Report on

GEOTECHNICAL STUDY
PROPOSED CARNABY'S COCKATOO SCULPTURE
APEX PARK, MOORA

Submitted to:
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APPENDICES

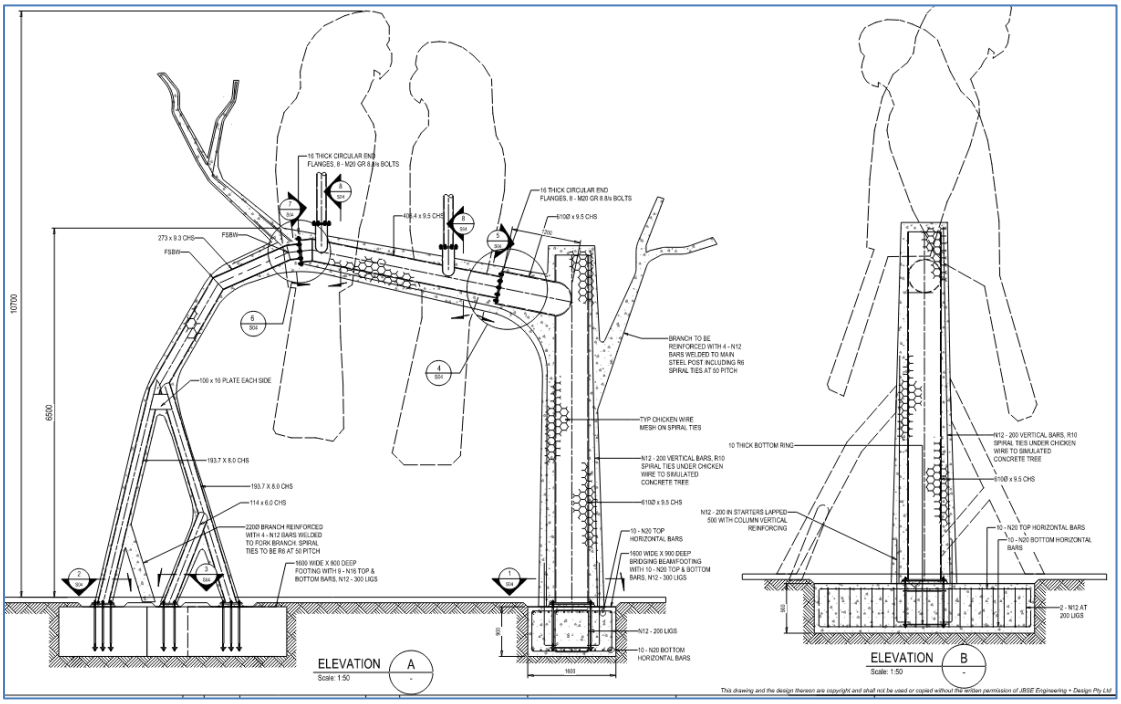
1. INTRODUCTION

This report presents the outcomes of Galt Geotechnics' (Galt's) geotechnical study for the proposed Carnaby's Cockatoo sculpture in Apex Park, Moora ("the site"). The location of the site relative to the surrounding area is shown on Figure 1, Site and Location Plan.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is rectangular and covers an area of about 1.2 ha. The site is near level at about RL 204 m AHD. The site is bounded by Moora Shire Caravan Park on the east, Dandaragan Street to the south, residential units to the west and bush to the north.

It is proposed to construct a sculpture of a pair of Carnaby's Cockatoos within a clearing in the park. The proposed sculpture is 10.7 m tall. Elevations of the proposed sculpture and footings are shown below. The supplied drawings are presented in Appendix A.



We have not been provided design bearing pressures.

3. PROJECT OBJECTIVES

The objectives of the study were to:

- assess subsurface soil and groundwater conditions at the site;
- provide recommendations on suitable footing systems for the proposed structure;
- provide allowable bearing pressure and settlement estimates for shallow foundations;
- provide a site classification(s) in accordance with AS 2870-2011 "Residential Slabs and Footings";
- provide recommendations and geotechnical design parameters for earth retaining structures;
- assess the appropriate site subsoil class for the site in accordance with AS 1170.4-2007;
- recommend appropriate site preparation procedures including compaction criteria.

4. FIELDWORK

The fieldwork was carried out on 31 August 2023 and comprised:

- Dynamic Probing Super Heavy (DPSH) tests at 3 locations, extending to refusal at depths ranging from at 3.7 m to 7.0 m; and
- drilling of a machine-auger borehole extending to a depth of 3 m;

General

Test locations were selected and positioned by a geotechnical engineer from Galt. The engineer conducted the inspection of the site, observed the DPSH tests, drilled the machine auger borehole and logged the materials encountered.

The approximate test locations are shown on Figure 1, Site and Location Plan. Photographs of the site taken during the fieldwork are presented in Appendix B: Site Photographs. Details of the tests are summarised below.

Table 1: Summary of Tests

Test Name	Test Depth (m)	Reason for Termination	Stratigraphy[2]
DPSH01	7.0	Refusal (Hammer Bounce)	FILL SAND (SP), over Clayey SAND (SC), over Silty SAND (SM)
DPSH02	3.7		
DPSH03	6.2		
BH01	3.0	Target depth	

Notes: 1. GNE – Groundwater not encountered
2. Soil stratigraphy below 2.0 m inferred from CPT data in accordance with Robertson et al (1986) method of CPT interpretation

Dynamic Probing Super Heavy Tests

Dynamic Probing Super Heavy (DPSH) tests were undertaken using a tracked DPSH rig supplied and operated by Galt.

The DPSH test involves driving a solid cone (20 cm^2) into the ground using a 63.5 kg hammer falling 760 mm. Testing was done in accordance with EN ISO 22476-2 – Geotechnical engineering – Field testing – Part 2: Dynamic probing – DPSH-B. The results are presented as cone resistance in MPa versus depth in Appendix C: Dynamic Probe Super Heavy Test Results

Auger Boreholes

Boreholes were drilled with a Scout EVH drill rig fitted with a 90 mm nominal diameter solid auger. Borehole reports are presented in Appendix D: Appendix D: Borehole Reports along with a list of notes and abbreviations and the method of soil description used in the reports.

5. LABORATORY TESTING

Laboratory testing was carried out by Liquid Labs WA in their NATA accredited laboratory. Testing comprised:

- Particle size distribution on 1 sample; and
- Atterberg limits on 1 sample.

The laboratory test results are presented in Appendix E: Laboratory Test Results and are summarised in Table 2.

Table 2: Summary of Laboratory Test Results

Test Location	Sample Depth (m)	% Gravel	% Sand	% Fines	LL (%)	PI (%)
BH01	0.8 – 1.5	0	57	43	26	13

Notes: **LL** – Liquid Limit **PI** – Plasticity Index N**O** – Not Obtainable **NP** – Non-Plastic

6. SITE CONDITIONS

6.1 Geology

The Moora sheet of the 1:250,000 scale Geology series map indicates that the area is underlain by alluvial deposits comprising clay, silt and sand.

The results of our investigation are in general accordance with the above.

