BANNISTERS
Port Stephens

TETRA TECH COFFEY

Salamander Shores

Geotechnical Investigation - Stage 2

Salamander Properties Pty Ltd ATF

Reference: 754-NTLGE202648-1-AB

22 February 2022

SALAMANDER SHORES

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PREPARED FOR

Salamander Properties Pty Ltd ATF
147 Soldiers Point Road
Port Stephens
NSW 2317

PREPARED BY

Tetra Tech Coffey
16 Callistemon Close
Warabrook
NSW 2304 Australia
p: +61 2 4028 9700

ABN 55 139 460 521

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AEC	Area of Environmental Concern
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
BGL	Below Ground Level
CBR	California Bearing Ratio
CPT	Cone Penetration Test
DBYD	Dial Before You Dig
DCP	Dynamic Cone Penetrometer
GPR	Ground Penetrating Radar
GPS	Global Positioning System
HSSE	Health, Safety, Security & Environment
m AHD	Elevation in metres relative to Australian Height Datum
NATA	National Association of Testing Authorities
PSD	Particle Size Distribution
QA / QC	Quality Assurance/ Quality Control
RL	Reduced Level
SPT	Standard Penetration Test
SWMS	Safe Work Method Statement
Tetra Tech	Tetra Tech Coffey Pty Ltd

1. INTRODUCTION

This report presents the results of our geotechnical investigation carried out by Tetra Tech Coffey Pty Ltd (Tetra Tech) for geotechnical input for the proposed development at 147 Soldiers Point Road, Soldiers Point.

It is understood that the proposed development will be two structures, one being a six-storey structure with three basement levels to approximately RL 5m and one being a five-storey structure with one basement level to approximately RL 16 m. The proposed development is shown in the drawings provided by the client titled 'SALAMANDER SHORES, 147 Soldiers Point Road Soldiers Point", ref 20421, Rev D, dated 24/09/2021.

This report addresses the objectives and scope of work set out in our proposal (754-NTLGE202648-1-AA Stage 2) dated 25 October 2021.

Tetra Tech (formerly Coffey Geotechnics Pty Ltd) undertook a previous geotechnical investigation at the site in 2009. The previous report was titled 'PROPOSED SALAMANDER SHORES HOTEL REDEVELOPMENT', (ref GEOTWARA20848AA-AB, dated 24 March 2009). Tetra Tech also provided previous reports assessing environmental conditions:

- Phase 1 Environmental Site Assessment for Salamander Shores Hotel dated 2 March 2009
- Phase 2 Environmental Site Assessment for Salamander Shores Hotel dated 13 April 2010

1.1 OBJECTIVES

The objectives of the consultancy were to:

- Assess the subsurface conditions within the proposed footprint of the development, particularly to the north, west and north-west of the site.
- Confirm the depth of bedrock across the site through a targeted geotechnical investigation
- Provide up to four (4) geotechnical sections across the site to inform the design of underground basement geometry, using a combination of proposed new boreholes and borehole data from previous investigations.
- Provide recommendations for deep footing design, retaining wall design parameters, excavatability and earthworks.
- Provide commentary on previous environmental assessments undertaken at the site location.

1.2 SCOPE OF WORK

The scope of works undertaken to achieve the objectives described above comprised:

- Desktop review of previous geotechnical reports for the site and surrounding areas from our files and of published geological maps.
- Liaison with DBYD and arrangement of a service locator to clear the locations of underground utilities
- Engagement of a suitably qualified surveyor to survey all borehole locations in order to obtain spatial coordinates and elevation levels
- Detailed mapping by an experienced engineer / engineering geologist to map salient features of the site and the surrounding area, including mapping of rock outcrops in the site area
- Drilling of four (4) boreholes to a target depth of up to 15m.
- Point loads were conducted on rock core at a rate of approximately one test per 1m of core.
- Analysis and preparation of a report addressing the objectives outlined above.
- Laboratory testing consisting of:

- No. 9 Particle Size Distribution
- No. 1 Atterberg Limits tests
- No. 3 Unconfined Compressive Strength (UCS) Tests
- No. 18 Point Load Tests
- No. 5 Aggressivity Tests

All laboratory testing was conducted at NATA accredited testing laboratories

2. FIELDWORK

Fieldwork was carried out in one field event between 6 and 10 December 2021. Fieldwork comprised the drilling of four (4) boreholes to depths between 6.42m and 15.0m BGL. Drilling was undertaken with a geoprobe drilling rig. Drilling was undertaken using hollow flight augers, washboring techniques and NMLC rock coring. Standard penetration tests were undertaken at regular intervals to assess soil strength / consistency.

The fieldwork was carried out in fulltime presence of a geotechnical engineer who produced engineering logs of the boreholes. The engineering logs of the borehole are attached together with photos and explanation sheets defining the terms and symbols used in its preparation.

Borehole locations from this and previous investigations are indicated on the attached drawings. Boreholes logs from this investigation and the previous investigation and are included in Appendix A and C respectively.

Table 1: Investigation coordinates from this investigation

Test Location	Easting	Northing	RL (mAHD)
BH01-21	413008.2	6380403.5	7.6
BH02-21	412976.6	6380385.7	7.0
BH03-21	413048.6	6380381.7	12.6
BH04-21	412979.4	6380363.5	7.7

Notes on Table 1.
(1) Surveyors from Barker Ryan Stewart were engaged by Tetra Tech to survey locations and elevations of each test location
(2) Coordinates are recorded in MGA94

3. SITE CONDITIONS

3.1 REGIONAL GEOLOGY

Regional topography in the vicinity of the site is characterized by an elongated peninsular (Soldiers Point) extending into Port Stephens approximately 600m wide and 3km long with a transition of residual slightly undulating terrain situated to the west of the area and near shore low lying aeolian dunes and estuarine tidal flats toward the east.

Reference to the Newcastle Coalfield 1:250 000 Geological Series Sheet S1 56-2, the site appears to be entirely underlain by Quaternary aged alluvial deposits, with neighbouring Carboniferous ages Nerong Volcanics to the west.

Reference to Minview Seamless Geology Maps, the site appears to be predominately underlain by Nerong Volcanics, with a dominant lithology of pyroclastic rock described as rhyodacitic ignimbrite (NSW Geology code: Cumn). To the north, south and west of the site is partially consolidated, marine deposited and aeolian

reworked coastal sand dunes. This sand is quaternary aged at the base to present at the surface and belongs to the Cenozoic Sedimentary Province (NSW Geology code: QP_bd). To the east of the site, bounded by the Karuah River is the shoreline of estuarine deposited clastic sediment (QH_ecl).

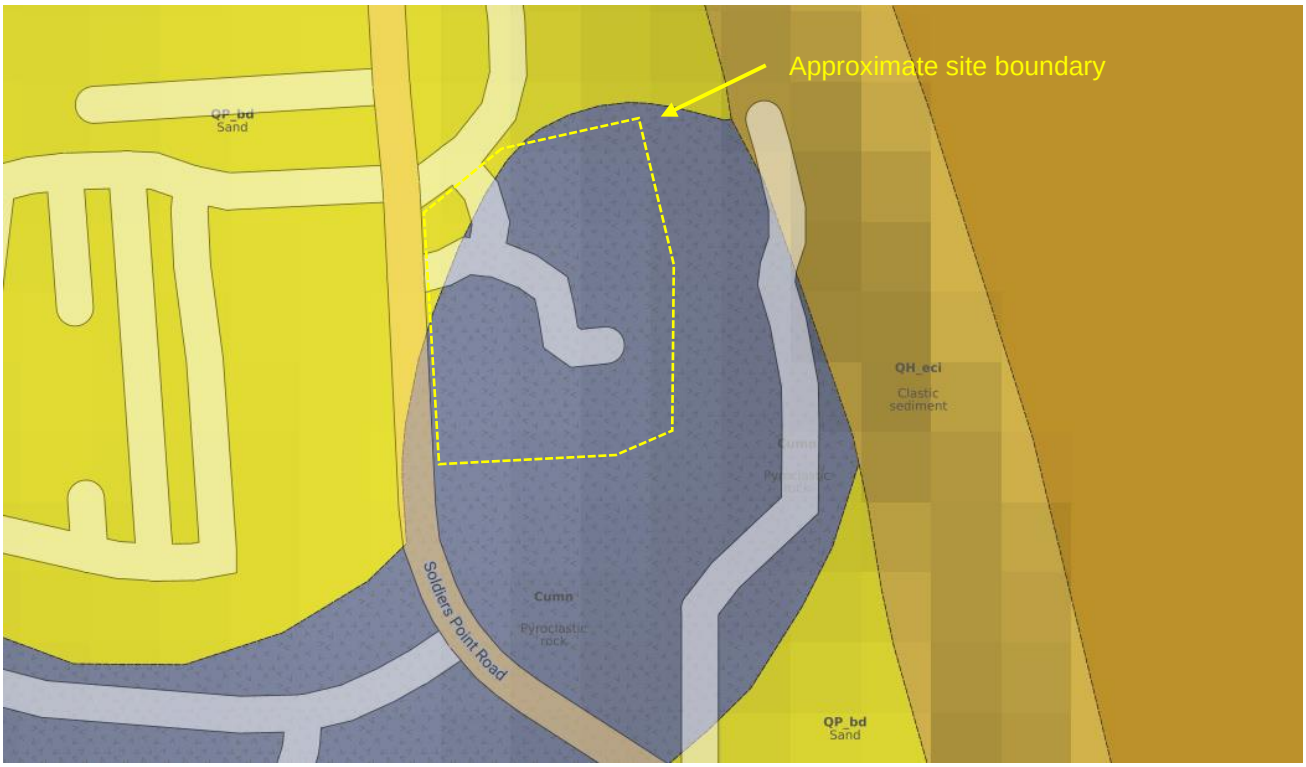

Figure 1: Published geology (Minview Seamless geology, 2022) and approximate site area boundaries (minview.geoscience.nsw.gov.au, n.d.)

3.2 SURFACE CONDITIONS

The site is located on the eastern side of Soldiers Point Road, Soldiers Point. Site dimensions are approximately 100m wide by 130m long and occupy an approximate area of 12,300m^2. The site is bounded by Port Stephens Sailing and Aquatic Club to the east, maintained reserve and parklands to the north and undeveloped bushland to the south. The foreshore of Port Stephens is situated approximately 50m to the east of the site boundary.

The site is positioned on the northern side pf a prominent low rounded residual knoll / hill with surface relief ranging from approximately RL20m to RL6m (AHD). The site predominately slopes toward the north west with slope angles in the order of 15° to 10° toward the upper slopes of the hill flatting to 5° toward Soldiers Point Road. The site slopes toward east / north east along the eastern boundary at 5° increasing to 10° to 15° toward the mid and lower slopes of the hill where it flattens at the foreshore of Port Stephens. A near vertical rock cutting is situated to the east of the site, approximately 8m high, with Port Stephens Sailing and Aquatic club clubhouse positioned within this area.

The site is currently occupied by a rendered brick construction multilevel hotel fronting Solider Point Road, with associated car parks and garden beds. No evidence of brickwork distress was noted from external observation.

Numerous small rock outcrops, comprising very high strength rhyodacite (volcanic rock), were observed along the eastern site boundary and in the adjacent council reserve. Slightly weathered rhyodacite was also observed in the rock cutting adjacent to the Sailing and Aquatic Club

Drainage at the site is assessed to occur predominantly by infiltration into the sand subsoil with some minor overland flow over paved surfaces directed to dedicated storm water drainage structures over the site. Vegetation across the site comprises maintained lawns and gardens, with some stands of trees up to 10m height.

3.3 SUBSURFACE CONDITIONS

The rhyodacite is a volcanic extrusive rock (lava) with a crystal structure predominately comprised phenocrysts (large crystals 1mm to 5mm) of quartz, alkali feldspar, plagioclase and biotite within a fine-grained pyroxene (iron) matrix. The rock is characterised by a very high to extremely high strength.

Defects throughout the rock mass comprise mainly of moderately dipping joints with clean or slightly iron stained joint faces. Some weathered clay seams occur throughout the rock mass representing weathering zones of secondary hydrothermal mineralisation and alteration. Defect spacing within the rock mass generally increases with depth, with the general defect spacing in Unit 2B in the order of 100m to 300m increasing in Unit 2C to 300mm to 1000mm. Local outcropping and previous experience with rhyodacite materials in the area suggest the defects within the rock mass form a predominately columnar jointing structure. Areas of localised intense random jointing may be apparent along previous cooling margins and hydrothermal intrusion within the rock mass.

The geotechnical units have been summarised in Table 2 and their distribution across the boreholes with depth summarised in Table 3. The distribution of geotechnical units from the previous investigation has been summarised in Table 4. Tables 2, 3 and 4 together comprise a simplified ground model for the site. Cross sections depicting interpreted subsurface conditions are included in the attached drawings.

Table 2: Summary of geotechnical units

Unit	Origin	Description
Unit 1A	Fill	ASPHALT Gravelly SAND: fine to medium grained, brown, angular to sub-angular, fine to medium grained gravels Silty SAND: fine to coarse grained, dark brown, with clay and fine to coarse grained gravels
Unit 1B	Aeolian Sand	SAND: fine to medium grained, brown / dark brown and yellow / light brown, medium dense
Unit 2A	Residual Soil / Extremely Weathered Material	Sandy CLAY / Clayey SAND: medium plasticity brown to yellow, fine to coarse sand. Moisture content generally less than plastic limits with a very stiff consistency.
Unit 2B	Highly to Moderately Weathered Rhyodacite	RHYODACITE: Coarse grained crystal structure, light pink and blue grey, highly to moderately weathered, very high to extremely high strength
Unit 2C	Slightly weathered to Fresh Rhyodacite	RHYODACITE: Coarse grained crystal structure, light pink and blue grey, slightly weathered to fresh, extremely high strength.

Table 3: Distribution of geotechnical units – current investigation (2021)

Location	Approximate depth range of unit (mBGL)				
	1A	1B	2A	2B	2C
BH01-21	0.0 - 0.6	0.6 - 6.9	NE	6.9 – 7.13	7.13 - >10.11
BH02-21	0.0 – 0.5	0.5 – 9.6	9.6 – 10.03	10.03 – 11.18	11.18 - >13.53
BH03-21	0.0 – 1.9	NE	1.9 – 2.32	2.32 – 3.3	3.3 - >6.42
BH04-21	0.0 – 1.0	1.0 – 7.77	7.77 – 8.0	8.0 – 9.7	9.7 – 15.0

Table 4: Distribution of geotechnical units - previous investigation (2009)

Location	Approximate depth range of unit (mBGL)				
	1A	1B	2A	2B	2C
HA1	0.0 – 0.3	NE	0.3 – 0.31	>0.31	-
HA2	0.0 – 0.2	NE	0.2 – 0.45	>0.45	-
HA3	0.0 – 0.2	NE	0.2 – 1.0	>1.00	-
HA4	0.0 – 0.5	NE	0.05 – 0.85	>0.85	-
HA5	NE	0.0 – 0.15	0.15 – 0.25	>0.25	-
HA6	0.0 – 0.1	0.1 – 0.2	0.2 – 0.4	>0.4	-
HA7	0.0 – 0.1	0.1 – >2.0	-	-	-
BH1	NE	NE	0.3 – 1.3	1.3 – 1.6	1.6 - >5.61
BH2	NE	0.2 – 0.6	0.6 – 1.3	1.3 – 1.8	1.8 - >7.00

Notes on Table 3 and Table 4:
'NE' denotes 'Not Encountered'
'-' denotes beyond the limits of the test location

3.4 GROUNDWATER

Groundwater was encountered at approximately 2.5mBGL in the boreholes that were drilled at similar elevations surrounding the lower, north-western areas of the site. Groundwater was not encountered in BH03-21 as it was located at the top of a fill mound overlying shallow rhyodacite. A summary of groundwater depths encountered is provided in Table 5.

Table 5: Summary of groundwater

Test Location	Date	Groundwater BGL (m)
BH01-21	06/12/2021	2.5
BH02-21	07/12/2021	2.5
BH03-21	08/12/2021	Not encountered
BH04-21	09/12/2021	2.4

4. LABORATORY TESTING

The laboratory testing results have been summarised in Table 6 to Table 9.

