH301 4.5-4.95m	BH0303 3.0-3.45m	BH0308 1.50-1.95m	BH0308 3.0-3.45m	BH0311 1.5-1.95m
	Cli	ent sampli	ng date / time	16-Jan-2020 00:00	16-Jan-2020 00:00	16-Jan-2020 00:00	16-Jan-2020 00:00	16-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	CA2000580-001	CA2000580-002	CA2000580-003	CA2000580-004	CA2000580-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
ø pH Value		0.1	pH Unit		7.5	8.2	8.4	8.1
EA010: Conductivity								
ø Electrical Conductivity @ 25°C		0.01	dS/m		0.05	0.08	0.09	0.03
EA002CA: pH in Soil								
ø pH Value		0.1	pH Unit	6.8				
EA010CA: Conductivity								
Ø Electrical Conductivity @ 25°C		0.01	dS/m	0.15				
EA080CA: Resistivity								
Resistivity at 25°C		1	ohm cm	6660	20000	12500	11100	33300
ED009CA: Anions								
Chloride	16887-00-6	1	mg/kg	38	29	28	40	23
Sulfate	14808-79-8	2	mg/kg	314	43	67	64	22

Page	: 4 of 4
Work Order	CA2000580
Client	: CARDNO
Project	50520049



#### Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)		Clie	ent sample ID	 BH312 4.5-4.95m	 BH321 1.5-1.95m	 BH321 4.5-4.95m	 
	Cli	ent sampli	ng date / time	16-Jan-2020 00:00	16-Jan-2020 00:00	16-Jan-2020 00:00	 
Compound	CAS Number	LOR	Unit	CA2000580-006	CA2000580-007	CA2000580-008	 
				Result	Result	Result	 
EA002 : pH (Soils)							
ø pH Value		0.1	pH Unit	7.6	8.8	8.3	 
EA010: Conductivity							
Ø Electrical Conductivity @ 25°C		0.01	dS/m	0.06	0.06	0.04	 
EA080CA: Resistivity	EA080CA: Resistivity						
Resistivity at 25°C		1	ohm cm	16700	16700	25000	 
ED009CA: Anions							
Chloride	16887-00-6	1	mg/kg	35	22	23	 
Sulfate	14808-79-8	2	mg/kg	32	76	21	 

Queanbeyan Palerang Regional Sports Complex

# APPENDIX

# SITE PHOTOGRAPHS





Plate 1: TP101



Plate 2: TP102



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 3: TP103



Plate 4: TP104



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 5: TP105



Plate 6: TP105A



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 7: TP106



Plate 8: TP107



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 9: TP108



Plate 10: TP109



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 11: TP110



Plate 12: TP201



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 13: TP202



Plate 14: TP203



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 15: TP401



Plate 16: TP402



Client:	Queanbeyan Palerang Regional Council	
Project:	Queanbeyan Palerang Regional Sports Complex	
Cardno Reference:	50520049	
Title:	Test Pit Photo Log	
Size:	A4	



Plate 17: TP403



Plate 18: TP404



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 19: TP406



Plate 20: TP407



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Test Pit Photo Log
Size:	A4



Plate 21: northern area of the site looking to the northwest



Plate 22: existing rock outcrops near the northwest boundary of the site



	Client:	Queanbeyan Palerang Regional Council
	Project:	Queanbeyan Palerang Regional Sports Complex
	Cardno Reference:	50520049
ſ	Title:	Site Photo
	Size:	A4



Plate 23: existing well near the northeast boundary of the site



Plate 24: drilling arrangements used at the site



Client:	Queanbeyan Palerang Regional Council
Project:	Queanbeyan Palerang Regional Sports Complex
Cardno Reference:	50520049
Title:	Site Photo
Size:	A4

Queanbeyan Palerang Regional Sports Complex

# APPENDIX



IMPORTANT INFORMATION





#### Important Information about this Geotechnical Report

#### Scope of Work

The purpose of this report and any associated documentation is expressly stated in the document. This document does not form a complete assessment of the site, and no implicit determinations about Cardno's scope can be taken if not specifically referenced. Whilst this report is intended to reduce geotechnical risk, no level of detail or scope of work can entirely eliminate risk.

The nature of geotechnical data typically precludes auxiliary environmental assessment without undertaking specific methods in the investigation. Therefore, unless it is explicitly stated in the scope of work, this report does not provide any contamination or environmental assessment of the site or adjacent sites, nor can it be inferred or implied from any component of the document.

The scope of work, geotechnical information, and assessments made by Cardno may be summarised in the report; however, all aspects of the document, including associated data and limitations should be reviewed in its entirety.

#### Standard of care

Cardno have undertaken investigations, performed consulting services, and prepared this report based on the Client's specific requirements, data that was available or was collected, and previous experience.

Cardno's findings and assessment represent its reasonable judgment, diligence, skill, with sound professional standards, within the time and budget constraints of its commission. No warranty, expressed or implied, is made as to the professional advice included in this report.

#### **Data sources**

In preparing this document, or providing any consulting services during the commission, Cardno may have relied on information from third parties including, but not limited to; sub-consultants, published data, and the Client including its employees or representatives. This data may not be verified and Cardno assumes no responsibility for the adequacy, incompleteness, inaccuracies, or reliability of this information.

Cardno does not assume any responsibility for assessments made partly, or entirely based on information provided by third parties.

#### Variability in conditions and limitations of data

Subsurface conditions are complex and can be highly variable; they cannot be accurately defined by discrete investigations. Geotechnical data is based on investigation locations which are explicitly representative of the specific sample or test points. Interpretation of conditions between such points cannot be assumed to represent actual subsurface information and there are unknowns or variations in ground conditions between test locations that cannot be inferred or predicted.

The precision and reliability of interpretive assessment between discrete points is dependent on the uniformity of the subsurface strata, as well as the frequency, detail, and method of sampling or testing.

Subsurface conditions are formed by various natural and anthropogenic processes and therefore are subject to change over time. This is particularly relevant with changes to the site ownership or usage, site boundary or layout, and design or planning modifications. Aspects of the site may also not be able to be determined due to physical or project related constraints and any information provided by Cardno cannot apply following modification to the site, regulations, standards, or the development itself.

It is important to appreciate that no level of detail in investigation, or diligence in assessment, can eliminate uncertainty related to subsurface conditions and thus, geotechnical risk. Cardno cannot and does not provide unqualified warranties nor does it assume any liability for site conditions not observed or accessible during the investigations.



#### Verification of opinions and recommendations

Geotechnical information, by nature, represents an opinion and is based extensively on judgment of both data and interpretive assessments or observation. This report and its associated documentation are provided explicitly based on Cardno's opinion of the site at the time of inspection, and cannot be extended beyond this.

Any recommendations or design are provided as preliminary until verified on site during project implementation or construction. Inspection and verification on site shall be conducted by a suitably qualified geotechnical consultant or engineer, and where subsurface conditions or interpretations differ from those provided in this document or otherwise anticipated, Cardno must be notified and be provided with an opportunity to review the recommendations.

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