6.2 Subsurface Conditions

The subsurface conditions across the site are relatively consistent and can be summarised as:

- **FILL SAND (SP)**: fine to medium grained, brown, pale brown, with trace low plasticity fines, loose to medium dense, from surface to a depth of about 0.8 m below ground level; overlying
- **Sandy CLAY (CL)**: fine to medium grained, brown, dark brown, low to medium plasticity fines, very stiff to hard, to a depth of about of 1.9 m.
- **Silty SAND (SM)** fine to medium grained, pale brown, with trace low plasticity fines, typically dense, becoming very dense from about 4 m to the maximum investigated depth of 7.0 m.

Notes: 1. Soil descriptions below 3.0m are based on interpretation of DPSH data.

6.3 Groundwater

According to a groundwater study completed in 2001 (Groundwater study of the Moora townsite (dpird.wa.gov.au)), perched groundwater is present between about 2 m to 4 m below surface.

Groundwater was not encountered during our investigation.

7. GEOTECHNICAL ASSESSMENT

7.1 Site Classification

We consider that the site is geotechnically capable of supporting the proposed development.

We have assessed the site classification in accordance with AS 2870-2011 "Residential Slabs and Footings". We consider that a site classification of "Class S" is appropriate provided that normal site preparation as presented in Section 7.3 is undertaken prior to construction.

Notes 1. AS 2870 is limited to single and double storey residential buildings with normal shallow footings with a maximum bearing pressure of 100 kPa.

7.2 Site Subsoil Class

We have assessed the site subsoil class in accordance with AS 1170.4-2007, "Earthquake Design Actions in Australia". We consider that a site subsoil class of "C_e" is appropriate for the site. This is based on the dense to very dense sand/stiff to very stiff clay, and the expected depth to rock being less than 60 m.

7.3 Site Preparation

The site preparation measures outlined below are to be completed prior to construction of the footings. Landscaped areas (if any) do not require this preparation.

- Clear and remove all vegetation including grubbing out of tree roots.
- Remove all debris and other deleterious material from site (as encountered).
- Underpin any settlement sensitive services, structures and infrastructure adjacent to footing excavations.
- Excavate to the required levels. Stockpile suitable excavated material for potential re-use as approved fill (refer Section 7.5).
- Compact the exposed surface to achieve the density specified in Section 7.4 to a minimum depth of 0.9 m.
- Any areas of loose sand or unsuitable material must be removed and replaced with approved fill as outlined in Section 7.5.
- Where fill is required to build up levels, use approved fill (see Section 7.5), placed and compacted in layers of no greater than 300 mm loose thickness in accordance with Section 7.4.
- Compact the bases of footing excavations to the density specified in Section 7.4 to a minimum depth of 0.9 m.

Note: Due to the presence of clay below footing level, the finished surface around the footings must be shaped to drain run-off away from the footings and avoid long-term saturation and softening of the underlying clayey strata.

7.4 Compaction

7.4.1 Sand

Approved granular fill and the *in situ* sands must be compacted using suitable compaction equipment to achieve a dry density ratio (DDR) of at least 95% MMDD (maximum modified dry density) as determined in accordance with AS 1289.5.2.1 at a moisture content within 2% of optimum moisture content (OMC).

Over-excavation and replacement of loose materials must be done where the minimum dry density ratio cannot be achieved.

Fill must be placed in horizontal layers of not greater than 300 mm loose thickness. Each layer must be compacted by suitable compaction equipment, and carefully controlled to ensure even compaction over the full area and depth of each layer.

Care will need to be taken when compacting in the vicinity of existing structures / infrastructure. This is particularly important if vibratory compaction is being carried out. Tynan (1973)[1] provides guidance on the selection of compaction equipment for use adjacent to structures.

7.4.2 Clayey Soils

The *in situ* clayey soils must be compacted using suitable compaction equipment to a minimum dry density ratio of 95% SMDD (standard maximum dry density) as determined in accordance with AS 1289.5.1.1.

The in-situ clayey soils will require careful moisture conditioning so that the moisture content of the material is between optimum moisture content (OMC) and 2% wet of OMC at the time of placement and compaction. We note that compaction to 95% SMDD can be difficult to achieve for the clayey in situ material when not appropriately moisture conditioned.

For clayey soils, compaction testing must be done using a nuclear density gauge (NDG) in accordance with AS 1289.5.8.1.

The clayey soils on the site will drain poorly when inundated during the wetter times of the year and result in saturated conditions that may inhibit compaction of the soil. To reduce the risk associated with this, we recommend that earthworks are not carried out within 1-2 weeks following heavy rainfall. If difficulties are encountered during compaction due to water, further advice should be sought from a geotechnical engineer.

7.4.3 Testing Frequency

After compaction, verify that the required density has been achieved by testing at the base of excavation and through the full depth of any fill and to a minimum depth of 0.9 m. The frequency of testing should be as follows:

- on each lift of fill at the rate of 1 test per 500 m^3 or at least 2 tests per layer (4 tests per layer below the building footprint), whichever is greater;
- At each spread footing location;
- at 5 m centres along gravity retaining wall footings and strip footings (where present); and
- at 10 m centres below on-ground slabs and pavements.
- Further to this, we recommend footings be inspected by a geotechnical engineer prior to blinding.

7.4.4 Compaction Vibrations

Care will need to be taken when compacting in the vicinity of existing services and structures. This is particularly important if vibratory compaction is being carried out. Tynan (1973)[2] provides assistance with the selection of compaction equipment for use adjacent to services.

7.5 Approved Fill

Imported granular fill must comply with the material requirements as stated in AS 3798-2007, "Guidelines on Earthworks for Commercial and Residential Developments".

[1] Tynan (1973) Ground Vibration and Damage Effects on Buildings, Australia Road Research Board, Special Report No. 11.
[2] Tynan (1973) Ground Vibration and Damage Effects on Buildings, Australia Road Research Board, Special Report No. 11.

We consider the upper sand Fill (excluding topsoil) present at the site is generally suitable for re-use as inert structural fill. Any other structural fill must meet the following requirements:

- must not contain any putrescible deleterious inclusions or rubbish.
- organic content must be less than 2% by weight.
- must not contain any particles greater than 100 mm in size.
- have a fines content (material passing the 0.075 mm sieve) of less than 5%.

Where doubt exists, a geotechnical engineer must be engaged to inspect and approve the use of potential fill materials.

7.6 Excavations and Slopes

Based on the soil profile encountered, we consider that excavation of the in situ material will be readily achieved to a depth of at least 2.0 m using conventional earthmoving equipment (i.e. with a 15 tonne or larger excavator with a toothed bucket).

The possible presence of obstructions such as buried services, cemented layers, old footings, slabs and tree roots must be taken into account when selecting excavation equipment.

Care must be exercised in excavations, and appropriate safety measures adopted where necessary, particularly in the vicinity of existing structures and infrastructure.

Temporary excavations may be battered to 1V:1.5H, provided that:

- The length of any excavation is no longer than 6 m.
- The maximum height of any such slope does not exceed 1 m.
- No surcharge is permitted within 2 m of the crest (stockpiles, machines, etc).
- The slope is carefully inspected by a competent person prior to man entry and working at the base.
- The excavation is not impacted by water.