The laboratory testing summarised below consists of:

- No. 9 Particle Size Distribution
- No. 1 Atterberg Limits tests
- No. 3 UCS Tests
- No. 18 Point Load Tests
- No. 5 Aggressivity Tests

The testing reports can be found in Appendix B

Table 6: Summary of Particle Size Distribution Results

Hole ID	Depth (m)	Sieve size (mm)	Percent passing (%)
BH01	1.0 – 1.45	1.18	99
		0.6	98
		0.425	87
		0.3	45
		0.15	6
BH01	4.0 – 4.45	1.18	100
		0.6	99
		0.425	86
		0.3	45
		0.15	6
BH02	2.5 – 2.95	1.18	100
		0.6	100
		0.425	91
		0.3	40
		0.15	2
BH02	5.5 – 5.95	1.18	100
		0.6	99
		0.425	91
		0.3	58
		0.15	6
BH02	8.5 – 8.95	1.18	100
		0.6	99
		0.425	91
		0.3	53
		0.15	7
BH04	1.0 – 1.45	1.18	99

		0.6	98
		0.425	89
		0.3	50
		0.15	12
BH04	2.5 – 2.95	1.18	98
		0.6	98
		0.425	88
		0.3	44
		0.15	2
BH04	5.5 – 5.95	1.18	100
		0.6	99
		0.425	89
		0.3	55
		0.15	8
BH04	6.65 – 7.10	26.5	93
		6.7	59
		2.36	51
		0.6	42
		0.15	13

Table 7: Atterberg limits test

Sample ID	Depth (m)	Plasticity Index (%)	Plastic Limit (%)	Liquid Limit (%)	Linear shrinkage (%)
BH04-21	7.77 – 7.92	12	20	32	6.5

Table 8: Unconfined Compressive Strength (UCS) results

Sample ID	Depth (m)	Unixial compressive strength (MPa)	Failure mechanism
BH01-21	8.72 – 9.00m	76.9	Defect / shear
BH02-21	11.37 – 11.63m	203	Axial
BH04-21	11.26 – 11.52m	189	Axial / defect

Table 9: Point Load Test results

Investigation Location ID	Sample	Rock Type	Depth (m)	Diametral			Axial			
				P kN	Is (50) MPa	Failure Mode	P kN	Is (Mpa)	Is (50) MPa	Failure Mode
BH01	1	Rhyodacite	7.94	30.03	11.3	Bad break	-	-	-	-
	2	Rhyodacite	8.67	24.27	9.14	Through substance	-	-	-	-
	3	Rhyodacite	9.73	22.25	8.38	Through substance	-	-	-	-
BH02	1	Rhyodacite	10.60	0.13	0.05	Through substance	0.14	0.05	0.05	Through substance
	2	Rhyodacite	11.68	29.74	11.19	Through substance	32.2	11.05	11.44	Through substance
	3	Rhyodacite	12.82	29.83	11.23	Through substance	-	-	-	-
	4	Rhyodacite	13.06	28.05	10.56	Through substance	-	-	-	-
BH03	1	Rhyodacite	2.84	1.91	0.72	Bad break	-	-	-	-
	2	Rhyodacite	3.69	7.18	2.7	Along defect	-	-	-	-
	3	Rhyodacite	4.94	24.19	9.11	Through substance	-	-	-	-
	4	Rhyodacite	5.49	6.21	2.34	Along defect	-	-	-	-
	5	Rhyodacite	6.30	19.64	7.39	Through substance	-	-	-	-
BH04	1	Rhyodacite	9.48	8.06	3.03	Bad break	-	-	-	-
	2	Rhyodacite	10.35	8.02	3.02	Bad break	-	-	-	-
	3	Rhyodacite	11.57	28.36	10.67	Through substance	-	-	-	-
	4	Rhyodacite	12.26	18.42	6.93	Through substance	5	1.76	1.81	Bad break
	5	Rhyodacite	13.47	15.96	6.01	Through substance	-	-	-	-
	6	Rhyodacite	14.25	0.49	0.18	Along defect	0.47	0.23	0.22	Bad break

5. DISCUSSION

5.1 FOOTING DESIGN

5.1.1 Footing Options

At this stage, it is unknown what the design loads will be, however it is known that the foundation level of structures is to be situated within Unit 2B and 2C rhyodacite.

High level strip or pad footings are considered appropriate where shallow rock is present. High level footings may also be appropriate for smaller structures (if any) founded entirely in dense SAND (Unit 1B) or Residual Soil (Unit 2A).

Excavations for footings founded into rock are expected to be very difficult as outlined in Section 5.3. Provision may be required in design for incorporating predrilled grouted dowels inserted into the rock and structurally incorporated (tied) into reinforcement to provide lateral shear resistance.

The larger buildings will transition the contact between shallow rock and rock underlying substantial deposits of Aeolian Sand (Unit 1B). To reduce the potential for differential settlement all footings must bear on rock. Footings may be deepened where sand is not thick, however this is unlikely to be achievable where surficial soils are deeper than approximately 1.5m. Piles will be required for the portions of buildings positioned where deep surficial deposits are present, namely the northwest portion of the site (see figure 1 in the attached drawings).

Due to the very high to extremely high rock strength and loose nature of the overlying sands, bored pier footings are not considered a viable option at the site due to possible excavation collapse and difficulty drilling a suitable socket depth.

For footings to carry design loads it is assumed that the footing excavations are cleaned of debris. Footing excavations should be inspected by a suitably experienced geotechnical engineer to confirm that conditions encountered during construction are consistent with the design assumptions.

All the footings for a single structure should bear on similar substrate unless the structure is designed with articulation to accommodate variable ground response under loading.

5.1.2 Strip and Pad Footings

Shallow footings comprising strip and pad footings may be proportioned for an allowable bearing pressure of;

- 100kPa in dense or better Sand (Unit 1B)
- 200kPa in Unit 2A residual soil and extremely weathered rhyodacite
- 5MPa in Unit 2B and 2C high to extremely high strength rhyodacite rock.

5.1.3 Piled Footings

Geotechnical design parameters for natural soil and rock units are provided in Table 10.

Table 10: Geotechnical Design Parameters

Unit	Material Description	Bulk Density γ (kN/m^3)	Inferred SPT (N_{60})	Effective Friction Angle, φ' (°)	Vertical Young's Modulus, E'_v (MPa)	Horizontal Young's Modulus, E'_H (MPa)	Poisson's Ratio
1B	Aeolian Sand *(ground surface to 3.0mRL)*	18	8	29	8	6	0.3
1B	Aeolian Sand *(from 3.0mRL to Unit 2A or deeper)*	19	30	33	50	35	0.3
2A	Residual Soil / XWM	20	10	30	10	7	0.3
2B	Rhyodacite (HW to MW)	25	-	33	14000	10000	0.25
2C	Rhyodacite (SW to FR)	25	-	33	50000	37000	0.25

Geotechnical design parameters for piled footings are provided in Table 11.

Table 11: Summary of Pile Design Parameters

Unit	Material Description	Ultimate End Bearing (MPa) (b)(f)	Serviceability End Bearing (MPa)	Ultimate End Bearing (MPa) (b)(f)	Serviceability End Bearing (MPa)	Ultimate Shaft Adhesion (kPa) (c)(d)(e)		Ultimate Lateral Yield Pressure (MPa) (g)(h)
		Displacement Piles		Non-displacement Piles		Displacement	Non-displacement	
1B	Aeolian Sand *(ground surface to 3.0mRL)*	2.5	0.9	1.3	0.4	30	15	0.1*Depth
1B	Aeolian Sand *(from 3.0mRL to Unit 2A or deeper)*	10	3.3	5.0	1.7	85	45	0.6
2A	RS / XWM	(k)	(k)	(k)	(k)	35	35	(k)
2B	HW – MW Rhyodacite	30(l)	10(l)	30	10	-	40	8
2C	SW - FR Rhyodacite	-	-	60	20	-	75	30

Notes on Table 10 and Table 11.

(a) The geotechnical parameters are applicable for a single pile of diameter of 0.6 m to 1.5 m.
(b) The end bearing pressures have been assessed for piles at the top of the relevant unit.
(c) Adopt shaft adhesion values only where the embedded length into the relevant bearing stratum is at least 2 pile diameters.
(d) To obtain shaft adhesion values for bored piles, the surface of the pile shaft should be cleared of clay smear and roughened using a suitable tool fitted to the piling rig. Augers and drilling buckets do not clean and roughen sockets adequately unless they are fitted with tools that protrude laterally from the sides of the auger or bucket.
(e) For limit state design, we recommend a geotechnical strength reduction factor (Φg) of 0.56 unless pile loads tests are carried out to justify a higher value.
(f) Assuming minimum 2.0 m embedment.
(g) The ultimate lateral yield pressure at the middle of the layer depth assumes an embedment of at least 2 times the pile diameter.
(h) Serviceability lateral yield pressure can be derived from the ultimate lateral yield pressure depending on the method adopted by the designer ie AS4678 or AS5100.
(i) Shaft adhesion is not applicable for steel screw piles.
(j) Shaft adhesion is not applicable in top 2.0m BGL
(k) End bearing and Lateral pressures not provided as layer 2A not thick enough to founded in
(l) The end bearing should be verified by pile driving formula

5.2 RETAINING WALLS

Geotechnical design parameters for retaining walls and temporary shoring are provided in Table 12.

Table 12: Summary of Retaining Wall Design Parameters

Unit	Active earth pressure coefficient (K_a)	Passive earth pressure coefficient (K_p)	At rest earth pressure coefficient (K_0)
Unit 1B (sand)	0.33	3.00	0.5
Unit 2A (residual/ XWM)	0.33	3.00	0.5

If retaining systems are to be eventually propped by the new building structure, the at-rest earth pressure coefficients indicated above should be used in design.

The above parameters make no allowance for lateral pressures induced by surcharge loading from existing or proposed structures near the crest of the excavation, or for hydrostatic pressure due to groundwater build-up. Based on the results of subsurface investigations, it is recommended that non free draining retaining structures (ie: secant or sheet pile walls) be designed for a full hydrostatic head.

It should be noted that some lateral deformation may still occur with the use of retaining walls. The amount of movement is dependent on the rigidity of the retaining walls, and on the excavation and anchoring procedure. Observed lateral movements of documented walls are typically of the order of 0.5% of wall height.

5.3 EARTHWORKS

5.3.1 General Geotechnical Constraints for Development

Excavation conditions within the weathered rock substrata are expected to be very difficult. Excavations in soil materials should be supported by properly designed and constructed retaining walls, rock bolting, shotcrete or else battered at 1V: 2H or flatter and protected against erosion. Excavations in rock should be subject to specific geotechnical assessment in relation to long term stable batter gradients and this will depend on treatment solutions such as rock bolting, shotcrete, meshing etc being adopted.

Permanent / temporary excavations greater than 1.5m deep will require further detailed geotechnical assessment once the location and extent of such excavations are known. This assessment may involve:

- Assessment of slope / retaining wall design parameters
- Assessment of need to provide temporary retention or special precautions during construction
- Viewing of the excavation by a geotechnical engineer during bulk excavation
- Assessment of staged construction requirements

Excavations should be designed for surcharge loading from slopes, retaining walls, structures and other improvements in the vicinity of the excavation.

Drainage measures should be implemented above and behind all temporary and permanent excavations to avoid concentrated water flows on the face of the cut or infiltration into the soil / rock profile behind the cut. Surface water flows from upslope areas should be diverted away from the cut face.

5.3.2 Excavatability

It is assessed that excavation conditions at the site pose the most significant geotechnical constraint to the project. Laboratory testing and field observations of the Unit 2 rhyodacite indicate an extremely high strength rock with defect spacing in the order of 300mm to 1000mm.

With reference to Table 9, a typical Is_{50} value for Unit 2C, when broken through substance is in the order of approximately 9MPa to 11MPa. With reference to Figure 2 below, blasting is likely to be required if unsuccessful with extremely hard ripping or hydraulic breaking.

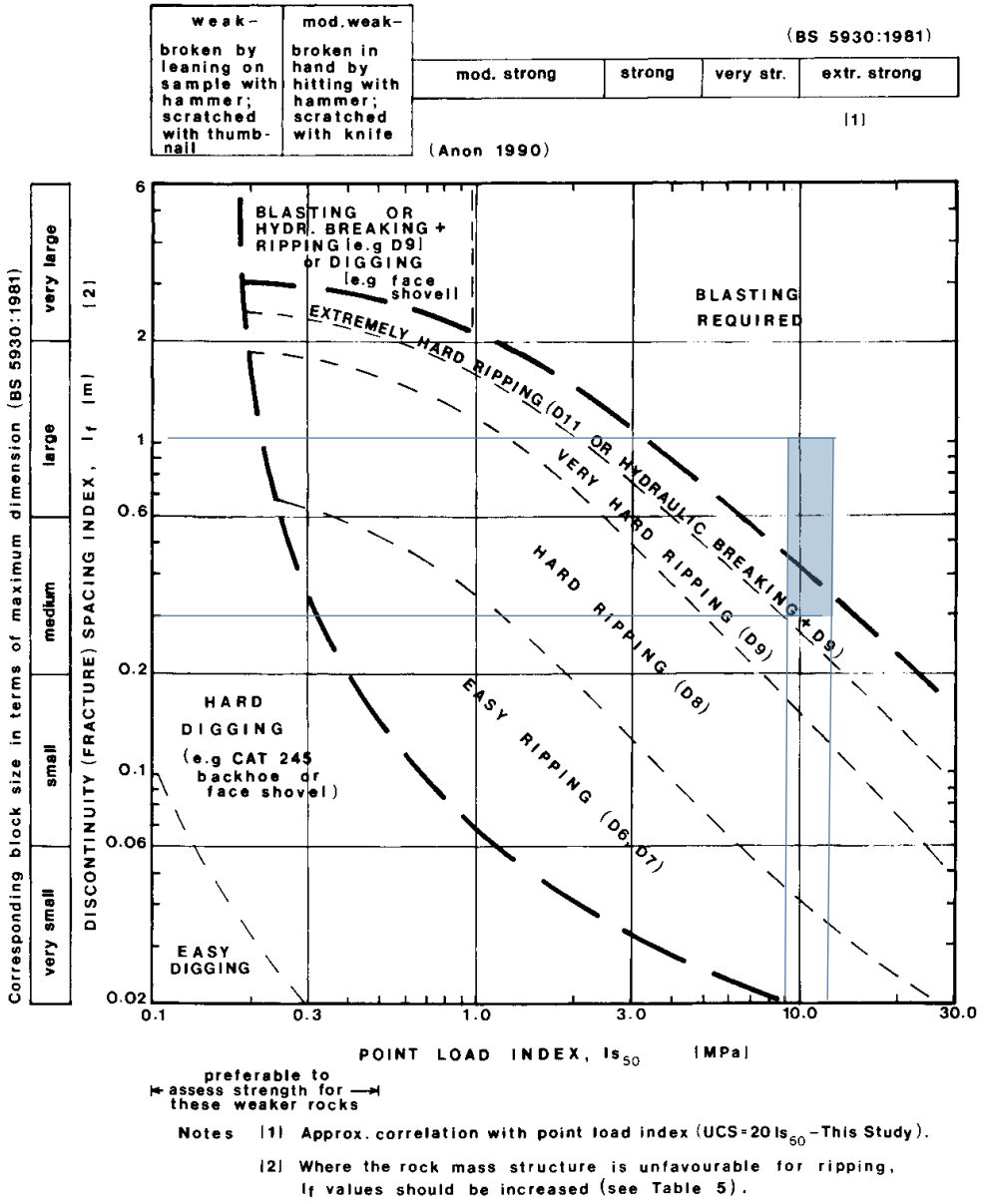

Figure 2: Excavatability graph from Pettifer & Frookes (1994) with the expected range shown in the blue shaded area based on the point load index and discontinuity spacing index

Bulk excavations within the underlying very high to extremely high strength rhyodacite (Unit 2B and 2C) are unlikely to be achievable using heavy construction plant (ie: Caterpillar D10 or 30 tonne excavator) equipped with ripping tynes. The rhyodacite rock is also likely to cause significant excavation resistance to hydraulic

rock hammering, with very slow excavation rates likely and possible vibratory dilapidation concerns for surrounding structures. Conventional hardened steel ripping tooths and bits are expected to experience significant wear and disintegration during excavation within the rhyodacite materials.