A geotechnical engineer must be consulted where there is any doubt regarding the stability or safety of unsupported excavations.

7.7 Shallow Footings

We consider the proposed structure may be founded on shallow pad and strip footings placed within the sand encountered across the site, provided the site preparation recommendations outlined in Section 7.3 are completed.

We consider that a peak bearing pressure of 150 kPa may be adopted for the proposed footings dimensions shown on the drawings in Appendix A. The total settlement is expected to be less than 10 mm.

Differential settlements of about 50% of the total estimated settlement values are likely between footings.

The estimated settlements indicated above does not include interaction effects from footings founded close to other footings. Interaction effects will need to be considered if the spacing between the edges of adjacent footings is less than the width of the footings (i.e. the centre-to-centre spacing of footings are less than twice the width of the footings). This could act to double the nominated settlements, dependent on the footing configuration.

About 50% of the settlement is expected to occur during construction.

All foundation excavations must be assessed by a competent person prior to blinding.

7.8 Earth Retaining Structures

Temporary retaining structures may be designed in accordance with AS 4678-2002 "Earth Retaining Structures". We recommend that all retaining walls at the site be backfilled with free-draining fill, e.g. sand (free draining sand fill with less than 5% fines as per Section 7.5).

For the design of retaining structures, the parameters in Table 3 are considered appropriate for compacted sand fill for gravity retaining walls.

Table 3: Retaining Wall Geotechnical Design Parameters

Soil Type	Bulk Unit Weight (kN/m³)	Angle of Internal Friction (deg.)	Wall Friction = 0°		Wall Friction = 0.5Φ	
			Coefficient of Active Earth Pressure, K_a	Coefficient of Passive Earth Pressure, K_p	Coefficient of Active Earth Pressure, K_a	Coefficient of Passive Earth Pressure, K_p
Compacted *in situ* sand or sand fill	18	35	0.27	3.69	0.24	6.08

Notes:
1. Earth pressure coefficients are provided in this table for conditions of zero friction between the wall and the soil and with wall friction of 0.5Φ'.
2. A horizontal ground surface behind the wall has been assumed.
3. The retaining wall designer should make an independent assessment of the parameters appropriate to the construction method to be used, including alternative values of wall friction.

Compaction plant can augment the lateral earth pressure acting on retaining walls. Hand operated compaction equipment is recommended within 2 m of any retaining walls to minimise compaction pressures.

It is important to note that some ground movement will occur behind any soil retaining system (from imposed soil loading and other factors) resulting in settlement behind the wall. This must be considered in the design and during construction of the retaining walls so that adjacent properties are not adversely affected. Particular care should be exercised when forming excavations so as to not to affect neighbouring properties. The effect of both temporary and permanent works on neighbouring properties must be considered. Anchoring or strutting of retaining walls may be required.

Detailed design of retaining structures must be undertaken using methods appropriate to the proposed retention system.

8. CLOSURE

We draw your attention to Appendix F: of this report, “Understanding your Report”. The information provided within is intended to inform you as to what your realistic expectations of this report should be. This information is provided not to reduce the level of responsibility accepted by Galt, but to ensure that all parties who rely on this report are aware of the responsibilities each assumes in so doing.

GALT GEOTECHNICS

Timothy Dunton

Engineering Geologist

Rick Piovesan CPEng

Geotechnical Engineer

https://galtgeo.sharepoint.com/sites/WAG230435/Shared Documents/01 Pure Style SI Cockatoo Sculpture/03 Correspondence/WAG230435-01 002 R Rev0.docx

Figures

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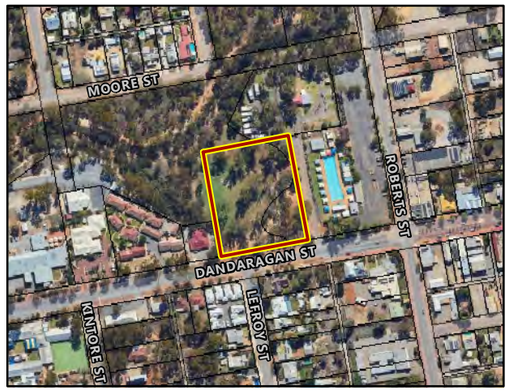

Legend

- Site Boundary
- Borehole
- Dynamic Probing Super Heavy Test

N

0 8.5 17 25.5 34 42.5
Meters

NOTES
Aerial Imagery and Cadastre sourced from Landgate/SLIP

SCALE	1:550	(A3)
DRAWN	DAC	
DATE DRAWN	4/09/2023	
CHECKED	MS	
DATE CHECKED	4/09/2023	
PROJECTION	GDA 1994 MGA Zone 50	

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CLIENT	**PURE STYLE**
PROJECT	PROPOSED COCKATOO SCULPTURE
LOCATION	APEX PARK MOORA
TITLE	SITE & LOCATION PLAN

Job No	Fig No	Rev
WAG230435-01	FIGURE 1	**A**

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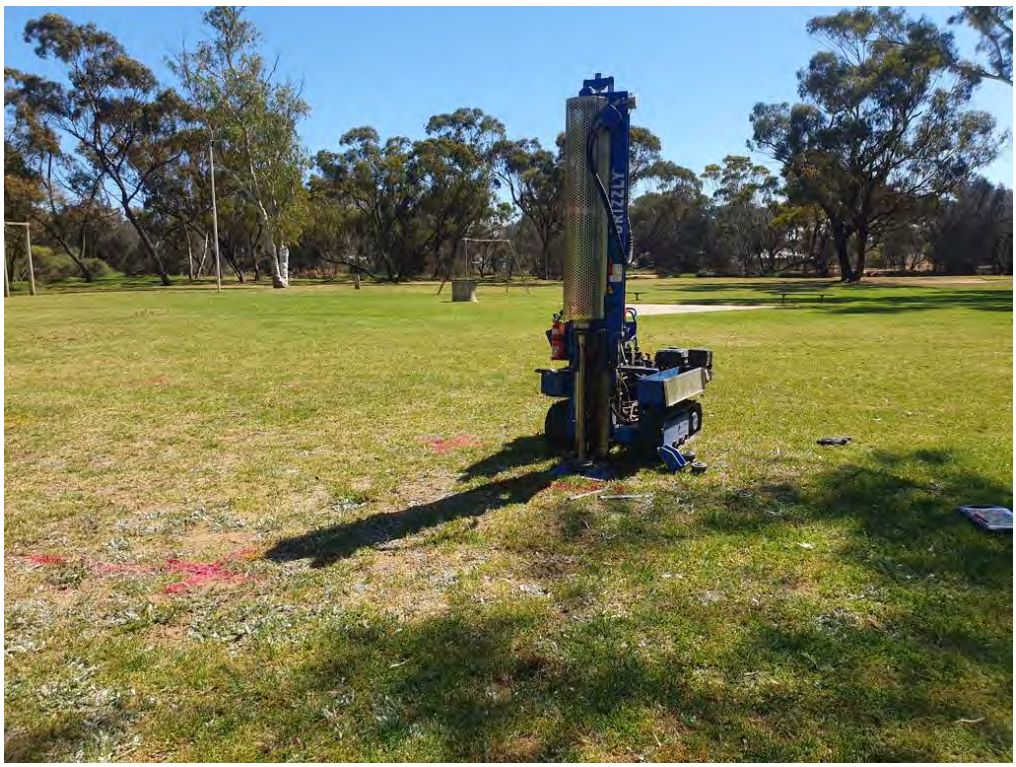
Appendix B: Site Photographs