Possible alternatives for excavation include;

- **Drilling presplit bores to aid hydraulic hammer**- this would involve using a dedicated drilling rig equipped with air percussion drilling techniques to drill a pattern closely spaced bores (say 300mm to 500mm centres) within the proposed excavation area to aid the purchase of hydraulic hammers fitted to excavators and to effectively increase the defect spacing (ie jointing) and therefore weakening, of the rock mass. This technique has been previously used on civil projects in the Nelson Bay area to facilitate rock excavation.
- **Rock sawing or milling with excavators –** diamond bit, large diameter rock saws or milling heads attached to excavators could be used to progressively cut then rip the rhyodacite rock. Advantages of this method are good control of excavation edges and dimension during excavation and limited use of vibratory hydraulic hammers. It is noted that this type of equipment is normally used on sandstone type rock and excessive wear associated with the volcanic rock may preclude this option.
- **Blasting** - the use of slow release expansive rock blasting techniques such as cone penetration fracture (RockTek) or similar that limit fly rock could be used to fracture the rock mass facilitating easier excavation.

5.3.3 Support of Excavations

Temporary excavations in sand (Unit 1B) should be supported by a suitable shoring system such as sheet piles or contiguous or secant pile walls installed using continuous flight auger (CFA) grout injected piles or alternatively battered at no steeper than 1V:2H. Temporary excavations in residual soil or weathered rock should be battered at no steeper than 1V:1H or retained by a suitable shoring system such as a contiguous or secant pile wall.

Temporary excavations in Unit 2B and 2C rhyodacite should be battered at 1V:0.25H or near vertical however retention of loose bocks or highly fractured zones may be required using scaling (removal), rock bolts, shotcrete or a combination of all three. All excavations within Unit 2B and 2C rhyodacite should be inspected by a suitably qualified geotechnical professional on site during the excavation to advise on retention measures.

Permanent excavations within Unit 2B and 2C may require support such as reinforced shotcrete and / or rock anchors. Need for support of excavations in rock should be assessed on a case-by-case basis. Any rock anchors or shotcrete works proposed for the development should be designed by a suitably qualified geotechnical professional in consideration of the conditions exposed in the excavation. Construction should be undertaken by qualified contractors familiar in working with the recommended design elements

Permanent excavations within Unit 1B should be constructed at 1V:3H or flatter. Permanent excavations in Unit 2A should be constructed at 1V:2H or flatter. Permanent excavations steeper than above should be supported by an engineer-designed retaining wall and or a contiguous bored-pile wall.

5.3.4 Filling

General earthworks and filling if required should be planned, executed and documented in accordance with AS3798-2007.

5.4 PREVIOUS ENVIRONMENTAL ASSESSMENTS

5.4.1 Acid Sulphate Soils Assessment (GEOTWARA20848AA-AB)

This report dated 24 March 2009, concluded that the results of the laboratory testing conducted of recovered samples were well below the ASSMAC action criteria and indicated all samples tested were not actual or potential ASS. This combined with the residual nature of the site and minimum elevation over the site of RL6m suggested that it is highly unlikely for acid sulphate soils to be present and an ASS Management Plan would not be required for the project.

5.4.2 Phase 1 Environmental Site Assessment (ENVIWARA00284AA-R01)

This report dated 2 March 2009, identified four (4) areas of environmental concern (AEC's) at the site based on observations compiled during the site walkover and the site history assessment. Fill materials were widely used on the site for re-contouring purposes, and as such there was a potential for contamination to exist on the site which could impact on proposed redevelopment / land use.

It was stated that preferential pathways for contamination existed in the car parking area due to the exposure of underlying substrates, and as such, presented an area of environmental concern. Storage areas, including the waste storage area in the south-western corner of the site, and the pool chemical store were identified as likely point sources of potential contamination on the site. The potential for onsite soil contamination to be present within the four (4) AEC's associated with the proposed redevelopment of the site was considered to be low to medium.

Based on the results of this Phase 1 ESA, it was considered that a Phase 2 ESA was required to assess potential soil/groundwater contamination, and presence of acid sulfate soils associated with the proposed development at the site.

5.4.3 Phase 2 Environmental Site Assessment (ENVIWARA00284AB)

Coffey reviewed the previous Phase 1 ESA in report dated 9 June 2010 and identified five areas of environmental concern. Ten boreholes were drilled to target these AECs, and also to provide spatial coverage across the site.

Selected soil samples were submitted for laboratory analysis for a number of contaminants of concern, including heavy metals, hydrocarbons, pesticides, asbestos and chloride. The laboratory results were assessed against the criteria relevant to the site redevelopment (residential with minimal access to soils). The assessment indicated that contaminant concentrations were either below laboratory reporting limits or the adopted investigation levels. Asbestos was not detected in the samples analysed, and a maximum chloride concentration of 63mg/kg was recorded.

The report concluded that based on the laboratory results, the likelihood for significant contamination to be present at the site was low, and further investigations (including management or remediation) was not required at that time.

5.4.4 Summary

Site specific environmental assessment completed as of 9 June 2010 concluded that potential for contamination was low. No evidence of contamination was observed during this investigation, however any releases that may have occurred since June 2010 would not have necessarily been detected during this investigation.

6. CLOSURE

Tetra Tech Coffey appreciates the opportunity to be of service. Further advice on the uses and limitations of this report is presented in the attached document*, 'Important Information about your Tetra Tech Coffey Report'.*

7. REFERENCES

Pettifer, G. a. (1994). A revision of the graphical method for assessing excavatability in rock. *Quatrely Journal of Engineering Geology and Hydrogeology, v. 27*, 145-164.

LIMITATIONS

IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY REPORT

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

Your report is based on project specific criteria

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

Subsurface conditions can change

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

Interpretation of factual data

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

Your report will only give preliminary recommendations

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

Your report is prepared for specific purposes and persons

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

Interpretation by other design professionals

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

Data should not be separated from the report

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

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Tetra Tech Coffey for information relating to geoenvironmental issues.

Rely on Tetra Tech Coffey for additional assistance

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

Responsibility

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

DRAWINGS

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

MAP PROJECTION: GDA2020 MGA ZONE 56

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Scale (metres) 1:1000

drawn	HL / AW
approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SITE PLAN

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 1 | rev: A

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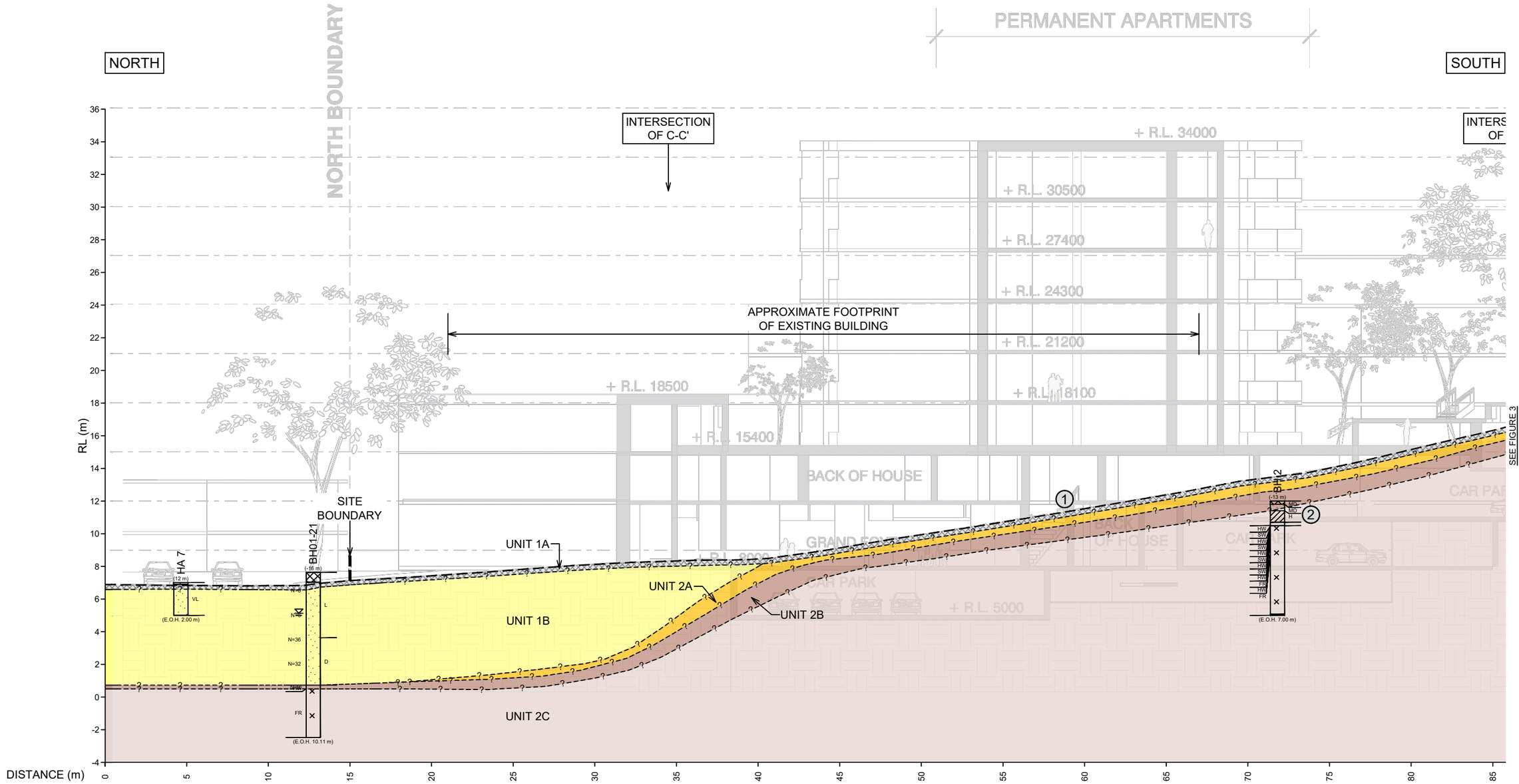

LEGEND

- FILL
- SAND
- SANDY CLAY
- RHYODACITE
- NO CORE

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- WATER LEVEL
- N*=17 STANDARD PENETRATION TEST RESULT

① KNOWN NEARBY OUTCROP OBSERVED ON GROUND FLOOR INSIDE EXISTING BUILDING

② SUBSURFACE UNITS PROJECTED TO ALIGN WITH ARCHITECTURAL SECTION

UNIT LEGEND

- UNIT 1A - FILL
- UNIT 1B - AEOLIAN SAND
- UNIT 2A - RESIDUAL SOIL / XWM
- UNIT 2B - RHYODACITE - HW TO MW
- UNIT 2C - RHYODACITE - SW TO FR

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

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Vertical Scale (metres) 1:250 — 2.5 0 5 10

drawn	HL / AW
approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

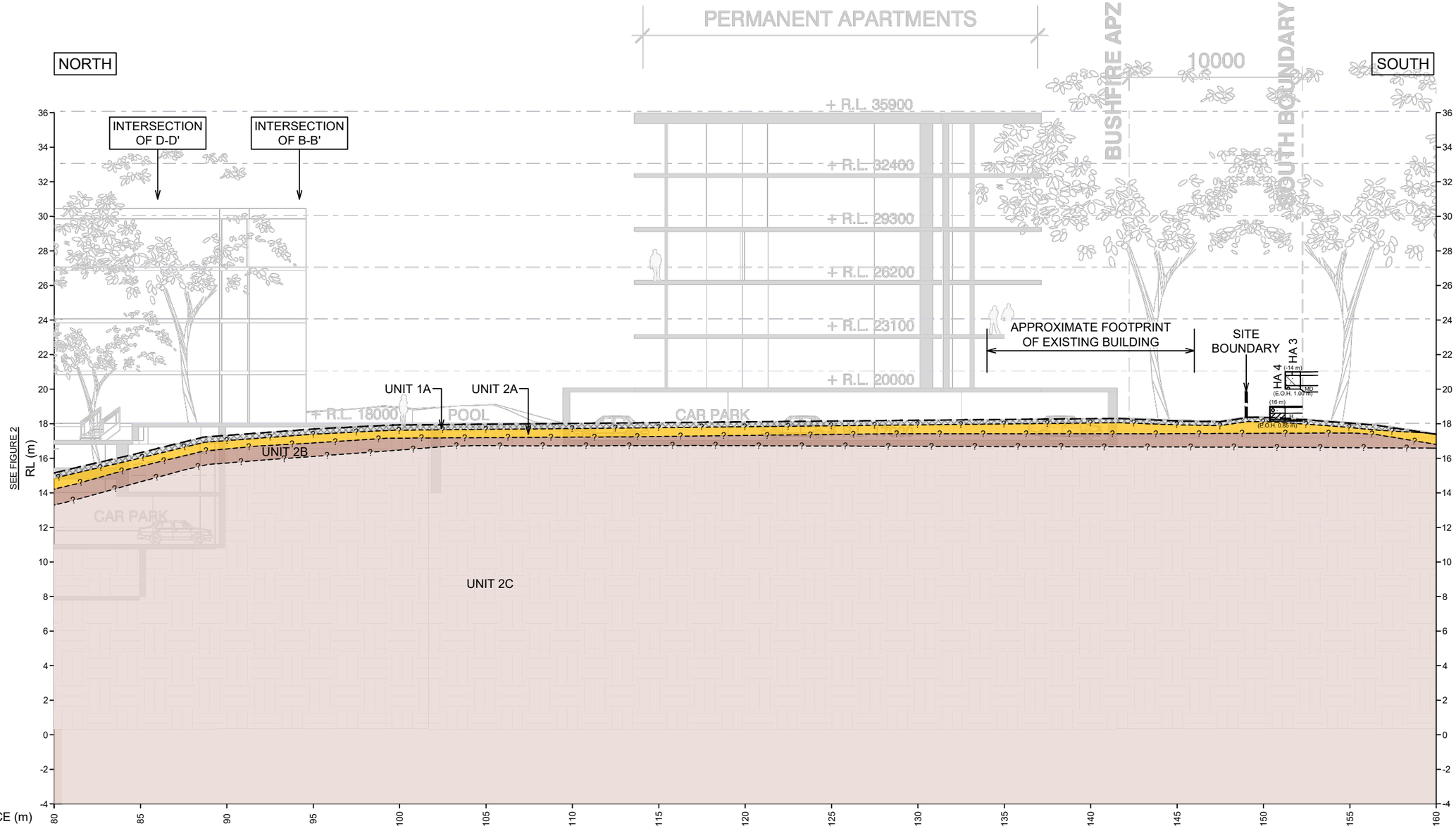
TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION A-A'
SHEET 1 OF 2

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 2 | rev: A



LEGEND

- FILL
- SAND
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- RHYODACITE
- NO CORE

SECTION LEGEND

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DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

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Vertical Scale (metres) 1:250 — 2.5 0 5 10

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approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

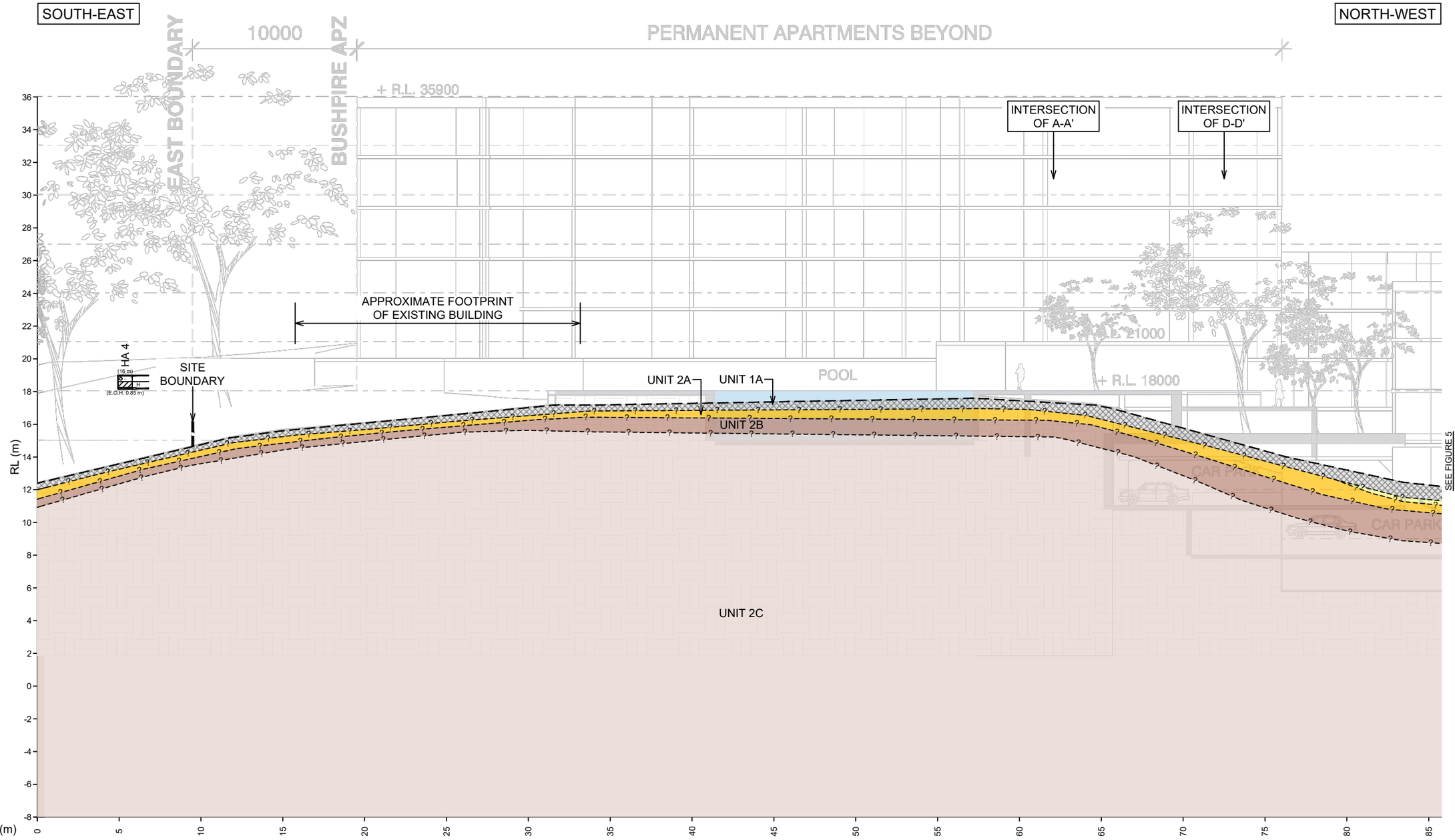
project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION A-A'
SHEET 2 OF 2

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 3 | rev: A

SOUTH-EAST

NORTH-WEST



LEGEND

- FILL
- SAND
- SANDY CLAY
- RHYODACITE
- NO CORE

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
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- UNIT 2C - RHYODACITE - SW TO FR

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

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Vertical Scale (metres) 1:250 — 2.5 0 5 10

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approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION B-B'
SHEET 1 OF 2

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 4 | rev: A

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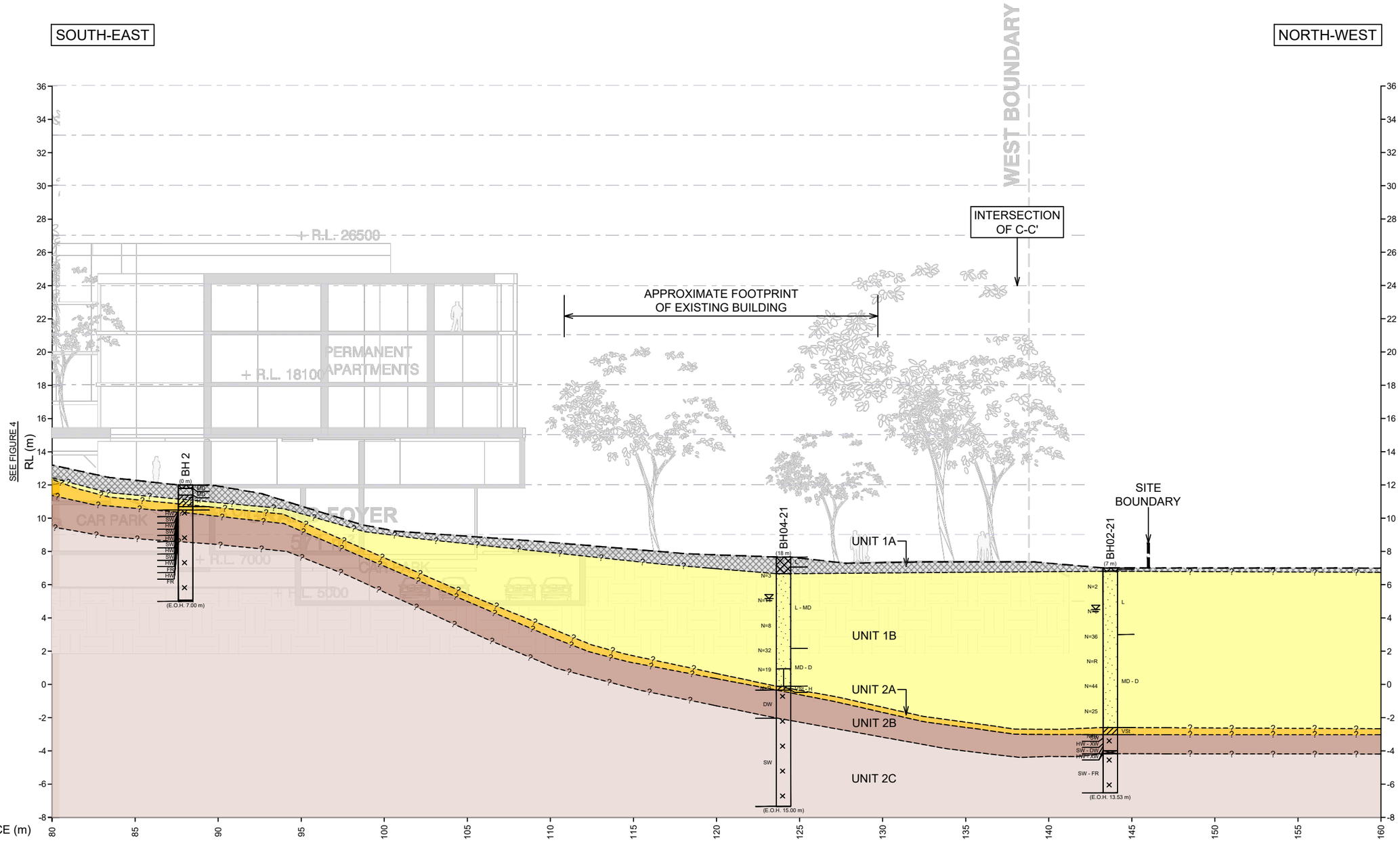
SOUTH-EAST

NORTH-WEST



LEGEND

- FILL
- SAND
- SANDY CLAY
- RHYODACITE
- NO CORE

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- WATER LEVEL
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UNIT LEGEND

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- UNIT 2C - RHYODACITE - SW TO FR

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

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Vertical Scale (metres) 1:250 — 2.5 0 5 10

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approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION B-B'
SHEET 2 OF 2

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 5 | rev: A

EAST

WEST

INTERSECTION OF A-A'

INTERSECTION OF B-B'

SITE BOUNDARY

SITE BOUNDARY

APPROXIMATE FOOTPRINT OF EXISTING BUILDING

HA 6
(9 m)
(E.O.H. 0.4 m)

BH03-21
(0 m)
N=9
St - VSt
SW - DW
(E.O.H. 6.42 m)

BH02-21
(0 m)
N=2
N=36
N=R
N=44
N=25
MD - D
VSt
SW - DW
HW - XW
SW - FR
(E.O.H. 13.53 m)

UNIT 1A

UNIT 1B

UNIT 2A

UNIT 2B

UNIT 2C

RL (m)

14 12 10 8 6 4 2 0 -2 -4 -6 -8

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

LEGEND

- FILL
- SAND
- SANDY CLAY
- RHYODACITE
- NO CORE

SECTION LEGEND

- EXISTING GROUND SURFACE
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- N*=17 STANDARD PENETRATION TEST RESULT

UNIT LEGEND

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- UNIT 1B - AEOLIAN SAND
- UNIT 2A - RESIDUAL SOIL / XWM
- UNIT 2B - RHYODACITE - HW TO MW
- UNIT 2C - RHYODACITE - SW TO FR

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

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Horizontal Scale (metres) 1:250

2.5 0 5 10
Vertical Scale (metres) 1:250

drawn	HL / AW
approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION C-C'

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 6 | rev: A

EAST

WEST

SITE BOUNDARY

APPROXIMATE FOOTPRINT OF EXISTING BUILDING

INTERSECTION OF A-A'

INTERSECTION OF B-B'

HA 5

BH 2

BH 1

UNIT 1A

UNIT 1B

UNIT 2A

UNIT 2B

UNIT 2C

(E.O.H. 7.00 m)

(E.O.H. 5.61 m)

RL (m)

LEGEND

- FILL
- SAND
- SANDY CLAY
- RHYODACITE
- NO CORE

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- WATER LEVEL
- N*=17 STANDARD PENETRATION TEST RESULT

UNIT LEGEND

- UNIT 1A - FILL
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- UNIT 2A - RESIDUAL SOIL / XWM
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- UNIT 2C - RHYODACITE - SW TO FR

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

Horizontal Scale (metres) 1:250

Vertical Scale (metres) 1:250

drawn	HL / AW
approved	-
date	11-02-2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SALAMANDER PROPERTIES PTY LTD ATF

project: GEOTECHNICAL INVESTIGATION
SALAMANDER SHORES
147 SOLDIERS POINT ROAD, SOLDIERS POINT, NSW

title: SECTION D-D'

project no: 754-NTLGE202648-1-AB | figure no: FIGURE 7 | rev: A

APPENDIX A: ENGINEERING BOREHOLE LOGS

Soil Description Explanation Sheet (1 of 2)

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

CLASSIFICATION SYMBOL & SOIL NAME

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

PARTICLE SIZE DESCRIPTIVE TERMS

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

MOISTURE CONDITION

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

CONSISTENCY OF COHESIVE SOILS

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

DENSITY OF GRANULAR SOILS

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

MINOR COMPONENTS

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

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man-made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES USC (Excluding particles larger than 60 mm and basing fractions on estimated mass)						USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes		GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.		GP	GRAVEL
			GRAVELS WITH FINES Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)		GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes		SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).		SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm				
			DRY STRENGTH	**DILATANCY**	**TOUGHNESS**		
		SILTS & CLAYS Liquid limit less than 50	None to Low	Quick to slow	None	ML	SILT
			Medium to High	None	Medium	CL	CLAY
			Low to medium	Slow to very slow	Low	CL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium	MH	SILT
			High	None	High	CH	CLAY
			Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			PT	PEAT

● Low plasticity – Liquid Limit w_L less than 35%. ● Medium plasticity – w_L between 35% and 50%. ● High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

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

Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:
AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

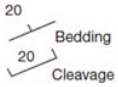
ROCK SUBSTANCE STRENGTH TERMS

Term	Abbre-viation	Point Load Index, $I_{s(50)}$ (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:
In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index Is(50). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES

Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

DEFECT SHAPE TERMS

Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS

Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS

Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Veneer	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS

Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greater than cross section

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TETRA TECH COFFEY

Engineering Log - Borehole

Borehole ID.	**BH01-21**
sheet:	1 of 2
project no.	**754-NTLGE202648-1**
client:	***Salamander Properties Pty Ltd***
date started:	**06 Dec 2021**
principal:	
date completed:	**06 Dec 2021**
project:	***Salamander Shores Geotechnical Investigation***
logged by:	**HL**
location:	***147 Soldiers Point road, Soldiers Point, NSW 2317***
checked by:	**SJB**

position: E: 413008; N: 6380404 (MGA94) | surface elevation: 7.63 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	soil origin, structure and additional observations
AD/V				7			SP	**SAND**: fine to medium grained, dark brown to grey, with fine to medium grained sub-angular gravels. 0.2m: becomes black, no gravels	D	L		
							SP	**SAND**: fine to medium grained, grey. 0.6m: becomes grey				
			SPT 2, 4, 4 N=8	6	1.0							
					2.0			1.8m: becomes yellow to pale brown	M			
HW casing		06-12-21 Encountered	SPT 1, 2, 4 N=6	5				2.5m: becomes pale grey to white	W			
				4	3.0							
W			SPT 6, 16, 20 N=36	3	4.0			4.0m: becomes dark grey, slight odour		D		
					5.0							
			SPT 10, 13, 19 N=32	2	6.0							
				1								
				0	7.0			Borehole BH01-21 continued as cored hole				

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method
- DT diatube
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- RR rock roller

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Cored Borehole

Borehole ID.	**BH01-21**
sheet:	2 of 3
project no.	**754-NTLGE202648-1**
client:	***Salamander Properties Pty Ltd***
date started:	**06 Dec 2021**
principal:	
date completed:	**06 Dec 2021**
project:	***Salamander Shores Geotechnical Investigation***
logged by:	**HL**
location:	***147 Soldiers Point road, Soldiers Point, NSW 2317***
checked by:	**SJB**

position: E: 413008; N: 6380404 (MGA94) | surface elevation: 7.63 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 X = axial; O = diametral VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		7	1.0								
		6	2.0								
		5	3.0								
		4	4.0								
		3	5.0								
		2	6.0								
		1			started coring at 6.90m						
NMLC	Encountered	0	7.0	× × × × × × × × × ×	**RHYODACITE**: brown, black, pink and white, anhedral to subhedral fine grains, ~40% quartz, ~35% alkali feldspar, 20% plagioclase, <5% biotite.	HW FR		SPT 8/25mm N=R	88%		SM, 25°, PL, CL-ML JT, 10°, PL, VR, - CN JT, 20°, PL, VR, - CN JT, 0°, IR, VR, - CN JT, 70°, PL, SO, Fe SN

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method
DT diatube
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)
RR rock roller

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS sheared surface
SZ sheared zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

TETRA TECH COFFEY

Engineering Log - Cored Borehole

Borehole ID.	**BH01-21**
sheet:	3 of 3
project no.	**754-NTLGE202648-1**
client:	***Salamander Properties Pty Ltd***
date started:	**06 Dec 2021**
principal:	
date completed:	**06 Dec 2021**
project:	***Salamander Shores Geotechnical Investigation***
logged by:	**HL**
location:	***147 Soldiers Point road, Soldiers Point, NSW 2317***
checked by:	**SJB**

position: E: 413008; N: 6380404 (MGA94) | surface elevation: 7.63 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
NMLC	Encountered	-1	9.0	×	**RHYODACITE**: brown, black, pink and white, anhedral to subhedral fine grains, ~40% quartz, ~35% alkali feldspar, 20% plagioclase, <5% biotite. *(continued)*	FR			88%		JT, 5°, IR, VR, - CN JT, 20°, PL, SO, Fe SN JT, 45°, PL, SO, Fe SN JT, 55°, PL, SO, Fe SN JT, 30°, PL, RO, - CN
		-2	10.0						100%		JT, 45°, IR, VR, - CN JT, 40°, PL, VR, - CN
		-3	11.0		Borehole BH01-21 terminated at 10.11 m Target depth						
		-4	12.0								
		-5	13.0								
		-6	14.0								
		-7	15.0								
		-8									

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method
DT diatube
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)
RR rock roller

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS sheared surface
SZ sheared zone
CO contact
CS crushed seam
SM seam

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

coating
CN clean
SN stained
VN veneer
CO coating

BH01-21, SPT at 1.0m, N=8

BH01-21, SPT at 2.5m, N=6

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

BH01-21, SPT at 4.0m, N=36

BH01-21, SPT at 5.5m, N=32

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

TETRA TECH COFFEY

PROJECT: Salamander Bay Hotel

PROJECT No: 754-NTLGE202648-1

BOREHOLE No: BH01

DEPTH: 6.90m to 10.11m DATE: 6/12/21

revision	description	drawn	approved	date
	Initial revision	HL	JD	15/02/2022

drawn	**HL**
approved	**SJB**
date	**15/02/2022**
scale	**NTS**
original size	**A3**