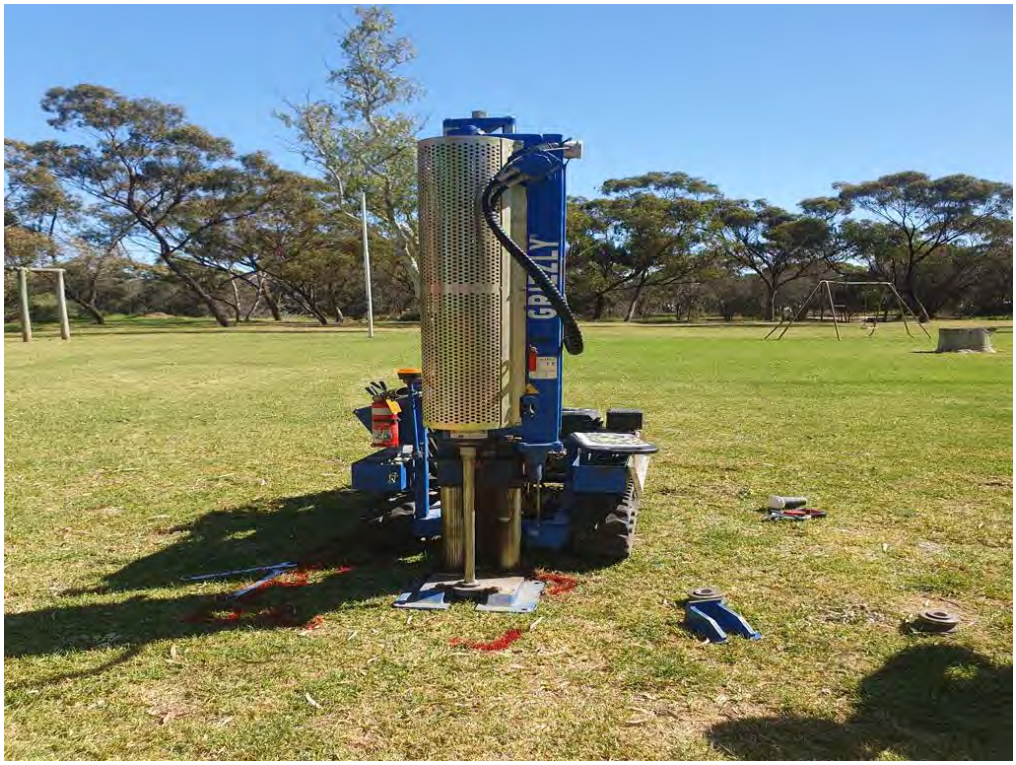
Photograph 1: Service location scanning carried out prior to works

Photograph 2: Facing northwest at BH01 location



Photograph 3: Facing north, DPSH01 in progress

Photograph 4: Facing southwest, DPSH01 in progress



Photograph 5: Facing north, DPSH02 in progress

Appendix C: Dynamic Probe Super Heavy Test Results

DPSH01 to DPSH03

LEGEND

DPSH01
DPSH02
DPSH03

Sounding :
Site : WAG230435-Moora
Date : 31/08/2023
Company : Galt Geotechnics
User :
Supervisor :
UTM area : 50J
UTM E,N :
Altitude :
Tracking :

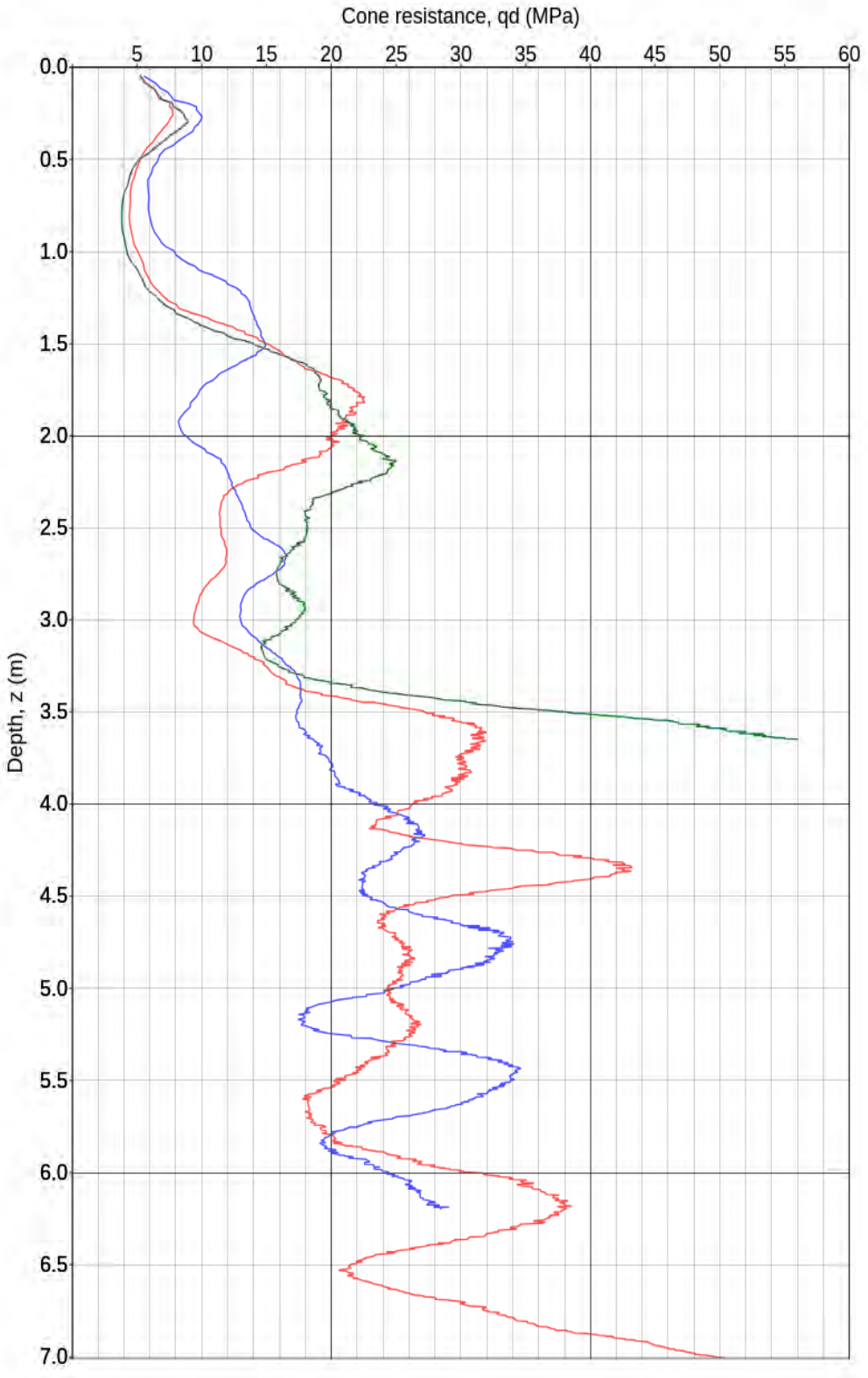
Test

Target depth : 8.0 m
Pre-drilling depth :
Stop condition : Temporary
Reached depth :
Water table :
Stable level :
Unstable level :