TETRA TECH COFFEY

client: **SALAMANDER PROPERTIES PTY LTD ATF**

project: **SALAMANDER SHORES**

title: **GEOTECHNICAL INVESTIGATION – STAGE 2**

project no: **754-NTLGE202648-1** figure no: -

TETRA TECH COFFEY

Engineering Log - Borehole

Borehole ID.	**BH02-21**
sheet:	1 of 3
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**07 Dec 2021**
principal:	
date completed:	**07 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 412977; N: 6380386 (MGA94) | surface elevation: 7.01 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristics, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	soil origin, structure and additional observations
AD/V				7				**ASPHALT**: 100mm, black.				
							SP	**Gravelly SAND**: fine to medium grained, brown, angular to sub-angular, fine to medium grained gravels.	M	L		
							SP	**SAND**: fine to medium grained, grey. 0.5m: becomes black to dark grey				
			SPT 2, 1, 1 N=2	6	1.0							
				5	2.0							
		07-12-21	SPT 2, 4, 4 N=8					2.5m: becomes pale grey to grey	W			
				4	3.0							
HW casing		Encountered	SPT 7, 17, 19 N=36	3	4.0			4.0m: becomes grey to dark grey		MD - D		
W				2	5.0							
			SPT 28, 30/77mm N=R					5.5m: becomes trace of silt, slight odour				
				1	6.0							
			SPT 15, 19, 25 N=44	0	7.0			7.0m: becomes dark brown				

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method
- DT diatube
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- RR rock roller

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration: 1 2 3 — no resistance ranging to refusal

water: 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & material description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Borehole

Borehole ID.	**BH02-21**
sheet:	2 of 3
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**07 Dec 2021**
principal:	
date completed:	**07 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 412977; N: 6380386 (MGA94) | surface elevation: 7.01 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristics, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	soil origin, structure and additional observations
W HW casing		Encountered	SPT 10, 13, 12 N=25	-1 -2	9.0		SP	**SAND**: fine to medium grained, grey. *(continued)* 8.5m: becomes grey	W	MD - D		
			SPT 13/30mm N=R	-3	10.0		CL	**CLAY**: grey.	<Wp	VSt		
				-4	11.0			Borehole BH02-21 continued as cored hole				
				-5	12.0							
				-6	13.0							
				-7	14.0							
				-8	15.0							

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method
- DT diatube
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- RR rock roller

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Cored Borehole

Borehole ID.	**BH02-21**
sheet:	3 of 3
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**07 Dec 2021**
principal:	
date completed:	**07 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 412977; N: 6380386 (MGA94) | surface elevation: 7.01 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information				material substance						rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular	general
		1										
		-2	9.0									
		-3	10.0		started coring at 10.03m							
NMLC	Encountered	-4	11.0		**RHYODACITE**: mottled orange and pale grey.	SW HW - XW SW - DW HW - XW			17%		JT, 10°, IR, VR, - CN JT, 50°, PL, VR, - CN SM, 55°, PL, CL-ML JT, 40°, PL, RO, - CN JT, 45°, PL, RO, - CN SM, 45°, PL, CL-ML	
					NO CORE: 0.18 m						Core Loss (180mm)	
		-5	12.0		**RHYODACITE**: mottled orange and pale grey, anhedral to subhedral fine grains, ~40% quartz, ~35% alkali feldspar, 20% plagioclase, <5% biotite. 11.3m: becomes brown, black, pink and white	SW - FR			52%		JT, 85°, PL, - CN, (Healed) JT, 45°, PL, RO, Fe SN JT, 70°, PL, RO, Fe SN JT, 5°, IR, VR, - CN JT, 45°, PL, RO, Fe SN	
		-6	13.0						82%		JT, 80°, PL, RO, - CN, (Healed) JT, 20°, PL, RO, - CN JT, 20°, PL, RO, - CN JT, 60°, PL, RO, Fe SN CS, 30°, PL, Rock fragments, Clay, Sand JT, 55°, PL, RO, Fe SN JT, 75°, PL, RO	
					Borehole BH02-21 terminated at 13.53 m Target depth							
		-7	14.0									
		-8	15.0									

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method
DT diatube
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)
RR rock roller

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS sheared surface
SZ sheared zone
CO contact
CS crushed seam
SM seam

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

coating
CN clean
SN stained
VN veneer
CO coating

BH02-21, SPT at 1.0m, N=2

BH02-21, SPT at 2.5m, N=8

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

BH02-21, SPT at 4.0m, N=36

BH02-21, SPT at 5.5m, N=R

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

BH02-21, SPT at 7.0m, N=44

BH02-21, SPT at 8.5m, N=25

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

TETRA TECH COFFEY

PROJECT: Salamander Bay Hotel

PROJECT No: 754-NTLGE202648-1

BOREHOLE No: BH02-21

DEPTH: 10.03 to 13.53m DATE: 7/12/21

revision	description	drawn	approved	date
	Initial revision	HL	JD	15/02/2022

drawn	**HL**
approved	**SJB**
date	**15/02/2022**
scale	**NTS**
original size	**A3**

TETRA TECH COFFEY

client: **SALAMANDER PROPERTIES PTY LTD ATF**

project: **SALAMANDER SHORES**

title: **GEOTECHNICAL INVESTIGATION – STAGE 2**

project no: **754-NTLGE202648-1** figure no: -

TETRA TECH COFFEY

Engineering Log - Borehole

Borehole ID.	**BH03-21**
sheet:	1 of 2
project no.	**754-NTLGE202648-1**
client:	***Salamander Properties Pty Ltd***
date started:	**09 Dec 2021**
principal:	
date completed:	**09 Dec 2021**
project:	***Salamander Shores Geotechnical Investigation***
logged by:	**HL**
location:	***147 Soldiers Point road, Soldiers Point, NSW 2317***
checked by:	**SJB**

position: E: 413049; N: 6380382 (MGA94) | surface elevation: 12.56 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	soil origin, structure and additional observations
AD/T HW casing		Encountered	SPT 8, 5, 4 N=9	12 11	1.0		SP	**SILTY SAND**: fine to coarse grained, dark brown, with clay and fine to coarse grained, sub-angular gravels. 1.0m: 80mm sandstone cobble	D - M	L		
			SPT 15/60mm N=R	10	2.0		CL	**Sandy CLAY**: low plasticity, orange, pale brown and grey, medium to coarse grained sand.	<Wp	St - VSt		
				9 8 7 6 5	3.0 4.0 5.0 6.0 7.0			Borehole BH03-21 continued as cored hole				

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method
- DT diatube
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- RR rock roller

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration 1 2 3 — no resistance ranging to refusal

water — 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & material description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Cored Borehole

Borehole ID.	**BH03-21**
sheet:	2 of 2
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**09 Dec 2021**
principal:	
date completed:	**09 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 413049; N: 6380382 (MGA94) | surface elevation: 12.56 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		12	1.0		started coring at 2.32m						
NMLC	Encountered	11	2.0		**Sandy CLAY**: low plasticity, dark brown to dark grey, fine ot medium grained sand.	XW					SOIL (290mm)
		10	3.0		**RHYODACITE**: orange to brown, anhedral to subhedral fine grains, ~40% quartz, ~35% alkali feldspar, 20% plagioclase, <5% biotite.	DW XW			0%		JT, 45°, PL, RO, - CN JT, 45°, PL, RO, - CN JT, 85°, PL, RO, - CN JT, 80°, CU, RO, - CN JT, 0°, PL, RO, - CN CS, 40°, UN, Rock fragments, Clay, Sand SM, 60°, UN, CL-ML JT, 80°, PL, RO, - CN JT, 70°, PL, RO, Fe SN JT, 8°, PL, RO, Fe SN JT, 45°, PL, RO, - CN JT, 20°, PL, RO, - CN, salt JT, 15°, PL, RO, - CN, salt JT, 25°, PL, VR, - CN JT, 20°, PL, RO, - CN JT, 25°, PL, RO, - CN JT, 5°, PL, VR, - CN JT, 70°, PL, RO, - CN, salt JT, 2°, CU, RO, Fe SN JT, 60°, PL, RO, Fe SN JT, 2°, PL, RO, Fe SN SM, 10°, PL, CL-ML JT, 10°, PL, VR, - CN JT, 65°, PL, RO, - CN, salt JT, 50°, PL, VR, - CN, salt JT, 20°, PL, RO, - CN JT, 2°, PL, VR, - CN JT, 50°, PL, RO, - CN, salt JT, 40°, PL, RO, - CN, salt JT, 50°, PL, RO, - CN, salt JT, 0°, PL, RO, - CN JT, 0°, PL, RO, - CN JT, 0°, PL, RO, - CN JT, 60°, PL, VR, Fe SN JT, 40°, PL, RO, Fe SN JT, 45°, PL, RO, Fe SN JT, 45°, PL, RO, Fe SN JT, 10°, CU, RO, Fe SN JT, 45°, PL, RO, Fe SN JT, 50°, PL, RO, - CN JT, 50°, PL, RO, - CN
		9	4.0		3.8m: becomes brown, black, pink and white	SW - DW			49%		
		8	5.0								
		7	6.0								
		6	7.0		Borehole BH03-21 terminated at 6.42 m Target depth				0%		
		5									

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method
DT diatube
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)
RR rock roller

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS sheared surface
SZ sheared zone
CO contact
CS crushed seam
SM seam

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

coating
CN clean
SN stained
VN veneer
CO coating

BH03-21, SPT at 1.0m, N=9

BH03-21, SPT at 2.2m, N=R

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

TETRA TECH COFFEY

PROJECT: Salamander Bay Hotel

PROJECT No: 754-NTLGE202648-1

BOREHOLE No: BH03-21

DEPTH: 2.32 to 6.42m DATE: 9/12/21

revision	description	drawn	approved	date
	Initial revision	HL	JD	15/02/2022

drawn	**HL**
approved	**SJB**
date	**15/02/2022**
scale	**NTS**
original size	**A3**

TETRA TECH COFFEY

client: **SALAMANDER PROPERTIES PTY LTD ATF**

project: **SALAMANDER SHORES**

title: **GEOTECHNICAL INVESTIGATION – STAGE 2**

project no: **754-NTLGE202648-1** figure no: -

TETRA TECH COFFEY

Engineering Log - Borehole

Borehole ID.	**BH04-21**
sheet:	1 of 2
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**09 Dec 2021**
principal:	
date completed:	**10 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 412979; N: 6380364 (MGA94) | surface elevation: 7.67 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristics, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	soil origin, structure and additional observations
AD/V				7			GW	**Sandy GRAVEL**: fine grained, sub-angular to angular, pale brown, fine to coarse sand, with clay, compacted.	D	L		
							GW	**Sandy GRAVEL**: fine to medium grained, sub-angular to angular, brown, medium to coarse grained sand.				
							SP	**SAND**: fine grained, grey.	M	L - MD		
HW casing			SPT 2, 2, 1 N=3	6	1.0		SP	**SAND**: fine grained, grey. 1.25m: becomes brown				
					2.0			2.0m: becomes pale brown and fine to medium grained				
W		09-12-21 ▽ Encountered	SPT 2, 4, 7 N=11	5					W			
				4	3.0							
			SPT 4, 4, 4 N=8		4.0			4.5m: becomes black				
HWT				3								
					5.0					MD - D		
			SPT 18, 17, 15 N=32	2								
					6.0							
			SPT 12, 13, 6 N=19	1			SM	6.65m: rhyodacite gravels, ~80mm, potentially thin rhyodative bands				
					7.0			**SILTY SAND**: fine to medium grained, dark grey to black, some clay. 6.95m: with rhyodacite gravels				
RR				0								
			SPT 18/50mm				CL	**Sandy CLAY**: low plasticity, pale grey, medium to	<Wp	VSt - H		

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method
- DT diatube
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- RR rock roller

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration — no resistance ranging to refusal

water — 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & material description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Cored Borehole

Borehole ID.	**BH04-21**
sheet:	2 of 2
project no.	**754-NTLGE202648-1**
client:	**Salamander Properties Pty Ltd**
date started:	**09 Dec 2021**
principal:	
date completed:	**10 Dec 2021**
project:	**Salamander Shores Geotechnical Investigation**
logged by:	**HL**
location:	**147 Soldiers Point road, Soldiers Point, NSW 2317**
checked by:	**SJB**

position: E: 412979; N: 6380364 (MGA94) | surface elevation: 7.67 m (AHD) | angle from horizontal: 90°

drill model: Geoprobe, Track mounted | drilling fluid: | casing diameter : HW

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 X = axial; O = diametral VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
NMLC	Encountered				started coring at 8.00m						
NMLC	Encountered	-1	9.0		**RHYODACITE**: mottled pale grey and orange, anhedral to subhedral fine grains, ~40% quartz, ~35% alkali feldspar, 20% plagioclase, <5% biotite. 8.11m: becomes mostly red to brown 8.34m: becomes mostly pale grey 8.43m: becomes mostly red to brown 8.6m: 40mm pale grey band	DW			46%		JT, 50°, PL, RO, Fe SN JT, 15°, PL, RO, Fe SN JT, 15°, PL, RO, Fe SN JT, 70°, PL, RO, Clay, 10 mm JT, 5°, PL, RO, Clay, 10 mm JT, 25°, PL, RO, Fe SN JT, 25°, PL, RO, Fe SN JT, 25°, PL, RO, - CN JT, 25°, PL, RO, Fe SN JT, 25°, PL, RO, Fe SN JT, 15°, IR, VR, Fe SN JT, 10°, PL, RO, Fe SN CS, 20°, IR, Rock fragments, Clay, Sand JT, 0°, PL, RO, - CN CS, 65°, IR, Rock fragments, Clay, Sand JT, 40°, PL, RO, Fe SN JT, 5°, PL, RO, Clay, 3 mm JT, 70°, PL, RO, Clay, 2 mm SM, 10°, PL, RO, CL-ML, 2 mm JT, 10°, PL, RO, Fe SN JT, 45°, PL, RO, Fe SN SM, 25°, PL, RO, CL-ML JT, 50°, PL, RO, Fe SN JT, 0°, PL, RO, Fe SN JT, 40°, PL, RO, Fe SN JT, 40°, PL, RO, Fe SN JT, 40°, PL, RO, Fe SN JT, 40°, PL, RO, Fe SN JT, 40°, ST, RO, Fe SN JT, 15°, PL, RO, - CN JT, 0°, PL, RO, Fe SN JT, 0°, PL, RO, Fe SN JT, 30°, PL, RO, - CN JT, 40°, PL, RO, Fe SN JT, 45°, PL, RO, Fe SN JT, 45°, PL, RO JT, 50°, PL, MU, 3 mm, (Healed) JT, 0°, PL, VR, - CN JT, 45°, PL, RO, - CN JT, 45°, PL, RO, - CN JT, 10°, IR, VR, Fe SN JT, 10°, PL, VR, Fe SN JT, 0°, PL, RO, - CN JT, 20°, PL, RO, Fe SN JT, 75°, PL, RO, Fe SN JT, 50°, PL, RO, Fe SN JT, 20°, PL, RO, Fe SN JT, 80°, PL, RO, MU CO JT, 30°, PL, RO, - CN JT, 40°, PL, RO, - CN JT, 30°, PL, RO, - CN JT, 15°, PL, RO, - CN JT, 20°, CU, RO, Fe SN JT, 25°, PL, RO, Fe SN JT, 25°, PL, RO, Fe SN JT, 45°, UN, RO, - CN JT, 10°, PL, RO, Fe SN JT, 10°, PL, RO, Fe SN JT, 10°, CU, RO, - CN JT, 40°, UN, VR, Fe SN JT, 75°, PL, VR, - CN JT, 40°, UN, VR, Fe SN JT, 70°, PL, RO, MU CO
NMLC	Encountered	-2	10.0		9.7m: becomes dark grey	SW			28%		
NMLC	Encountered	-3	11.0						43%		
NMLC	Encountered	-4	12.0						84%		
NMLC	Encountered	-5	13.0						82%		
NMLC	Encountered	-6	14.0						53%		
NMLC	Encountered	-7	15.0		Borehole BH04-21 terminated at 15.00 m Target depth						
		-8									

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method
DT diatube
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)
RR rock roller

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS sheared surface
SZ sheared zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

BH04-1, SPT at 1.0m, N=3

BH04-1, SPT at 2.5m, N=11

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

BH04-21, SPT at 4.0m, N=8

BH04-21, SPT at 5.5m, N=32

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

BH04-21, SPT at 6.65m, N=19

BH04-21, SPT at 7.77m, N=R

drawn	**HL**	TETRA TECH COFFEY	client: **SALAMANDER PROPERTIES PTY LTD ATF**	
approved	**SJB**		project: **SALAMANDER SHORES**	
date	**15/02/2022**			
scale	**NTS**		title: **GEOTECHNICAL INVESTIGATION – STAGE 2**	
original size	**A4**		project no: **754-NTLGE202648-1**	figure no: -

TETRA TECH COFFEY

PROJECT: Salamander Bay Hotel

PROJECT No: 754-NTLGE202648-1

BOREHOLE No: BH04-21

DEPTH: 8.00 to 12.00m DATE: 10/12/21

revision	description	drawn	approved	date
	Initial revision	HL	JD	15/02/2022

drawn	**HL**
approved	**SJB**
date	**15/02/2022**
scale	**NTS**
original size	**A3**

TETRA TECH COFFEY

client: **SALAMANDER PROPERTIES PTY LTD ATF**

project: **SALAMANDER SHORES**

title: **GEOTECHNICAL INVESTIGATION – STAGE 2**

project no: **754-NTLGE202648-1** figure no: -

APPENDIX B: LABORATORY TEST RESULTS

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10185-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID:	NEWC21S-10185 / -
Date Sampled:	07/12/2021
Source:	On-Site
Material:	Existing Ground
Specification:	No Specification
Sampling Method:	Submitted by client*
Project Location:	Salamander Bay, NSW
Sample Location:	BH02-21 - 8.5 - 8.95m

Other Test Results

Description	Method	Result	Limits

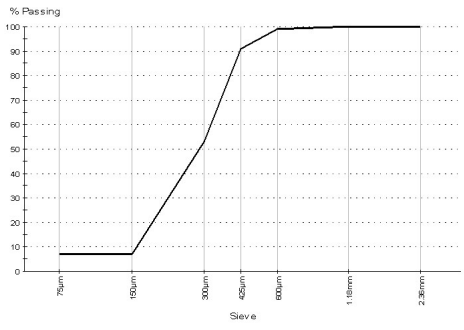
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	91	
300µm	53	
150µm	7	
75µm	7	

Chart



Comments

*Results relate only to the items tested or sampled.