Characteristics

Device type : Grizzly
Hammering mode : 63.5 kg
Cone section : 20 cm²

GRIZZLY®



Processing

Smoothing step : 100 mm
Regularization step : 1 mm
Clipping : No

Observation

DPSH01

Sounding : DPSH01
Site : WAG230435-Moora
Date : 31/08/2023 10:31
Company : Galt Geotechnics
User :
Supervisor :
UTM area : 50J
UTM E,N : 404528 | 6609985
Altitude : 208.0 m
Tracking :

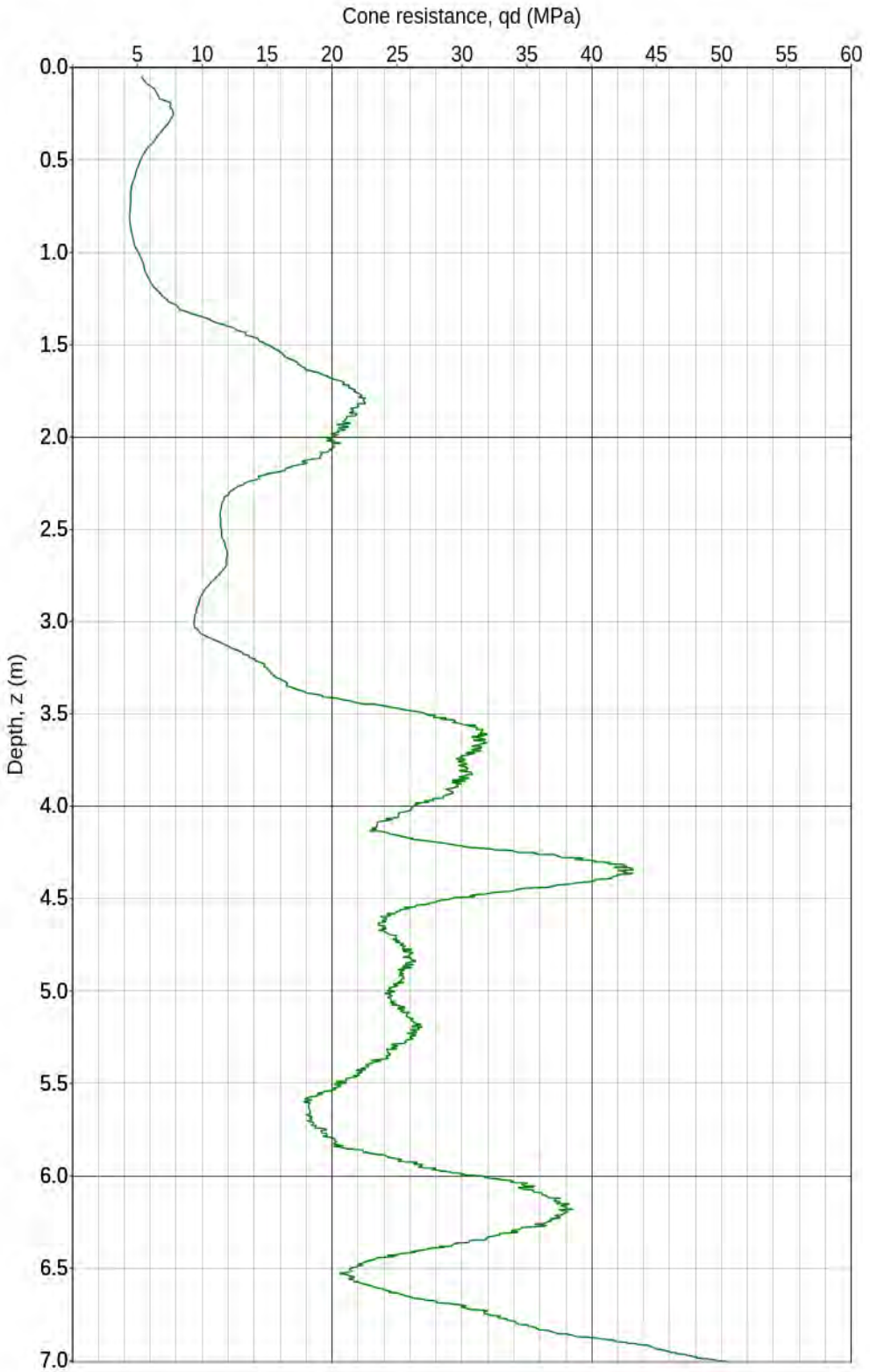
Test

Target depth : 8.0 m
Pre-drilling depth :
Stop condition : Temporary
Reached depth : 7.01 m
Water table : Not found
Stable level :
Unstable level :

Characteristics

Device type : Grizzly
Hammering mode : 63.5 kg
Cone section : 20 cm²

GRIZZLY®



Processing

Smoothing step : 100 mm
Regularization step : 1 mm
Clipping : No

Observation

Refusal @7m on HB > 50MPa Dry to 5.4m Hole Collapse

DPSH02

Sounding : DPSH02
Site : WAG230435-Moora
Date : 31/08/2023 10:01
Company : Galt Geotechnics
User :
Supervisor :
UTM area : 50J
UTM E,N : 404524 | 6609991
Altitude : 223.8 m
Tracking :

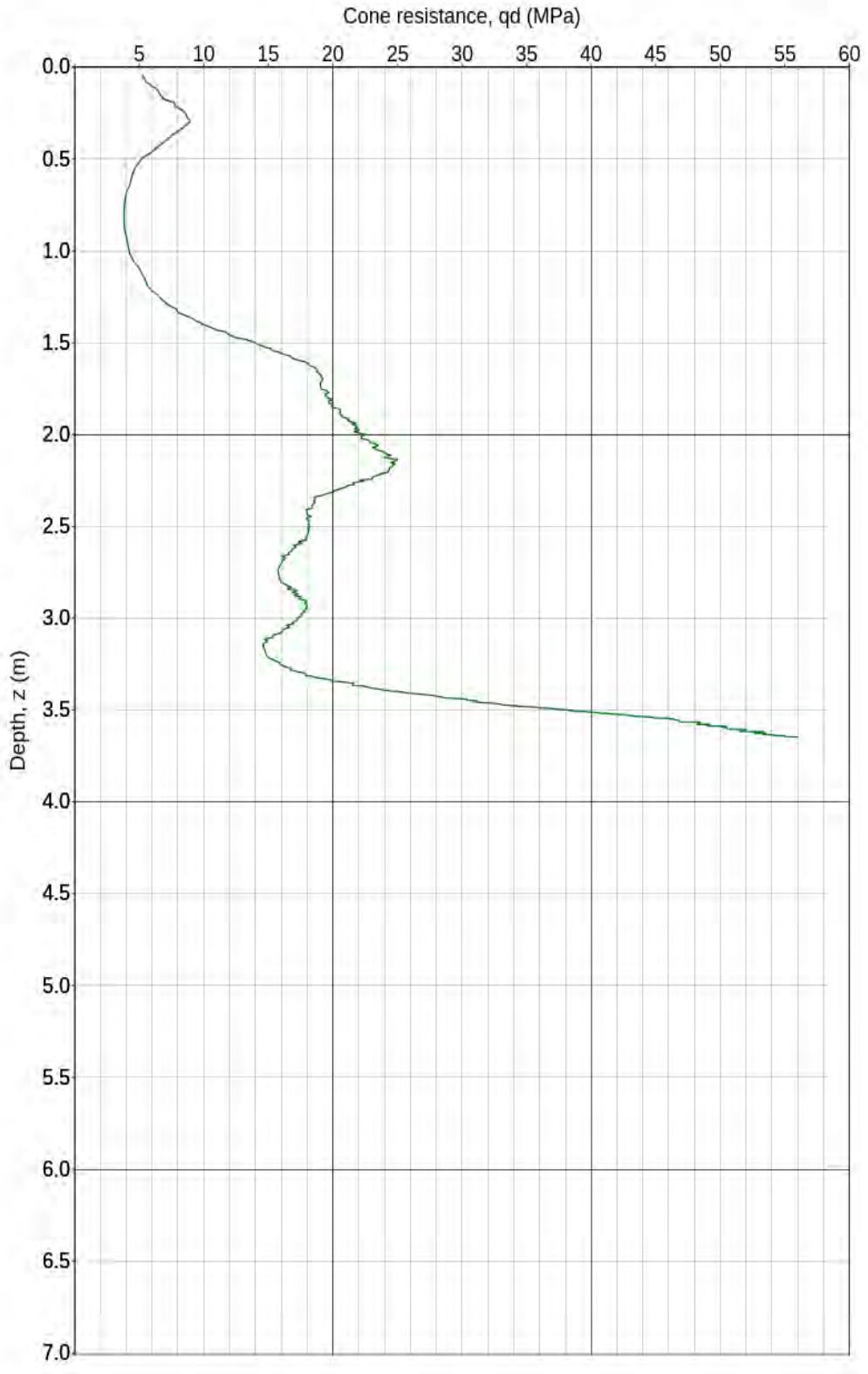
Test

Target depth : 8.0 m
Pre-drilling depth :
Stop condition : Temporary
Reached depth : 3.65 m
Water table : Not found
Stable level :
Unstable level :

Characteristics

Device type : Grizzly
Hammering mode : 63.5 kg
Cone section : 20 cm²

GRIZZLY®



Processing

Smoothing step : 100 mm
Regularization step : 1 mm
Clipping : No

Observation

Refusal @3.65m on HB > 50MPa Dry to 3.6m

DPSH03

Sounding : DPSH03
Site : WAG230435-Moora
Date : 31/08/2023 09:11
Company : Galt Geotechnics
User :
Supervisor :
UTM area : 50J
UTM E,N : 404522 | 6609981
Altitude : 211.9 m
Tracking :

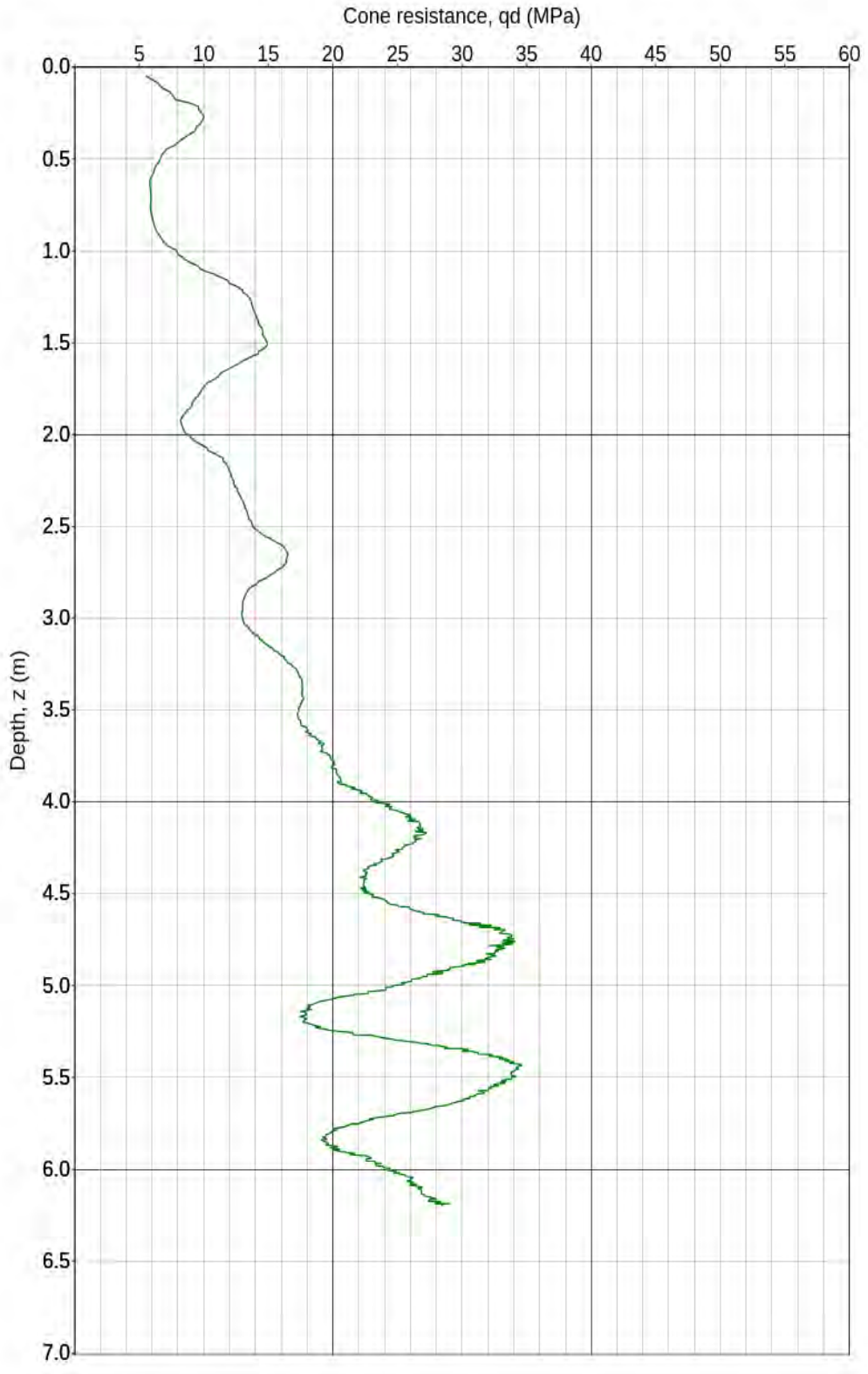
Test

Target depth : 6.2 m
Pre-drilling depth :
Stop condition : Temporary
Reached depth : 6.2 m
Water table : Not found
Stable level :
Unstable level :

Characteristics

Device type : Grizzly
Hammering mode : 63.5 kg
Cone section : 20 cm²

GRIZZLY®



Processing

Smoothing step : 100 mm
Regularization step : 1 mm
Clipping : No

Observation

Refusal @6.2m on HB Dry to 6.2m

Appendix D: Borehole Reports

METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

GRAPHIC LOG & SOIL CLASSIFICATION SYMBOLS

Graphic	USCS	Soil Name
		FILL (various types)
		COBBLES / BOULDERS
	GP	GRAVEL (poorly graded)
	GW	GRAVEL (well graded)
	GC	Clayey GRAVEL
	GM	Silty GRAVEL
	SP	SAND (poorly graded)
	SW	SAND (well graded)
	SC	Clayey SAND

Graphic	USCS	Soil Name
	SM	Silty SAND
	ML	SILT (low liquid limit)
	MH	SILT (high liquid limit)
	CL	CLAY (low plasticity)
	CI	CLAY (medium plasticity)
	CH	CLAY (high plasticity)
	OL	Organic SILT (low liquid limit)
	OH	Organic SILT (high liquid limit)
	Pt	PEAT

NOTE: Dual classification given for soils with a fines content between 5% and 12%.

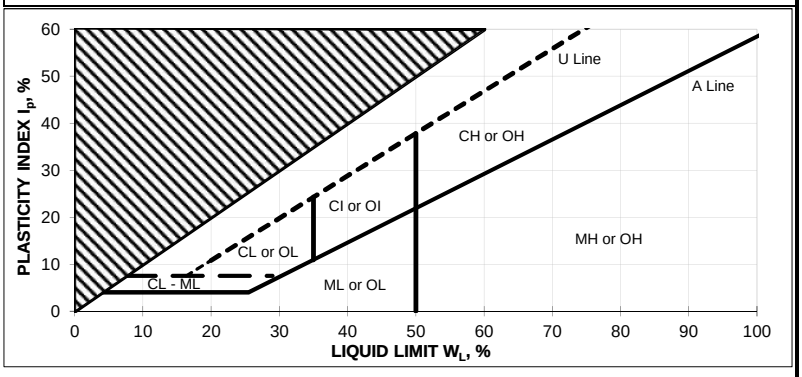
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil descriptions are based on AS1726-2017. Material properties are assessed in the field by visual/tactile methods in combination with field and laboratory testing techniques (where used).

NOTE: AS 1726-2017 defines a fine grained soil where the total dry mass of fine fractions (<0.075 mm particle size) exceeds 35%.

PARTICLE SIZE		
Soil Name		**Particle Size (mm)**
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	19 to 63
	Medium	6.7 to 19
	Fine	2.3 to 6.7
SAND	Coarse	0.6 to 2.36
	Medium	0.21 to 0.6
	Fine	0.075 to 0.21
FINES	SILT	0.002 to 0.075
	CLAY	<0.002

PLASTICITY - MODIFIED CASAGRANDE CHART - AS1726-2017



RESISTANCE TO EXCAVATION		
Symbol	**Term**	**Description**
VE	Very easy	All resistances are relative to the selected method of excavation
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

MOISTURE CONDITION	
Symbol	**Term**
D	Dry
M	Moist
W	Wet

CEMENTATION	
Cementation	**Description**
Weakly cemented	Soil may be easily disaggregated by hand in air or water
Moderately cemented	Effort is required to disaggregate the soil by hand in air or water

CONSISTENCY		
Symbol	**Term**	**Undrained Shear Strength (kPa)**
VS	Very Soft	0 to 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very Stiff	100 to 200
H	Hard	>200

ORGANIC SOILS	
Material	**Organic Content % of dry mass**
Inorganic soil	<2%
Organic soil	2% to 25%
Peat	>25%

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

EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

METHOD OF DRILLING OR EXCAVATION

AC	Air Core	E	Excavator	PQ3	PQ3 Core Barrel
AD/T	Auger Drilling with TC-Bit	EH	Excavator with Hammer	PT	Push Tube
AD/V	Auger Drilling with V-Bit	HA	Hand Auger	R	Ripper
AT	Air Track	HMLC	HMLC Core Barrel	RR	Rock Roller
B	Bulldozer Blade	HQ3	HQ3 Core Barrel	SON	Sonic Rig
BH	Backhoe Bucket	N	Natural Exposure	SPT	Driven SPT
CT	Cable Tool	NMLC	NMLC Core Barrel	WB	Washbore
DT	Diatube	PP	Push Probe	X	Existing Excavation

SUPPORT

T	Timbering

PENETRATION EFFORT (RELATIVE TO THE EQUIPMENT USED)

VE	Very Easy	E	Easy	F	Firm
H	Hard	VH	Very Hard		

WATER

►	Water Inflow	▼	Water Level
◄	Water Loss (complete)		
◁	Water Loss (partial)		

SAMPLING AND TESTING

B	Bulk Disturbed Sample	P	Piston Sample
BLK	Block Sample	PBT	Plate Bearing Test
C	Core Sample	U	Undisturbed Push-in Sample
CBR	CBR Mould Sample		U50: 50 mm diameter
D	Small Disturbed Sample	SPT	Standard Penetration Test
ES	Environmental Soil Sample		Example: 3, 4, 5 N=9
EW	Environmental Water Sample		3,4,5: Blows per 150 mm
G	Gas Sample		N=9: Blows per 300 mm after
HP	Hand Penetrometer		150 mm seating interval
LB	Large Bulk Disturbed Sample	VS	Vane Shear; P = Peak
M	Mazier Type Sample		R = Remoulded (kPa)
MC	Moisture Content Sample	W	Water Sample

ROCK CORE RECOVERY

TCR = Total Core Recovery (%) $= \frac{CRL}{TCL} \times 100$

RQD = Rock Quality Designation (%) $= \frac{ALC>100}{TCL} \times 100$

TCL	Length of Core Run
CRL	Length of Core Recovered
ALC>100	Total Length of Axial Lengths of Core Greater than 100 mm Long

REPORT OF BOREHOLE: BH01

Job No	: WAG230435-01	Easting	: 404526.9	Sheet	: 1 OF 1
Client	: Pure Style Engineering and Design	Northing	: 6609988.1	Logged	: MDS
Project	: Proposed Carnaby's Cockatoo Sculpture	UTM	: 50J	Logged Date	: 31/08/2023
Location	: Apex Park Moora	Drill Rig	: EVH Scout 1750	Checked	: TD
Contractor	: Galt Geotechnics	Inclination	: -90 deg	Checked Date	: 10/09/2023

Excavator Attachment	Excavation Resistance	PSP	DCP graph	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
90 mm Solid Auger V-Bit					0	Fill		SP	Fill SAND: brown and pale brown, loose to medium dense, fine to medium grained, trace low plasticity fines.	M-D	L-MD		
					0.8	Natural		CL	Natural Sandy CLAY: low plasticity, brown and dark brown, fine to medium grained sand, inorganic.	M	St-VSt		
					1								
					1.9	Natural		SM	Natural Silty SAND: pale brown, fine to medium grained, trace low plasticity fines.		D		
					2								
					3				**BH01 Terminated at 3 m (Target Depth)**				

Appendix E: Laboratory Test Results

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

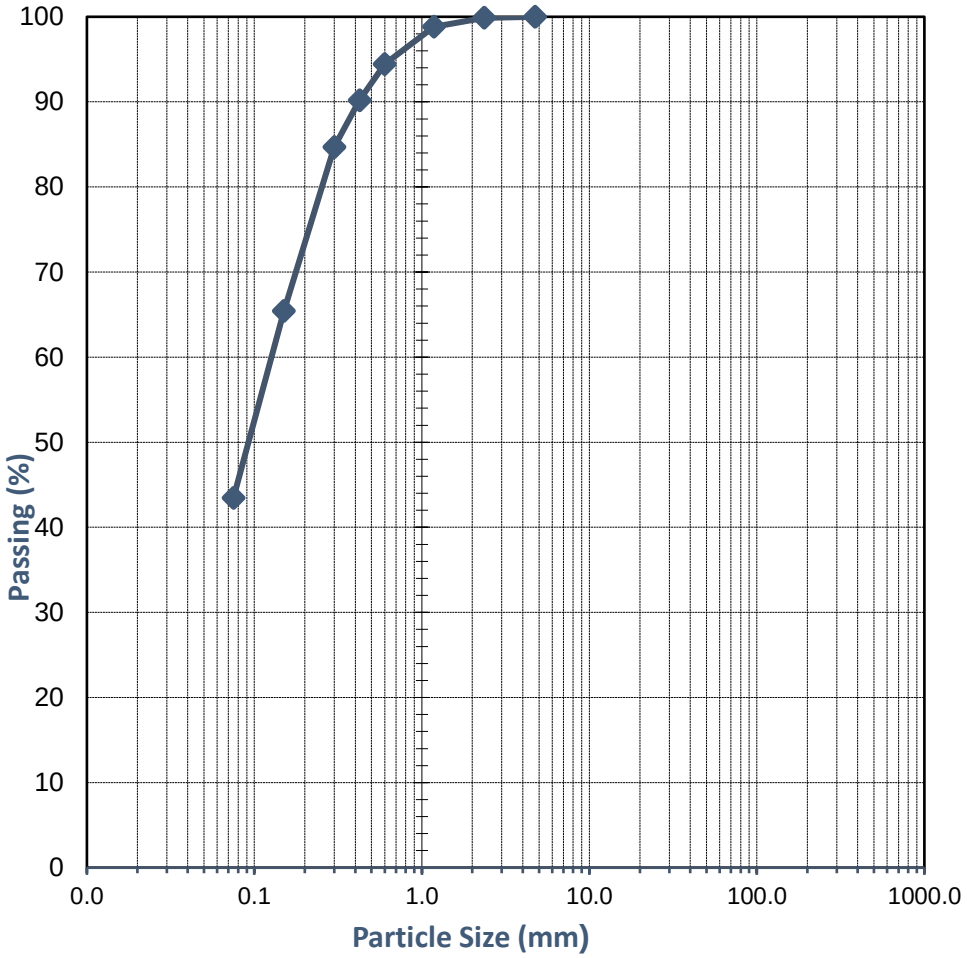
TEST REPORT - AS 1289.3.6.1

Client:	Purestyle Engineering & Design	*Ticket No.*	S10826
Client Address:	-	*Report No.*	WG23.13946_1_PSD
Project:	Proposed Carnaby Cockatoo Sculpture	*Sample No.*	WG23.13946
Location:	Apex Park, Moora	*Date Sampled:*	Not Specified
Sample Identification:	BH02 S02 0.8-1.5m	*Date Tested:*	06/09 - 07/09/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	99
0.600	94
0.425	90
0.300	85
0.150	65
0.075	43



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 07/September/2023

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Purestyle Engineering & Design	*Ticket No.*	S10826
Client Address:	-	*Report No.*	WG23.13946_1_PI
Project:	Proposed Carnaby Engineering & Design	*Sample No.*	WG23.13946
Location:	Apex Park, Moora	*Date Sampled:*	Not Specified
Sample Identification:	BH02 S02 0.8-1.5m	*Date Tested:*	7/09/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**13**
AS 1289.3.3.1	**Plasticity Index (%)**	**13**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Matthew Lichon

Date: 08/September/2023

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

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Appendix F: Understanding Your Report

UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev4

1. EXPECTATIONS OF THE REPORT

This document has been prepared to clarify what is and is not provided in your report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with the conditions on site.

Geotechnical engineering and environmental science are less exact than other engineering and scientific disciplines. We include this information to help you understand where our responsibilities begin and end. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of projects and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following:

- the project objectives as we understood them and as described in this report;
- the specific site mentioned in this report; and
- the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this report if any of the following conditions apply:

- the report was not written for you;
- the report was not written for the site specific to your development;
- the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the design process by being engaged for consultation with other members of the project team. Furthermore, we recommend that we be able to review work produced by other members of the project team that relies on information provided in our report.

3. DATA PROVIDED BY THIRD PARTIES

Where data is provided by third parties, it will be identified as such in our reports. We necessarily rely on the completeness and accuracy of data provided by third parties in order to draw conclusions presented in our reports. We are not responsible for omissions, incomplete or inaccurate data associated with third party data, including where we have been requested to provide advice in relation to field investigation data provided by third parties.

4. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques prepared by Galt. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

5. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party because of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

6. CHANGE IN SUBSURFACE CONDITIONS

The recommendations in this report are based on the ground conditions that existed at the time when the study was undertaken. Changes in ground conditions can occur in numerous ways including anthropogenic events (such as construction or contaminating activities on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where ground conditions have changed, additional sampling, testing or analysis may be required to fully assess the changed conditions.

7. SUBSURFACE CONDITIONS DURING CONSTRUCTION

Practical constraints mean that we cannot know every minute detail about the subsurface conditions at a particular site. We use professional judgement to form an opinion about the subsurface conditions at the site. Some variation to our evaluated conditions is likely and significant variation is possible. Accordingly, our report should not be considered as final as it is developed from professional judgement and opinion.

The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot observe construction.

8. ENVIRONMENTAL AND GEOTECHNICAL ISSUES

Unless specifically mentioned otherwise in our report, environmental considerations are not addressed in geotechnical reports. Similarly, geotechnical issues are not addressed in environmental reports. The investigation techniques used for geotechnical investigations can differ from those used for environmental investigations. It is the client's responsibility to satisfy themselves that geotechnical and environmental considerations have been taken into account for the site.

Geotechnical advice presented in a Galt Environmental report has been provided by Galt Geotechnics under a sub-contract agreement. Similarly, environmental advice presented in a Galt Geotechnics report has been provided by Galt Environmental under a sub-contract agreement.

Unless specifically noted otherwise, no parties shall draw any inferences about the applicability of the Western Australian state government landfill levy from the contents of this document.

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