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10186-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10186 / -
Date Sampled: 07/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH04-21 - 1.0 - 1.45m

Other Test Results

Description	Method	Result	Limits

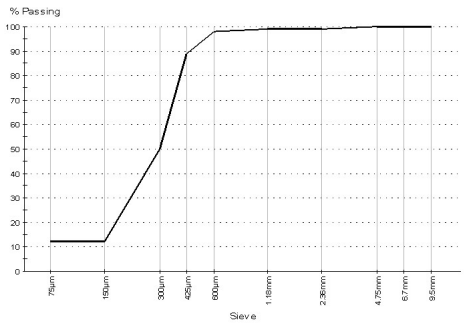
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	99	
1.18mm	99	
600µm	98	
425µm	89	
300µm	50	
150µm	12	
75µm	12	

Chart



Comments

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Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10187-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10187 / -
Date Sampled: 09/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH04-21 - 2.5 - 2.95m

Other Test Results

Description	Method	Result	Limits

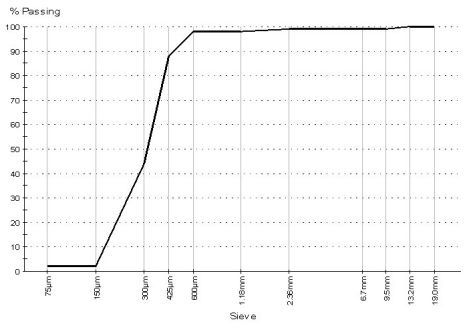
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	99	
6.7mm	99	
2.36mm	99	
1.18mm	98	
600µm	98	
425µm	88	
300µm	44	
150µm	2	
75µm	2	

Chart



Comments

*Results relate only to the items tested or sampled.

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10188-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID:	NEWC21S-10188 / -
Date Sampled:	09/12/2021
Source:	On-Site
Material:	Existing Ground
Specification:	No Specification
Sampling Method:	Submitted by client*
Project Location:	Salamander Bay, NSW
Sample Location:	BH04-21 - 5.5 - 5.95m

Other Test Results

Description	Method	Result	Limits

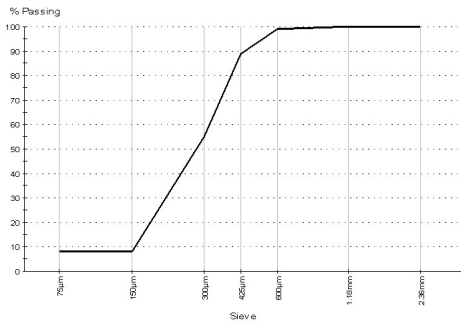
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	89	
300µm	55	
150µm	8	
75µm	8	

Chart



Comments

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Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10189-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10189 / -
Date Sampled: 10/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH04-21 - 6.65 - 7.10m

Other Test Results

Description	Method	Result	Limits

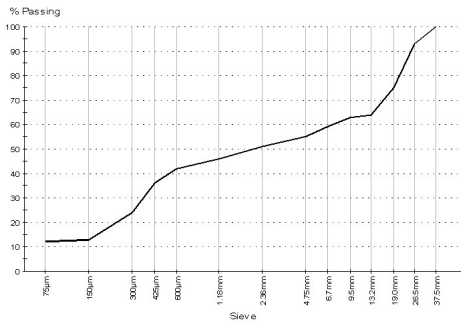
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
37.5mm	100	
26.5mm	93	
19.0mm	75	
13.2mm	64	
9.5mm	63	
6.7mm	59	
4.75mm	55	
2.36mm	51	
1.18mm	46	
600µm	42	
425µm	36	
300µm	24	
150µm	13	
75µm	12	

Chart



Comments

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Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10190-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10190 / -
Date Sampled: 10/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH04-21 - 7.77 - 7.92m

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	6.5	
Mould Length (mm)		124.9	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	32	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	20	
Plasticity Index (%)	AS 1289.3.3.1	12	
Date Tested		16/12/2021	

Comments

*Results relate only to the items tested or sampled.

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10181-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10181 / -
Date Sampled: 06/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH01-21 - 1.0 - 1.45m

Other Test Results

Description	Method	Result	Limits

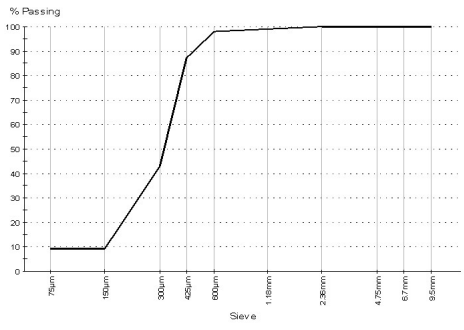
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	98	
425µm	87	
300µm	43	
150µm	9	
75µm	9	

Chart



Comments

*Results relate only to the items tested or sampled.

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10182-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10182 / -
Date Sampled: 06/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH01-21 - 4.0 - 4.45m

Other Test Results

Description	Method	Result	Limits

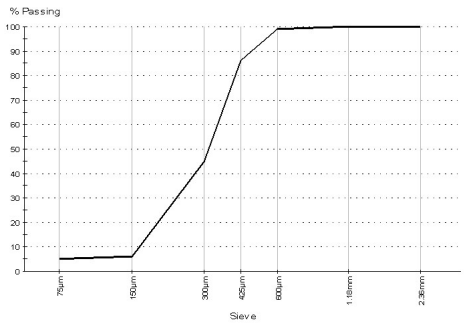
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	86	
300µm	45	
150µm	6	
75µm	5	

Chart



Comments

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Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10183-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID: NEWC21S-10183 / -
Date Sampled: 07/12/2021
Source: On-Site
Material: Existing Ground
Specification: No Specification
Sampling Method: Submitted by client*
Project Location: Salamander Bay, NSW
Sample Location: BH02-21 - 2.5 - 2.95m

Other Test Results

Description	Method	Result	Limits

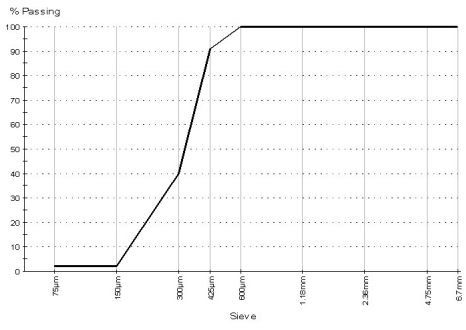
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	100	
600µm	100	
425µm	91	
300µm	40	
150µm	2	
75µm	2	

Chart



Comments

*Results relate only to the items tested or sampled.

Newcastle Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
16 Callistemon Close
Warabrook NSW 2304

Phone: +61 2 4016 2300

Material Test Report

Report No: NEWC21S-10184-1
Issue No: 1

Client: Tetra Tech Coffey Pty Ltd (Newcastle)
16 Callistemon Close
Newcastle NSW 2304

Principal:
Project No.: TESTNEWC00596AA
Project Name: 754-NTLGE202648-1 - Salamander Shores Hotel - Bannisters
Lot No.: - **TRN:** -

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Chris Blackford
(Construction Materials Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/12/2021

Sample Details

Sample ID / Client ID:	NEWC21S-10184 / -
Date Sampled:	07/12/2021
Source:	On-Site
Material:	Existing Ground
Specification:	No Specification
Sampling Method:	Submitted by client*
Project Location:	Salamander Bay, NSW
Sample Location:	BH02-21 - 5.5 - 5.95m

Other Test Results

Description	Method	Result	Limits

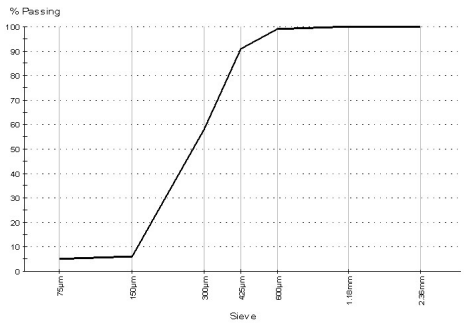
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 16/12/2021

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	91	
300µm	58	
150µm	6	
75µm	5	

Chart



Comments

*Results relate only to the items tested or sampled.

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*COFFEY TESTING PTY LTD*	job no:	***TESTSYDS 00107AA***
Principal:	*TETRATECH COFFEY PTY LTD*		
project:	*TESTNEWC00596AA - SALAMANDER SHORES HOTEL - BANNISTE*	report date:	*31 January 2022*
location:	*SALAMANDER BAY NSW*	borehole:	***BH01-21***
	test procedure: *AS 4133.1.1.1 and 4133.4.2.1*	date received:	*10 January 2022*
	test apparatus: *Matest 3000 kN compression machine 9015*		*page 1 of 1*

All samples were tested in an "As Received" condition.
Top platen 300 mm, Bottom platen 200 mm. Timer 26850

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS22W00001 / ***8.72 to 9.00 m*** / *SYDS22S00001*	*14 Jan 22* / *4.35 min*	*141 mm* / *51.8 mm* / *2.71:1*	***76.9*** **MPa**	***2.6 t/m³*** / ***0.5 %***	*Granite*	***NEWC21S-10191*** / *Defect/Shear*

8.72 to 9.00 m

SYDS_001R

\Ct-fs\zct\Sydney\Data\50. ROCK TESTING_TESTSYD-Rocks-2022\TESTSYDS00107AA - Salamander Shores Motel\[BH01-21.xlsm]Report

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

NATA Accredited Laboratory
No. 431

Date: *31 Jan 2022*

Authorised Signature:
Alan Cocks
Rock Testing Manager

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*COFFEY TESTING PTY LTD*	job no:	***TESTSYDS 00107AA***
Principal:	*TETRATECH COFFEY PTY LTD*		
project:	*TESTNEWC00596AA - SALAMANDER SHORES HOTEL - BANNISTE*	report date:	*31 January 2022*
location:	*SALAMANDER BAY NSW*	borehole:	***BH02-21***
	test procedure: *AS 4133.1.1.1 and 4133.4.2.1*	date received:	*10 January 2022*
	test apparatus: *Matest 3000 kN compression machine 9015*		*page 1 of 1*

All samples were tested in an "As Received" condition.
Top platen 300 mm, Bottom platen 200 mm. Timer 26850

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS22W00001 / ***11.37 to 11.63 m*** / *SYDS22S00002*	*14 Jan 22* / *5.58 min*	*140 mm* / *51.8 mm* / *2.70:1*	***203***	***2.6 t/m³*** / ***0.8 %***	*Granite*	***NEWC21S-10192*** / *Axial*

11.37 to 11.63 m

SYDS_001R

\Ct-fs\zct\Sydney\Data\50. ROCK TESTING_TESTSYD-Rocks-2022\TESTSYDS00107AA - Salamander Shores Motel\[BH02-21.xlsm]Report

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

NATA Accredited Laboratory
No. 431

Date: *31 Jan 2022*

Authorised Signature:
Alan Cocks
Rock Testing Manager

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*COFFEY TESTING PTY LTD*	job no:	***TESTSYDS 00107AA***
Principal:	*TETRATECH COFFEY PTY LTD*		
project:	*TESTNEWC00596AA - SALAMANDER SHORES HOTEL - BANNISTE*	report date:	*31 January 2022*
location:	*SALAMANDER BAY NSW*	borehole:	***BH04-21***
	test procedure: *AS 4133.1.1.1 and 4133.4.2.1*	date received:	*10 January 2022*
	test apparatus: *Matest 3000 kN compression machine 9015*		*page 1 of 1*

All samples were tested in an "As Received" condition.
Top platen 300 mm, Bottom platen 200 mm. Timer 26850

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS22W00001 / ***11.26 to 11.52 m*** / *SYDS22S00003*	*14 Jan 22* / *7.17 min*	*133 mm* / *51.7 mm* / *2.58:1*	***189***	***2.6 t/m³*** / ***0.9 %***	*Granite*	***NEWC21S-10193*** / *Axial/defect*

11.26 to 11.52 m

SYDS_001R

\Ct-fs\zct\Sydney\Data\50. ROCK TESTING_TESTSYD-Rocks-2022\TESTSYDS00107AA - Salamander Shores Motel\[BH04-21.xlsm]Report

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

NATA Accredited Laboratory
No. 431

Date: *31 Jan 2022*

Authorised Signature:
Alan Cocks
Rock Testing Manager

TETRA TECH COFFEY
A TETRA TECH COMPANY

Point Load Strength Index Test Results

Project No: **754-NTLGE202648-1**

Sheet: **1** of **4**

Client: **Salamander Properties Pty Ltd ATF**

Principal:

Project: **Salamander Shores Hotel**

Location: **147 Soldiers Point Rd, Soldiers Point NSW 2317**

Office: **Newcastle**

Date: **25-1-2022**

By: **DB**

Checked: **HL**

Test Method: AS 4133.4.1-2007 (2016)

Test Machine: 0

Calibration Date: 8-4-2019

Sampling Technique: Point Load Tester

Storage History:

Moisture Condition: Samples tested in an 'as received' condition

Loading Rate:

Sampling Date: 6-12-2021

Testing Date: 25-1-2022

Tested By: DB

Rock Type	Location	Depth (m)	Diametral Tests					Axial, Block, and Irregular Lump Tests							Moisture Content (%)	Strength Classification
			D (mm)	L (mm)	P (kN)	$I_{s(50)}$ (MPa)	Failure Mode	W (mm)	D (mm)	L (mm)	P (kN)	I_s (MPa)	$I_{s(50)}$ (MPa)	Failure Mode		
Rhyodacite	**bh01**	**7.94**	52	40	30.03	**11.3**	Bad break									**EH**
Rhyodacite	**bh01**	**8.67**	52	40	24.27	**9.14**	Through substance									**VH**
Rhyodacite	**bh01**	**9.73**	52	32	22.25	**8.38**	Through substance									**VH**

TETRA TECH COFFEY
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Project No: **754-NTLGE202648-1**

Point Load Strength Index Test Results

Sheet: **2** of **4**

Client: **Salamander Properties Pty Ltd ATF**

Office: **Newcastle**

Principal:

Date: **25-1-2022**

Project: **Salamander Shores Hotel**

By: **DB**

Location: **147 Soldiers Point Rd, Soldiers Point NSW 2317**

Checked: **HL**

Test Method: AS 4133.4.1-2007 (2016)

Sampling Technique: Point Load Tester

Sampling Date: 7-12-2021

Storage History:

Testing Date: 25-1-2022

Test Machine: 0

Moisture Condition: Samples tested in an 'as received' condition

Tested By: DB

Calibration Date: 8-4-2019

Loading Rate:

Rock Type	Location	Depth	Diametral Tests					Axial, Block, and Irregular Lump Tests							Moisture Content	Strength Classification
			D	L	P	$I_{s(50)}$	Failure Mode	W	D	L	P	I_s	$I_{s(50)}$	Failure Mode		
		(m)	(mm)	(mm)	(kN)	(MPa)		(mm)	(mm)	(mm)	(kN)	(MPa)	(MPa)		(%)	
Rhyodacite	**BH02-21**	**10.60**	52	49	0.13	**0.05**	Parallel to bedding	52	42		0.14	0.05	**0.05**	Through substance		**VL**
Rhyodacite	**BH02-21**	**11.68**	52	40	29.74	**11.19**	Parallel to bedding	52	44		32.2	11.05	**11.44**	Through substance		**EH**
Rhyodacite	**BH02-21**	**12.82**	52	36	29.83	**11.23**	Through substance									**EH**
Rhyodacite	**BH02-21**	**13.06**	52	40	28.05	**10.56**	Through substance									**EH**

TETRA TECH COFFEY
A TETRA TECH COMPANY

Point Load Strength Index Test Results

Project No: **754-NTLGE202648-1**

Sheet: **3** of **4**

Client: **Salamander Properties Pty Ltd ATF**

Principal:

Project: **Salamander Shores Hotel**

Location: **147 Soldiers Point Rd, Soldiers Point NSW 2317**

Office: **Newcastle**

Date: **25-1-2022**

By: **DB**

Checked: **HL**

Test Method: AS 4133.4.1-2007 (2016)

Test Machine: 0

Calibration Date: 8-4-2019

Sampling Technique: Point Load Tester

Storage History:

Moisture Condition: Samples tested in an 'as received' condition

Loading Rate:

Sampling Date: 9-12-2021

Testing Date: 25-1-2022

Tested By: DB

Rock Type	Location	Depth (m)	Diametral Tests					Axial, Block, and Irregular Lump Tests							Moisture Content (%)	Strength Classification
			D (mm)	L (mm)	P (kN)	$I_{s(50)}$ (MPa)	Failure Mode	W (mm)	D (mm)	L (mm)	P (kN)	I_s (MPa)	$I_{s(50)}$ (MPa)	Failure Mode		
Rhyodacite	**BH03-21**	**2.84**	52	30	1.91	**0.72**	Bad break									**M**
Rhyodacite	**BH03-21**	**3.69**	52	42	7.18	**2.7**	Along defect									**H**
Rhyodacite	**BH03-21**	**4.94**	52	47	24.19	**9.11**	Through substance									**VH**
Rhyodacite	**BH03-21**	**5.49**	52	38	6.21	**2.34**	Along defect									**H**
Rhyodacite	**BH03-21**	**6.30**	52	40	19.64	**7.39**	Through substance									**VH**

TETRA TECH COFFEY
A TETRA TECH COMPANY

Point Load Strength Index Test Results

Project No: **754-NTLGE202648-1**

Sheet: **4** of **4**

Client: **Salamander Properties Pty Ltd ATF**

Principal:

Project: **Salamander Shores Hotel**

Location: **147 Soldiers Point Rd, Soldiers Point NSW 2317**

Office: **Newcastle**

Date: **25-1-2022**

By: **DB**

Checked: **HL**

Test Method: AS 4133.4.1-2007 (2016)

Test Machine: 0

Calibration Date: 8-4-2019

Sampling Technique: Point Load Tester

Storage History:

Moisture Condition: Samples tested in an 'as received' condition

Loading Rate:

Sampling Date: 10-12-2021

Testing Date: 25-1-2022

Tested By: DB

Rock Type	Location	Depth (m)	Diametral Tests					Axial, Block, and Irregular Lump Tests							Moisture Content (%)	Strength Classification
			D (mm)	L (mm)	P (kN)	$I_{s(50)}$ (MPa)	Failure Mode	W (mm)	D (mm)	L (mm)	P (kN)	I_s (MPa)	$I_{s(50)}$ (MPa)	Failure Mode		
Rhyodacite	**BH04-21**	**9.48**	52	40	8.06	**3.03**	Bad break									**VH**
Rhyodacite	**BH04-21**	**10.35**	52	37	8.02	**3.02**	Bad break									**VH**
Rhyodacite	**BH04-21**	**11.57**	52	30	28.36	**10.67**	Through substance									**EH**
Rhyodacite	**BH04-21**	**12.26**	52	40	18.42	**6.93**	Through substance	52	43		5	1.76	**1.81**	Bad break		**H / VH**
Rhyodacite	**BH04-21**	**13.47**	52	45	15.96	**6.01**	Through substance									**VH**
Rhyodacite	**BH04-21**	**14.25**	52	30	0.49	**0.18**	Along defect	52	31		0.47	0.23	**0.22**	Bad break		**L**

APPENDIX C: PREVIOUS BOREHOLE LOGS

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH 1**
Sheet	1 of 3
Project No:	**GEOTWARA20848AA**
Client:	**SAKE DEVELOPMENT PTY LTD**
Date started:	**23.2.2009**
Principal:	
Date completed:	**23.2.2009**
Project:	**PROPOSED HOTEL REDEVELOPMENT**
Logged by:	**GDT**
Borehole Location:	**REFER TO FIGURE 1**
Checked by:	

drill model and mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 10

hole diameter: 51 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT		N							FILL: ASHPALT				PAVEMENT GRAVEL
								GC	**FILL:** Clayey GRAVEL, fine to medium grained, sub rounded to sub angular, brown mottled red and dark brown, medium plasticity clay, with some fine to coarse grained sand.	M	D		
					9.5	0.5		CL	**Sandy CLAY:** medium plasticity, brown mottled yellow and white, fine to coarse grained sand.	M/W	H		EXTREMELY WEATHERED RHYODACITE
					9.0	1.0							
							× ×		**RHYODACITE:** fine grained with phenocrysts of quartz and black feldspar, pink, mottled black and white.		VD		HIGHLY WEATHERED RHYODACITE
			None Observed		8.5	1.5			Borehole BH 1 continued as cored hole				
					8.0	2.0							
					7.5	2.5							
					7.0	3.0							
					6.5	3.5							
					6.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, N nil, C casing

penetration: 1 2 3 4 — no resistance ranging to refusal

water: 10/1/98 water level on date shown; water inflow; water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 1**
Sheet 2 of 3
Project No: **GEOTWARA20848AA**

Client: ***SAKE DEVELOPMENT PTY LTD***
Date started: ***23.2.2009***
Principal:
Date completed: ***23.2.2009***
Project: ***PROPOSED HOTEL REDEVELOPMENT***
Logged by: ***GDT***
Borehole Location: ***REFER TO FIGURE 1***
Checked by:

drill model & mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 10
hole diameter: 51 mm | Drilling fluid: Water | Northing: | bearing: | datum: AHD

drilling information					material substance						rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa (D- diametral, A- axial)	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
			9.5	0.5		Continued from non-cored borehole						
			9.0	1.0								
NMLC		None Observed	8.5	1.5	×	**RHYODACITE:** fine grained with phenocrysts of quartz and black feldspar, pink, grey mottled black and white.	HW / SW			66		JT, 45°, IR, RO, CO, clay JT, 50°, PL, RO, CO, grey, clay JT, 0°, PL, RO, CO, grey, clay JT, 30°, IR, RO, CN JT, 10°, IR, RO, CN
			8.0	2.0	×							
			7.5	2.5	×	**RHYODACITE:** CLAY, laminated, yellow, grey mottled green.	HA					JT, 40°, IR, RO, CN
			7.0	3.0	×	**RHYODACITE:** fine grained with phenocrysts, grey mottled pink.	FR			100		JT, 32°, PL, RO, VN, ironstained JT, 85°, (Hematite?), PL, RO, VN, black stained JT, 45°, IR, RO, CN
			6.5	3.5	×							
			6.0	4.0	×							

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No.	BH 1		
Sheet	3 of 3		
Project No:	GEOTWARA20848AA		
Client:	SAKE DEVELOPMENT PTY LTD	Date started:	23.2.2009
Principal:		Date completed:	23.2.2009
Project:	PROPOSED HOTEL REDEVELOPMENT	Logged by:	GDT
Borehole Location:	REFER TO FIGURE 1	Checked by:	

drill model & mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 10

hole diameter: 51 mm | Drilling fluid: Water | Northing: | bearing: | datum: AHD

drilling information					material substance						rock mass defects		
method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular	general
NMLC		None Observed	5.5	4.5		**RHYODACITE:** fine grained with phenocrysts, grey mottled pink. *(continued)*	FR			100		JT, 50°, IR, RO, CN	
												JT, 50°, PL, RO, CN	
												JT, 40°, PL, RO, CN	
												JT, 45°, PL, SO, VN, clay	
												JT, 25°, PL, SO, CN	
												JT, 0°, PL, RO, CN	
			5.0	5.0						98		JT, 60°, PL, RO, CN	
												JT, 60°, PL, RO, CN	
												JT, 45°, PL, RO, CN	
			4.5	5.5									
												JT, 15°, IR, RO, CN	
						BH 1 terminated at 5.61m							
			4.0	6.0									
			3.5	6.5									
			3.0	7.0									
			2.5	7.5									
			2.0	8.0									

method

DT	diatube
AS	auger screwing
AD	auger drilling
RR	roller/tricone
CB	claw or blade bit
NMLC	NMLC core
NQ, HQ, PQ	wireline core

core-lift

- casing used
- barrel withdrawn

graphic log/core recovery

- core recovered - graphic symbols indicate material
- no core recovered

water

- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- 25 water pressure test result (lugeons) for depth interval shown

weathering

FR	fresh
SW	slightly weathered
MW	moderately weathered
HW	highly weathered
XW	extremely weathered
DW	distinctly weathered (covers MW and HW)

strength

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

defect type

JT	joint
PT	parting
SM	seam
SZ	sheared zone
SS	sheared surface
CS	crushed seam

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

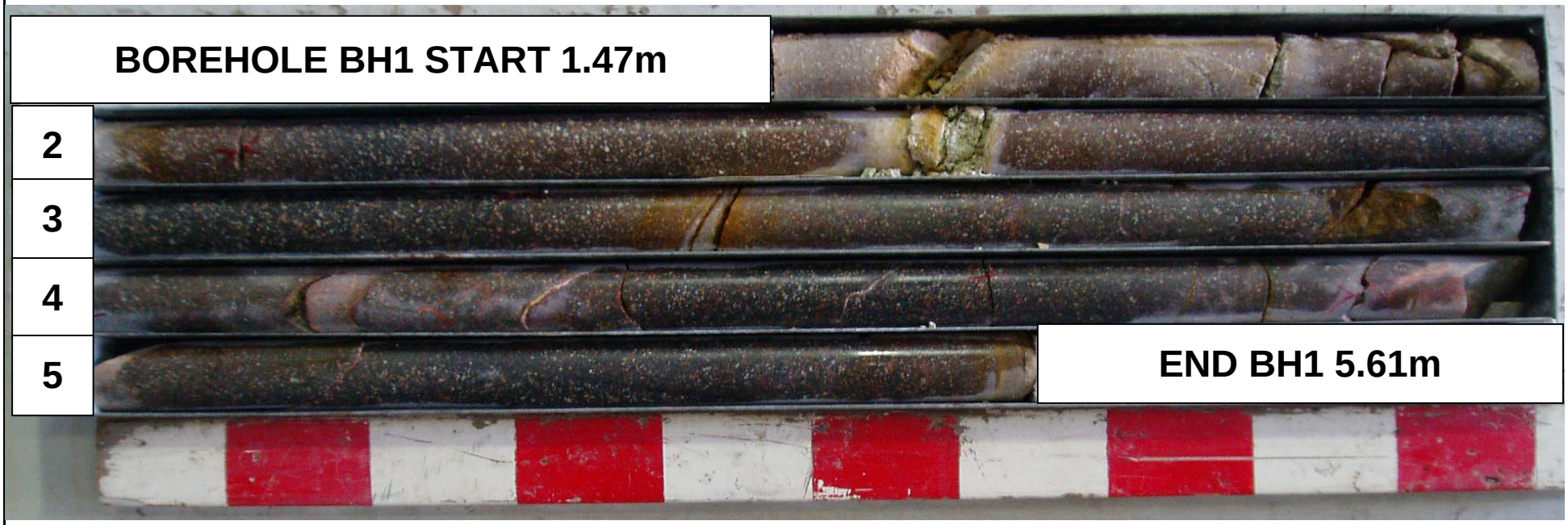
roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

coating

CN	clean
SN	stained
VN	veneer
CO	coating

BOREHOLE BH1 START 1.47m



1000mm

drawn	**AMT**	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	**SAKE DEVELOPMENT PTY LTD**
approved			project:	**SALAMANDER SHORES HOTTEL REDEVELOPMENT** **SOLDIERS POINT**
date	**23-Mar-09**		title:	**CORE PHOTO**
scale	**AS SHOWN**		project no:	**GEOTWARA20848AA-AB** **BH 1**
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20800 - 20899\WARA20848AA\[GEOTWARA20848AA - AB BH1 CORE PHOTO.xls]A4 Landscape Figure

coffey geotechnics

Borehole No. **BH 2**

Sheet 1 of 3

Project No: **GEOTWARA20848AA**

Engineering Log - Borehole

Client: ***SAKE DEVELOPMENT PTY LTD***

Date started: ***23.2.2009***

Principal:

Date completed: ***23.2.2009***

Project: ***PROPOSED HOTEL REDEVELOPMENT***

Logged by: ***GDT***

Borehole Location: ***REFER TO FIGURE 1***

Checked by:

drill model and mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 12

hole diameter: 51 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT		N							**Sandy GRAVEL:** fine to coarse grained, angular, brown pink, fine to coarse grained sand, trace of fines.	D	MD		ROAD BASE
					11.5	0.5		SP	**SAND:** fine to medium grained, pale brown, trace of fines.	M	MD		AEOLIAN
					11.0	1.0		CL	**Sandy CLAY:** medium plasticity, brown, fine to coarse grained sand with some fine sub angular to angular gravel.	M<Wp	H		EXTREMELY WEATHERED RHYODACITE
					10.5	1.5	× × ×		**RHYODACITE:** fine grained with phenocrysts of quartz and black feldspar pink, brown colour.				HIGHLY WEATHERED RHYODACITE
			None Observed		10.0	2.0			Borehole BH 2 continued as cored hole				
					9.5	2.5							
					9.0	3.0							
					8.5	3.5							
					8.0	4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration 1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE BH1- BH2.GPJ COFFEY.GDT 3.23.09

Form GEO 5.3 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 2**
Sheet 2 of 3
Project No: **GEOTWARA20848AA**

Client: ***SAKE DEVELOPMENT PTY LTD***
Date started: ***23.2.2009***

Principal:
Date completed: ***23.2.2009***

Project: ***PROPOSED HOTEL REDEVELOPMENT***
Logged by: ***GDT***

Borehole Location: ***REFER TO FIGURE 1***
Checked by:

drill model & mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 12
hole diameter: 51 mm | Drilling fluid: Water | Northing: | bearing: | datum: AHD

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
			11.5	0.5								
			11.0	1.0								
			10.5	1.5		Continued from non-cored borehole						SM, 0°, 40mm, PL, SO, clay
NMLC		None Observed	10.0	2.0	×	**RHYODACITE:** fine grained with phenocrysts of quartz and black feldspar, pink, brown.	HW / SW / HW / SW / HW / SW / HW / SW			38		SM, 0°, 20mm, PL, SO, clay SM, 15°, 60mm, IR, SO, clay JT, 10°, PL, RO, CN SM, 45°, 50mm, IR, RO, Sandy Clay.
			9.5	2.5			HW / F					JT, 5°, PL, RO, CN, clay JT, 60°, PL, RO, CN SM, 55°, 5mm, PL, RO, clay JT, 25°, PL, RO, CN
			9.0	3.0						63		JT, 25°, PL, RO, VN, clay JT, 25°, PL, RO, VN, sand JT, 3°, PL, RO, CN
			8.5	3.5		Becomes grey mottled pink and white.	HW / F					JT, 60°, PL, SO, VN, clay SM, 60°, 70mm, PL, SO, clay JT, 60°, PL, SO, VN, clay JT, 30°, IR, RO, CN JT, 50°, IR, RO, CN JT, 37°, IR, RO, VN, clay JT, 10°, PL, RO, CN
			8.0	4.0						98		JT, 52°, PL, RO, CN JT, 88°, IR, RO, CN JT, 43°, PL, RO, CN

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

roughness
VR very rough
RO rough
SO smooth
SL slickensided

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 2**
Sheet 3 of 3
Project No: **GEOTWARA20848AA**

Client: ***SAKE DEVELOPMENT PTY LTD***
Date started: ***23.2.2009***

Principal:
Date completed: ***23.2.2009***

Project: ***PROPOSED HOTEL REDEVELOPMENT***
Logged by: ***GDT***

Borehole Location: ***REFER TO FIGURE 1***
Checked by:

drill model & mounting: Land Cruiser | Easting: | slope: -90° | R.L. Surface: 12
hole diameter: 51 mm | Drilling fluid: Water | Northing: | bearing: | datum: AHD

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness. particular / general
NMLC		None Observed	7.5	4.5		**RHYODACITE:** fine grained with phenocrysts of quartz and black feldspar, pink, brown. *(continued)*	F			98		JT, 0°, IR, RO, CO, sand JT, 0°, IR, RO, CN JT, 30°, PL, SO, CN JT, 10°, PL, SO, CO, clay
			7.0	5.0								JT, 3°, IR, RO, CN
			6.5	5.5								JT, 5°, PL, RO, CN
			6.0	6.0						100		
			5.5	6.5								JT, 71°, PL, RO, VN
			5.0	7.0		Core Loss				97		SM, 0°, 50mm, IR, RO, Sandy Clay and fine gravel. JT, 37°, PL, RO, CN
						BH 2 terminated at 7m						
			4.5	7.5								
			4.0	8.0								

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

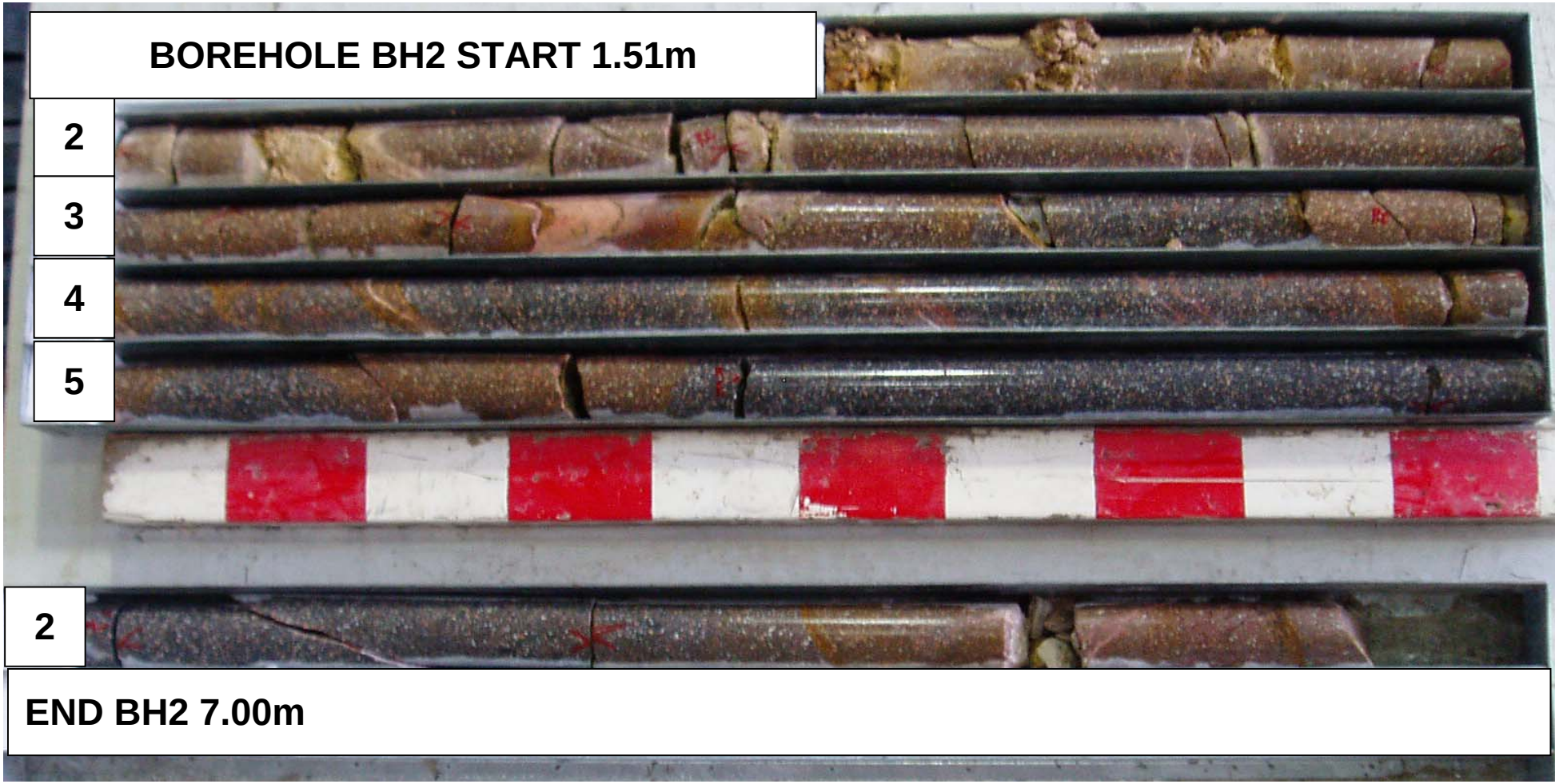
defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

BOREHOLE BH2 START 1.51m



END BH2 7.00m

1000mm

drawn	**AMT**	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	**SAKE DEVELOPMENT PTY LTD**
approved			project:	**SALAMANDER SHORES HOTTEL REDEVELOPMENT** **SOLDIERS POINT**
date	**23-Mar-09**		title:	**CORE PHOTO**
scale	**AS SHOWN**		project no:	**GEOTWARA20848AA-AB** **BH 2**
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20800 - 20899\WARA20848AA\[GEOTWARA20848AA - AB BH2 CORE PHOTO.xls]A4 Landscape Figure

coffey geotechnics

Engineering Log - Borehole

Borehole No. **HA 1**

Sheet 1 of 1

Project No: **GEOTWARA20848AA**

Client: **SAKE DEVELOPMENT PTY LTD**

Date started: **9.12.2008**

Principal:

Date completed: **9.12.2008**

Project: **PROPOSED HOTEL REDEVELOPMENT**

Logged by: **GDT**

Borehole Location: **REFER TO FIGURE 1**

Checked by:

drill model and mounting: Hand Auger | Easting: | slope: -90° | R.L. Surface: 13

hole diameter: 62 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SC	**TOPSOIL:** Clayey SAND, fine to medium grained, dark brown, medium plasticity fines, some sub angular gravel, trace of rootlets.	M			TOPSOIL
								GP	**Sandy GRAVEL:** fine grained, angular, pale grey to white with fine to coarse grained sand.				EXTREMELY WEATHERED RHYODACITE
					12.5	0.5			Terminated at refusal on Highly Weathered Rhyodacite. Borehole HA 1 terminated at 0.31m				
					12.0	1.0							
					11.5	1.5							
					11.0	2.0							
					10.5	2.5							

method
AS auger screwing*
AD auger drilling*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
*bit shown by suffix
e.g. ADT

support
M mud N nil
C casing

penetration 1 2 3 4
no resistance ranging to refusal

water
10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
V vane shear (kPa)
P pressuremeter
Bs bulk sample
E environmental sample
R refusal

classification symbols and soil description
based on unified classification system

moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/density index
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

BOREHOLE HA1 - HA7.GPJ COFFEY.GDT 3.24.09

Form GEO 5.3 Issue 3 Rev.2

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Engineering Log - Borehole

Borehole No.	HA 2
Sheet	1 of 1
Project No:	GEOTWARA20848AA
Date started:	9.12.2008
Date completed:	9.12.2008
Logged by:	GDT
Checked by:	

Client: SAKE DEVELOPMENT PTY LTD

Principal:

Project: PROPOSED HOTEL REDEVELOPMENT

Borehole Location: REFER TO FIGURE 1

drill model and mounting: Hand Auger | Easting: | slope: -90° | R.L. Surface: 18

hole diameter: 62 mm | Northing | bearing: | datum: AHD

drilling information							material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SW	**TOPSOIL:** SAND, fine to medium grained, brownish grey speckled white, some organics and rootlets.	D			TOPSOIL
								SC	**Gravelly Clayey SAND:** fine to coarse grained, brown mottled yellow, medium plasticity fines, some sub angular gravel.	M	MD		EXTREMELY WEATHERED RHYODACITE
				D									
					17.5	0.5			Borehole HA 2 terminated at 0.45m				
					17.0	1.0							
					16.5	1.5							
					16.0	2.0							
					15.5	2.5							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration 1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE HA1 - HA7.GPJ COFFEY.GDT 3.24.09

Form GEO 5.3 Issue 3 Rev 2

coffey geotechnics

Engineering Log - Borehole

Borehole No.	HA 3
Sheet	1 of 1
Project No:	GEOTWARA20848AA
Client:	SAKE DEVELOPMENT PTY LTD
Date started:	9.12.2008
Principal:	
Date completed:	9.12.2008
Project:	PROPOSED HOTEL REDEVELOPMENT
Logged by:	GDT
Borehole Location:	REFER TO FIGURE 1
Checked by:	

drill model and mounting:	Hand Auger	Easting:	slope: -90°	R.L. Surface:	21
hole diameter:	62 mm	Northing	bearing:	datum:	AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SP	**TOPSOIL:** SAND, fine to medium grained, brownish grey with some rootlets and traces of organics.	D			TOPSOIL
								SC	**Clayey SAND:** fine to coarse grained, brown with low to medium plasticity clay and minor cobbles at top, trace of cobbles less than 100mm in dimension.	M			RESIDUAL
					20.5	0.5							
				D				SP	**Gravelly SAND:** fine to coarse grained, yellow / brown with fine to coarse grained sub angular to angular gravel.		MD		EXTREMELY WEATHERED RHYODACITE
					20.0	1.0							
									Borehole HA 3 terminated at 1m				
					19.5	1.5							
					19.0	2.0							
					18.5	2.5							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, C casing, N nil

penetration: 1 2 3 4 — no resistance ranging to refusal

water: 10/1/98 water level on date shown; water inflow; water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE HA1 - HA7.GPJ COFFEY.GDT 3.24.09

Form GEO 5.3 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Borehole

Borehole No. **HA 4**

Sheet 1 of 1

Project No: **GEOTWARA20848AA**

Client: **SAKE DEVELOPMENT PTY LTD**

Date started: **9.12.2008**

Principal:

Date completed: **9.12.2008**

Project: **PROPOSED HOTEL REDEVELOPMENT**

Logged by: **GDT**

Borehole Location: **REFER TO FIGURE 1**

Checked by:

drill model and mounting: Hand Auger | Easting: | slope: -90° | R.L. Surface: 19

hole diameter: 62 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N							**TOPSOIL:** fine to coarse grained, black with rootlets.	M			TOPSOIL
								SW	**Gravelly SAND:** fine to coarse grained, pale brown with minor sub angular to angular gravel, trace of cobbles <100mm in dimension, trace of organics.				RESIDUAL
					18.5	0.5		CL	**Sandy CLAY:** medium plasticity, pale brown, mottled yellow and grey, fine grained sand.	<Wp	H		EXTREMELY WEATHERED RHYODACITE
								SC	**Clayey SAND:** fine to coarse grained, pale pink, mottled red and white, medium plasticity fines.	M			
					18.0	1.0			Borehole HA 4 terminated at 0.85m				
					17.5	1.5							
					17.0	2.0							
					16.5	2.5							

method
AS auger screwing*
AD auger drilling*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
*bit shown by suffix
e.g. ADT

support
M mud N nil
C casing

penetration
1 2 3 4 no resistance ranging to refusal

water
10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
V vane shear (kPa)
P pressuremeter
Bs bulk sample
E environmental sample
R refusal

classification symbols and soil description
based on unified classification system

moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/density index
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **HA 5**

Sheet 1 of 1

Project No: **GEOTWARA20848AA**

Client: ***SAKE DEVELOPMENT PTY LTD***

Date started: ***9.12.2008***

Principal:

Date completed: ***9.12.2008***

Project: ***PROPOSED HOTEL REDEVELOPMENT***

Logged by: ***GDT***

Borehole Location: ***REFER TO FIGURE 1***

Checked by:

drill model and mounting: Hand Auger | Easting: | slope: -90° | R.L. Surface: 17

hole diameter: 62 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SP	**SAND:** fine to coarse grained, pale brown with grass at top and rootlets.	M			AEOLIAN
				D				SC	**Clayey SAND:** fine to medium grained, dark brown with medium plasticity clay.	W	MD		EXTREMELY WEATHERED RHYODACITE
									Terminated at refusal on Highly Weathered Rhyodacite. Borehole HA 5 terminated at 0.25m				
					16.5	0.5							
					16.0	1.0							
					15.5	1.5							
					15.0	2.0							
					14.5	2.5							

method
- AS auger screwing*
- AD auger drilling*
- RR roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- B blank bit
- V V bit
- T TC bit
- *bit shown by suffix
- e.g. ADT

support
- M mud
- C casing
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- V vane shear (kPa)
- P pressuremeter
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No.	HA 6		
Sheet	1 of 1		
Project No:	GEOTWARA20848AA		
Client:	SAKE DEVELOPMENT PTY LTD	Date started:	9.12.2008
Principal:		Date completed:	9.12.2008
Project:	PROPOSED HOTEL REDEVELOPMENT	Logged by:	GDT
Borehole Location:	REFER TO FIGURE 1	Checked by:	

drill model and mounting:	Hand Auger	Easting:	slope: -90°	R.L. Surface:	14
hole diameter:	62 mm	Northing	bearing:	datum:	AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SP	**TOPSOIL:** SAND, fine to coarse grained, with organics and rootlets.	M	VL		TOPSOIL
								SC	**Clayey SAND:** fine to medium grained, dark brown to brown with medium plasticity clay, trace of angular gravel <10mm.	W			RESIDUAL
								CL	**Sandy CLAY:** medium plasticity, brown mottled yellow and red, trace of fine to coarse grained sand and fine grained gravel, sub angular to angular.	<Wp	VSt		EXTREMELY WEATHERED RHYODACITE
								CL	**Gravelly CLAY:** medium plasticity, pale brown, mottled yellow with fine grained gravel.	M			
					13.5	0.5			Terminated at refusal on Highly Weathered Rhyodacite. Borehole HA 6 terminated at 0.4m				
					13.0	1.0							
					12.5	1.5							
					12.0	2.0							
					11.5	2.5							

method
AS auger screwing*
AD auger drilling*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
*bit shown by suffix
e.g. ADT

support
M mud N nil
C casing

penetration
1 2 3 4
no resistance ranging to refusal

water
10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
V vane shear (kPa)
P pressuremeter
Bs bulk sample
E environmental sample
R refusal

classification symbols and soil description
based on unified classification system

moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE HA1 - HA7.GPJ COFFEY.GDT 3.24.09

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Engineering Log - Borehole

Borehole No. **HA 7**

Sheet 1 of 1

Project No: **GEOTWARA20848AA**

Client: ***SAKE DEVELOPMENT PTY LTD***

Date started: ***9.12.2008***

Principal:

Date completed: ***9.12.2008***

Project: ***PROPOSED HOTEL REDEVELOPMENT***

Logged by: ***GDT***

Borehole Location: ***REFER TO FIGURE 1***

Checked by:

drill model and mounting: Hand Auger | Easting: | slope: -90° | R.L. Surface: 7

hole diameter: 62 mm | Northing | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N						SP	**TOPSOIL:** SAND, fine to medium grained, grey with rootlets.	M	VL		TOPSOIL
				D				SP	**SAND:** fine to coarse grained, mottled brown, white and pale grey, angular gravel (<10mm), trace of fine to medium grained.	M			AEOLIAN
					6.5	0.5							
				D									
					6.0	1.0							
					5.5	1.5							
					5.0	2.0			Borehole HA 7 terminated at 2m				
					4.5	2.5							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration 1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense