Geotechnical Desktop Assessment

Proposed Highrise Unit Development
15 Anderson Street, Fortitude Valley

Prepared for:
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PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2022/1337

Date: 22 December 2023

Queensland Government

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June 2023

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Appendices

1.0 INTRODUCTION

This report presents the results of a geotechnical desktop assessment carried out by Core Consultants Pty Ltd (Core) for a proposed high-rise unit development at 15 Anderson Street, Fortitude Valley.

The work was carried out for Property Projects Australia Pty Ltd (PPA) in accordance with Core's proposal Q004203-001-L-Rev0, dated 28 April 2023.

The assessment has been carried out based on the results of a review of available public information and a previous report provided by the client, together with preliminary comments and recommendations regarding:

- Earthworks, including excavation conditions, reuse of materials, compaction and workability, subgrade preparation, indicative working platform requirements for piling rigs
- Temporary and permanent batter slopes and suitable temporary support options including basement retaining walls and design parameters
- Likely groundwater conditions and inflow during construction, permanent groundwater management, impacts of dewatering on surrounding properties.
- Suitable foundation types including shallow footings and piles if required, design parameters, reduction factors and estimated settlements
- Assessment of earthquake site sub-soil class to AS1170.4-2007 Part 4
- Subgrade design parameters at basement level and crossover driveway
- Presence of acid sulfate soils and any associated management requirements
- Recommendations for detailed geotechnical investigation.

2.0 PROPOSED DEVELOPMENT

It is understood that the proposed development (refer Images 1 and 2 below) is a twenty-five level building with a three level inground basement carpark. It is expected that the column loads might be of the order of up to 25,000 kN. Bulk excavation level (BEL) of RL -1.2 m is expected requiring cut generally of up to about 10 m at the boundaries and locally deeper for the lift overun; the basement is set back from all boundaries except where it adjoins a highset timber house in the western corner.

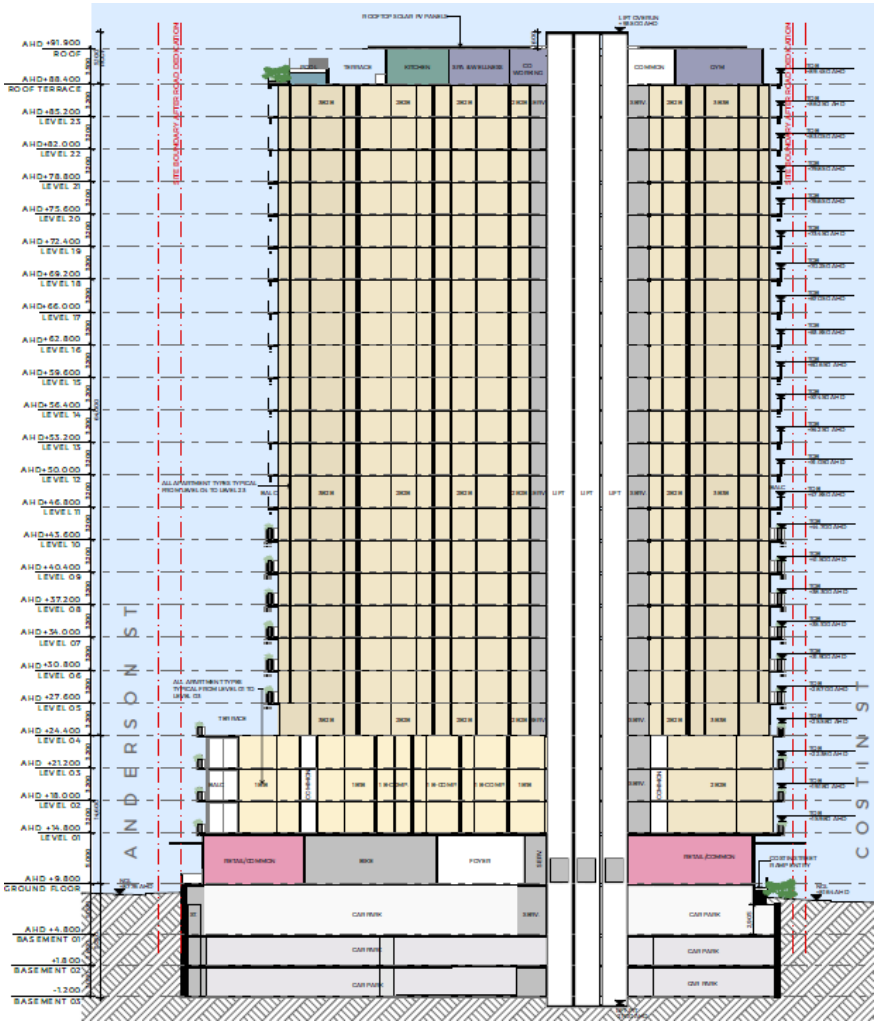


Image 1 – Cross Section of Proposed Development

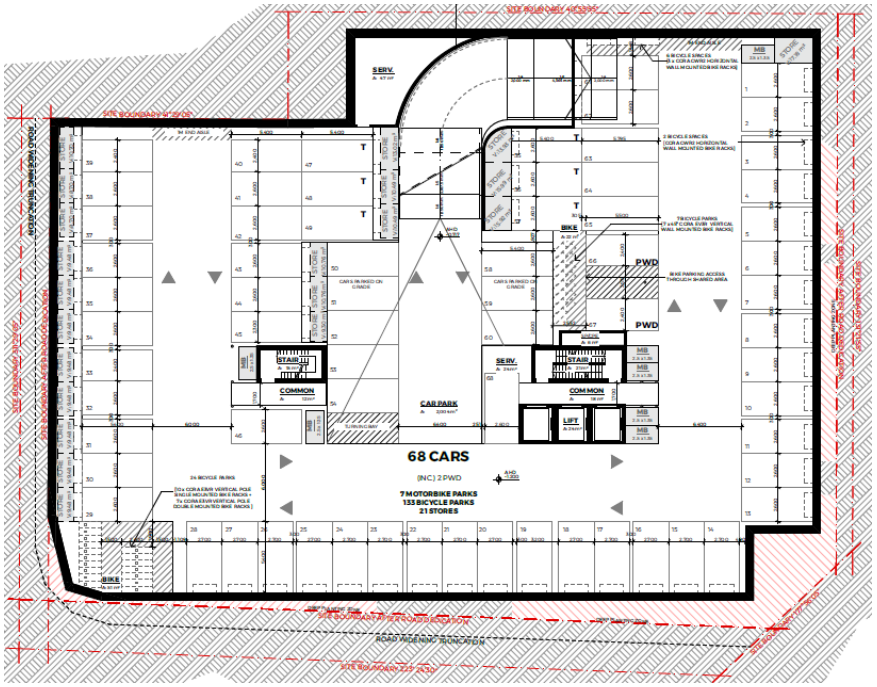


Image 2 – Basement Level Plan of Proposed Development

3.0 SITE DESCRIPTION

The site is located at 15 Anderson Street, Fortitude Valley and is approximately 65 m by 50 m and adjoined by Anderson Street to the southwest, Water Street to the southeast, Costin Street to the northeast and highset timber buildings and an open carpark along the northwest boundary. An aerial view of the site is shown in Image 3.

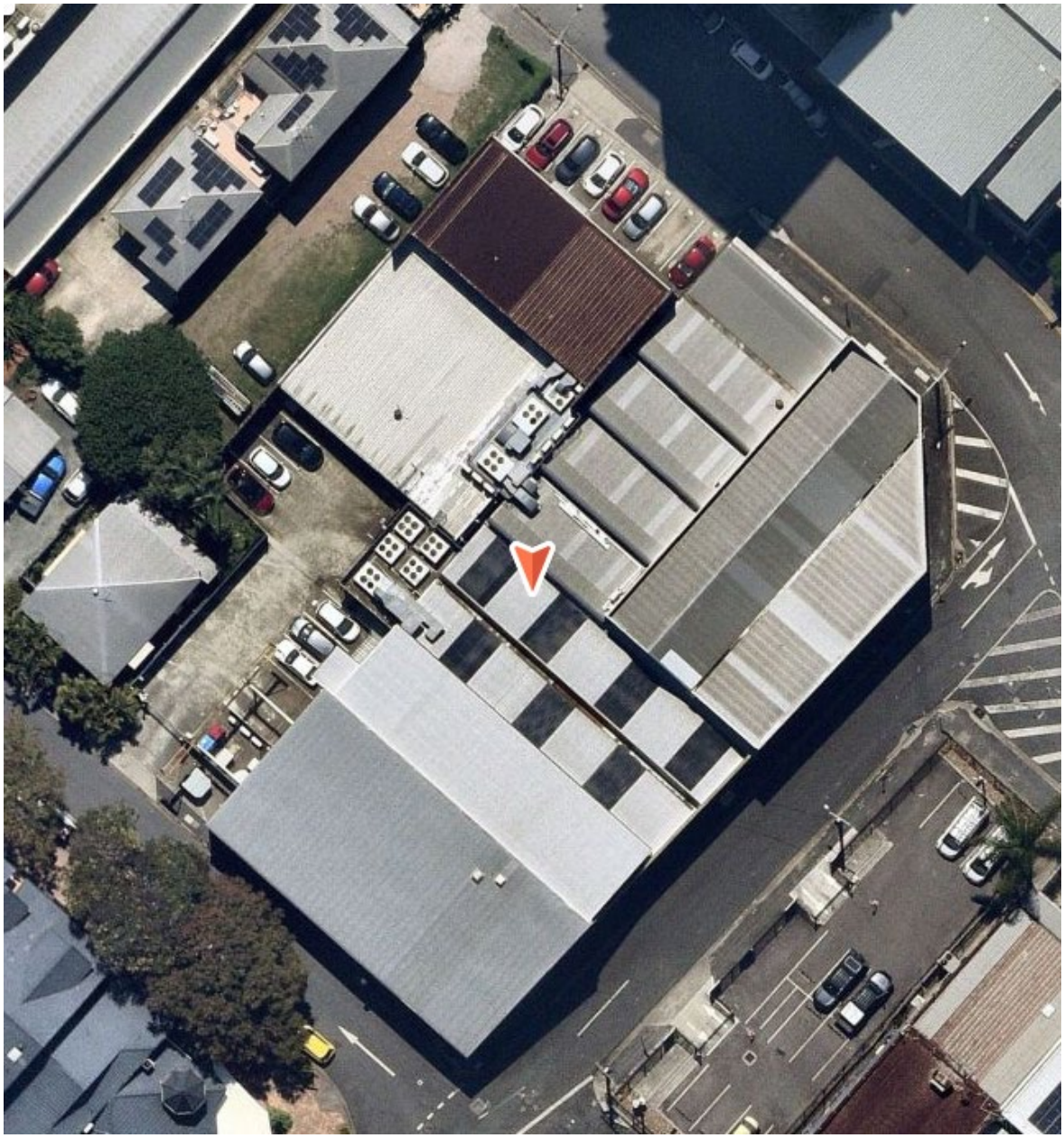


Image 3: Site Location

Site conditions including adjoining properties are shown below in Images 4 to 6.

Currently the site is occupied by a two-level office building and former industrial buildings converted to a training college with concrete pavements covering the remaining area. Apart from the highset timber buildings along the northwest boundary, the surrounding buildings comprise three level brick units to the southwest, a carpark and two-level commercial brick and reinforced concrete building to the southwest and reinforced concrete multilevel unit buildings and multilevel carpark to the northeast which are of modern construction.

The site falls from RL 9.6 m to RL 7.6 m towards the east.

Image 4: View along Anderson Street looking southeast (Google Earth, annotations by Core)

Image 5: View along Water Street looking southwest (Google Earth, annotations by Core)

Image 6: View along Costin Street looking southeast (Google Earth, annotations by Core)

4.0 REVIEW OF AVAILABLE INFORMATION

4.1 Published Geological Information

Available geological information[1] indicates that the site is underlain by Brisbane Tuff comprising '*Rhyolitic tuff, ignimbrite, agglomerate, conglomerate, sandstone, shale.'*. Quaternary Alluvium comprising '*Clay, silt, sand and gravel; flood-plain alluvium.'* is present about 150 m to the east. The Tuff is expected to overlie Neranleigh-Fernvale beds comprising '*Mudstone, shale, arenite, chert, jasper, basic metavolcanics, pillow lava, conglomerate'* at significant depth. An extract of the regional geology map is shown below in Image 7.

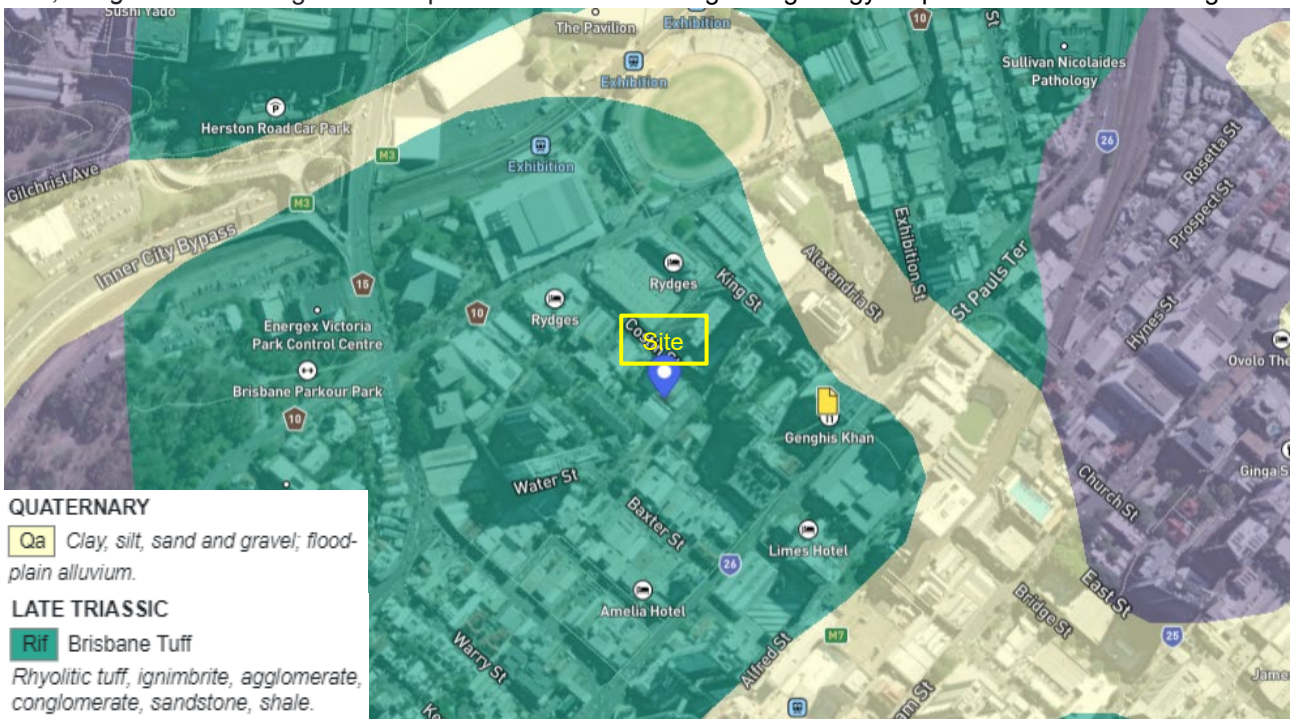


Image 7: Extract of QLD geology dataset.

[1] Queensland Geology Database 2017 https://qgd.org.au

4.2 Published Acid Sulfate Soil and Groundwater Bore Information

Published ASS information[2] (refer Image 8 below) shows that the site is zoned Cq(p4) extremely low (1-5%) probability of ASS. The nearest mapped zone of high probability ASS is shown about 0.5 km to the east.

Image 8: Extract of QLD acid sulfate dataset with registered groundwater bores

The information for the nearest groundwater bore 194680 located about 150 m to the east is reproduced below in Image 9. No groundwater level information is shown on the records for this and the other nearby bores.

Strata Logs

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	3.00	CLAY
2	3.00	20.00	BRISBANE TUFF

Image 9: Extract of Registered Groundwater Bore 194680

4.3 Previous Investigation Reports by Others

A Preliminary Site Investigation report (J000818 dated 17 February 2022 by Range Environmental Consultants) undertaken for contamination assessment was provided by the client for review. The report included thirteen shallow boreholes. Also in the report were appended an Environmental Site Assessment (report 02628 dated 30 April 2002 by Butler Partners) and a Preliminary Environmental Site Assessment (report 02628A dated 18 August 2003 by Butler Partners) which included thirteen shallow environmental sampling boreholes in total.

[2] 1:100,000 QGD Acid Sulfate Soil Map 1 CSIRO https://qgd.org.au

In summary, the subsurface conditions encountered in the previous boreholes comprised:

- typically about 0.5 m to 2.5 m of silty clay and silty sand uncontrolled fill
- residual silty clays to about 1 m to 4.5 m below ground level (bgl)
- extremely weathered Tuff, with refusal at 2.1 m to 3 m bgl in some of the boreholes

Groundwater was only encountered in two boreholes as perched groundwater in the fill at 1.1 m bgl and 1.6 m bgl.

4.4 Nearby Investigations by Core

Previous geotechnical investigations including borehole drilling and seismic shear wave testing as well as inspection of basement construction works for developments in Tuff in the local Fortitude Valley area were also reviewed to provide further background information on typical conditions on the rock conditions. Some extracts form these reports are shown below in Images 10 to 12.

From these, typically in the upper 3 m the Tuff is fractured, weathered and medium strength, increasing to high strength, and then below that, slightly fractured, less weathered and high or very high strength. The dominant jointing in the Tuff is typically subvertical to about 70°.

Images 10a and 10b – Nearby excavation face in Tuff (St Pauls Terrace)

Image 11 – Rock Core sample in Tuff

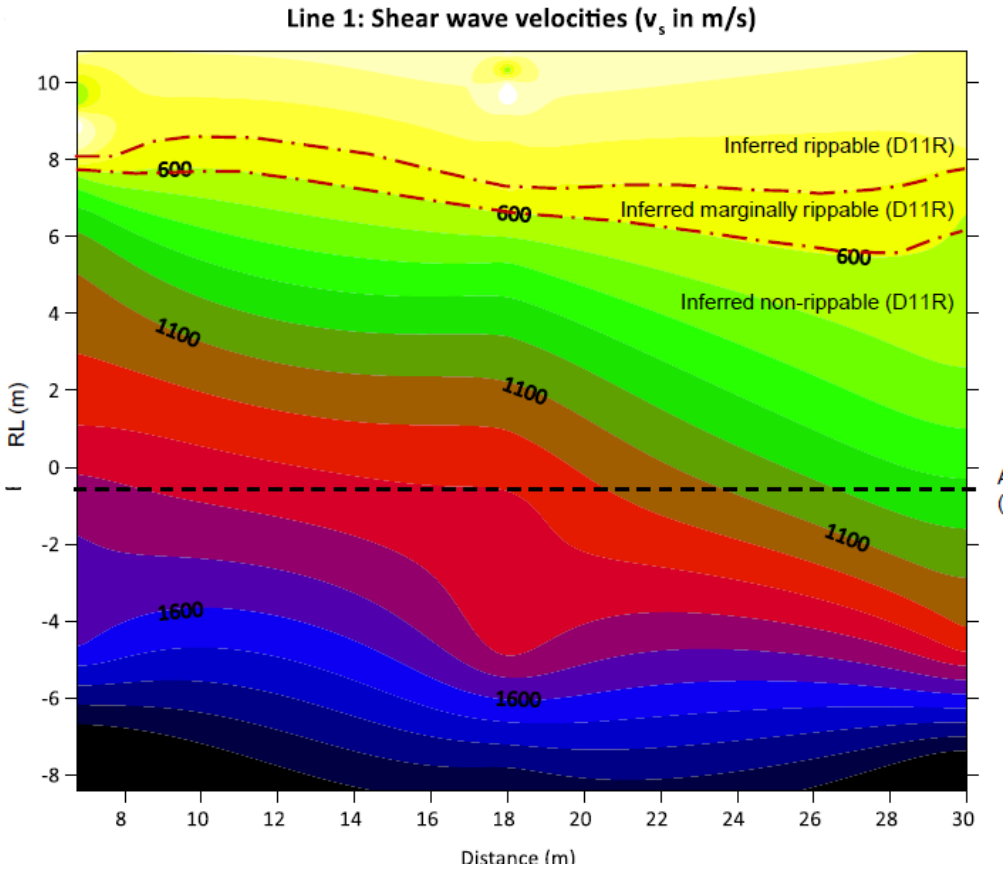


Image 12 – Seismic Shear Wave Velocity Profile in Tuff

5.0 PRELIMINARY COMMENTS & RECOMMENDATIONS

5.1 Earthworks including Basement Construction

Excavations for the basement construction is expected to encounter surface fill and residual soils to about 1 m to 4 m bgl, overlying medium strength, fractured Tuff, becoming high and very high strength slightly fractured Tuff.

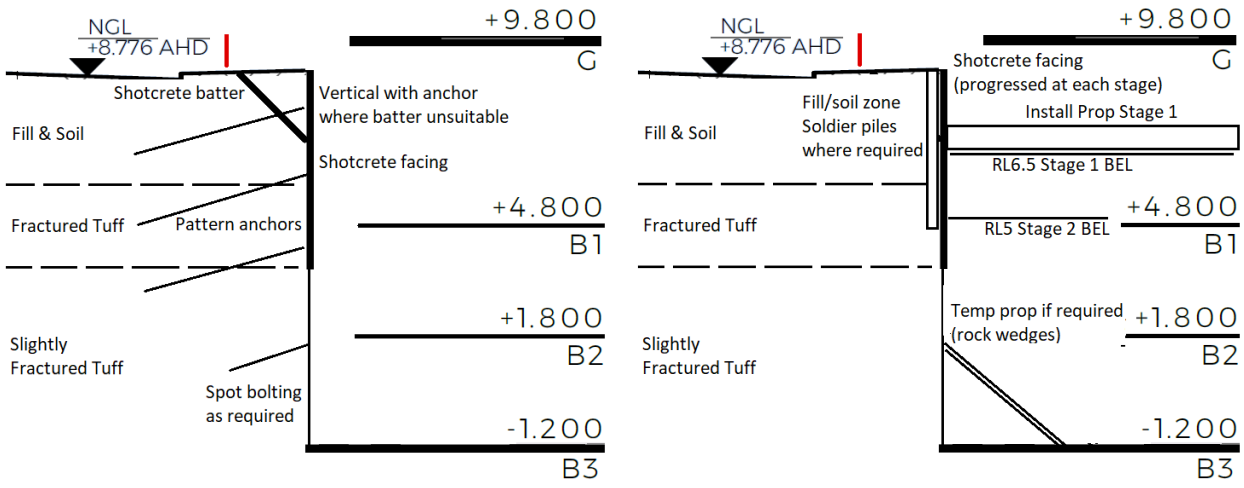
It is expected that the fill, residual soils could be excavated using small excavators (8 to 15 t). Medium to large size excavators (45 t or larger) will be required for excavation of the medium strength Tuff, with use of large hydraulic rock breakers for excavation of the high strength (or stronger) Tuff. Rock saws could be used to limit overbreak of the excavations (especially along steep joint planes, where present) and to reduce vibration transmission.

It is assumed that the fill is likely to be taken to an approved landfill and not reused. The residual clay soils and very low strength Tuff which is likely to excavate and breakdown under compaction to a clayey gravel could be reused as fill, placed and compacted in layers not exceeding 250 mm thick to a minimum dry density ratio of 98% (Standard compaction) at a moisture content with 2% of optimum. The stronger Tuff is likely to excavate as coarse rock fill and could be exported for reuse elsewhere in that form or would require crushing for use as select fill.

The subgrade at the surface following demolition of buildings and slabs will comprise existing uncontrolled fill of variable consistency. If a working platform is required for large, tracked equipment (not anticipated based on expected basement construction methods), then the subgrade should be proof rolled and any soft spots removed and replaced with select fill, and a working platform of granular fill placed. The thickness of this platform would depend on the pressures required and subgrade conditions following site preparation, but typically for stiff subgrades, platforms of 0.4 m to 0.6 m thick are needed.

The subgrade at basement level will comprise high or very high strength Tuff and would only require removal of loose materials. Subgrade for the crossover driveway is likely to comprise existing fill materials and preparation should comprise inspection and proof rolling to check for soft spots which should be removed and replaced with select fill.

A preliminary assessment for temporary retention options (one with anchors over boundary and an alternate relying on internal propping only) for the basement construction is illustrated below in Images 13a and 13b.



Images 13a and 13b – Concept Designs for Temporary Excavation Support (anchoring or propping)

Shotcreted batters in the upper excavation in the fill and soils, no steeper than 1V:1H could be considered where space permits and there are no structures, movement sensitive services or surcharges close to the excavation crest. For the anchor option, shotcrete and passive soil anchors installed in lifts not exceeding 1.5 m will be required where battering is not suitable. Alternatively, for the propping option, soldier bored piles drilled into the medium strength Tuff with internal popping installed after partial bulk excavation for stability could be considered.

In the Tuff, it is expected that pattern anchors on a 1.5 m to 2 m grid typically with shotcreting of the upper fractured layer would be required to provide positive support with only spot bolting below that where the rock fracturing reduces and weathering/strength improves. These works would require detailed design but for planning purposes the anchors might range up to the order of 6 m to 8 m in length.

For the propping option, the soldier piles should extend to 'toe' into relatively unfractured medium strength tuff; conceptually these piles might be around 4 m deep and 0.6 m diameter spaced at about 1.8 m centres (i.e. 3 times pile diameter) with shotcrete lagging between piles. These piles would cantilever to 2.5 m depth with movements of the supported not exceeding about 10 mm; the internal propping could be installed at this point before advancing the bulk excavation. For preliminary design of the temporary support system, at rest earth pressures (to minimise ground movement to less than 10 mm) should be used with an at rest earth pressure of 0.5 and cohesion of 5 kPa for the soils, and an earth pressure coefficient of 0.15 for the weathered tuff rock zone with an applied external surcharge of 10 kPa. The earth pressure diagram for these values is shown below in Image 14.

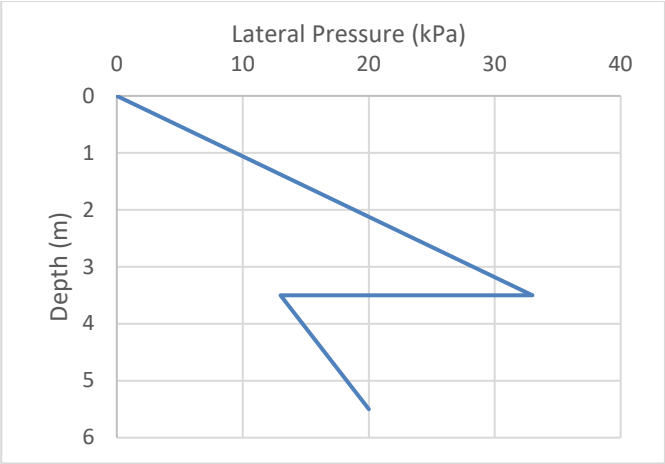


Image 14 – Earth Pressures for Temporary Propping Design

In the less weathered tuff at depth, isolated props might be required where there is a potential rock wedge similar to that seen in Image 10b. Preliminary analysis for a wedge 3 m high and 2 m in width indicates that a prop load of approximately 20 kN is required to support this size of rock wedge. Where wedges are identified, excavation would need to progress in stages with an initial prop left in place on a rock shelf until the excavation is progress to the side, and then a replacement prop installed and the remaining rock shelf then removed. Shotcrete pads with short pins (not extending beyond site boundaries) into the rock might locally be required to engage the prop with the rock wedge.

The temporary basement support must be designed by a suitably qualified and experienced engineer (RPEQ), and advice from specialist contractors should be sought regarding the design and construction. The temporary support system adopted would need to prevent the loss of support to adjacent sites and other structures (if any). Permission would be required to install anchors into the neighbouring sites or road reserve. Structural advice on the temporary propping is provided separately.

For preliminary design, the permanent retaining systems can be designed using an average lateral earth pressure of 30 kPa with a triangular distribution over the upper 3 m.

5.2 Groundwater

Groundwater encountered during construction is likely to be limited to seepage inflows from perched groundwater in the fill which evaporation should largely remove; if more significant flows are encountered

then these could be managed by pumping from local sumps. Standing groundwater levels should be confirmed by monitoring but seems unlikely to be encountered or if so, as small seepage inflows, and the building could be designed with a drained basement.

Drawdown effects either due to construction or permanently will at most be limited to localised lowering of the perched groundwater in the upper soils in close proximity (i.e. within 3 to 5m) of the basement excavation. Groundwater drawdown leads to settlement due to an increase in the net effective pressure of the overburden causing underlying soil to consolidate; in this case, due to the presence of rock and the likely variable perched water levels over many years, it is highly unlikely there will be any significant settlement (i.e. < 10 mm) associated with any drawdown, with no significant effects on adjoining properties.

5.3 Construction Vibrations

From the available information and local experience, significant vibrations are likely to be generated using rock breakers for the removal of rock in the basement excavation from about 3 m depth onwards, which have potential to damage adjoining buildings and infrastructure.

Tolerable peak particle velocity (PPV) values for structures published in German Standard DIN 4150 are given in Table 1 below.

Table 1 – PPV Limits

Structure Type	PPV (mm/s) for 4-8 Hz	PPV (mm/s) for 8-30 Hz	PPV (mm/s) for 30–100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

High frequency rock hammers operate in the range up to 1,500 beats per minute, or about 25 Hz. In this case, the closest buildings adjoining the northwest boundary are highset timber, whilst otherwise there are modern built residential units across Anderson Street and Costin Street. It is considered that a PPV limit of at least 15 mm/s should generally be acceptable for the residential units across Anderson Street and Costin Street, subject to dilapidation survey confirming the buildings are in good condition. Considering the distance from the excavation and use of rock sawing where required to attenuate vibration transmission, and many similar excavations in similar conditions in the Fortitude Valle area, it is expected these limits are unlikely to be exceeded by experienced contractors using available equipment.

The timber buildings to the northwest are closer but much more flexible and designed and detailed to experience movement of ground (in response to seasonal moisture changes), and a less stringent (i.e. higher) PPV limit to avoid structural damage should be suitable in that case; a specific assessment should be undertaken to confirm the nature of the building (and internally in particular) in conjunction with a dilapidation survey.

Full time vibration monitoring will be required through construction. Nuisance to occupants will also need to be considered in a specific vibration impact assessment.

5.4 Foundation Design

It is expected that high strength (or stronger) Tuff will be present at the basement excavation level, and high-level strip and pad footings will be suitable and could be designed using an allowable bearing pressure of 6 MPa. Settlement of footings should not exceed about 0.5% of footing width. Subsurface conditions can be variable and foundation excavations will need to be checked by an experienced geotechnical engineer to confirm bearing pressures and may need to be revised.

Due to the presence of uncontrolled fill, the site in its current conditions would be *Class P* requiring design by engineering principles in accordance with AS 2870-2011 *Residential slabs and footings.* For plumbing design

and ancillary slab on ground structures (if any), it is estimated that the surface movements in response to normal seasonal moisture change might be in the range up to 40 mm, consistent with *Class M*.

Reference to AS1170.4-2007 indicates that the site would be a Class C_e - shallow soil site; it does not appear to meet the requirements for Class B_e – rock, because the depth of soil exceeds 3 m.

5.5 Slab on Ground and Driveway Subgrade Design Parameters

The available information suggests that the subgrade conditions for the crossover driveway will comprise clay fill. For preliminary design, a soaked CBR value of 3% would be appropriate for this subgrade after site preparation. For the basement subgrade, where high strength (or stronger) rock will be present, the slabs may be designed for a modulus of subgrade reaction of 80 kPa/mm or CBR 20%. CBR values should be confirmed by sampling and testing at the time of construction.

5.6 Acid Sulfate Soils

The available mapping indicates ASS has an extremely low probability of occurrence and the geological setting is not suited for the formation of ASS, with rock present from around RL 5 m. The fill and soils reported in the investigation also do not appear consistent with ASS. Consequently, ASS is considered to be of negligible risk for the development.

5.7 Design Life

The design life of the works will be essentially related to the structural elements primarily including steel and concrete and are outside the scope of geotechnical assessment. Geotechnical elements such as anchors, if required, will be temporary only and not subject to these long term requirements.

5.8 Detailed Investigation

The comments and recommendations in this report have been based on limited shallow boreholes prepared for environmental purposes and the local knowledge and experience of Core personnel. Detailed investigation will be required to confirm the subsurface conditions and groundwater conditions to prepare a detailed investigation report and retention design. The investigation should include at least 3 boreholes drilled to 15 m depth, with groundwater monitoring and rock strength testing, and an additional 3 boreholes drilled to top of rock around the boundary to confirm shallow subsurface conditions for boundary retention.

6.0 LIMITATIONS

Should you require any further information please contact the undersigned. We draw your attention to the document, Limitations, which is attached.

Core Consultants Pty Ltd

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Associate, Principal Geotechnical Engineer

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Appendix A
Previous Investigation Logs and Test Location Plans

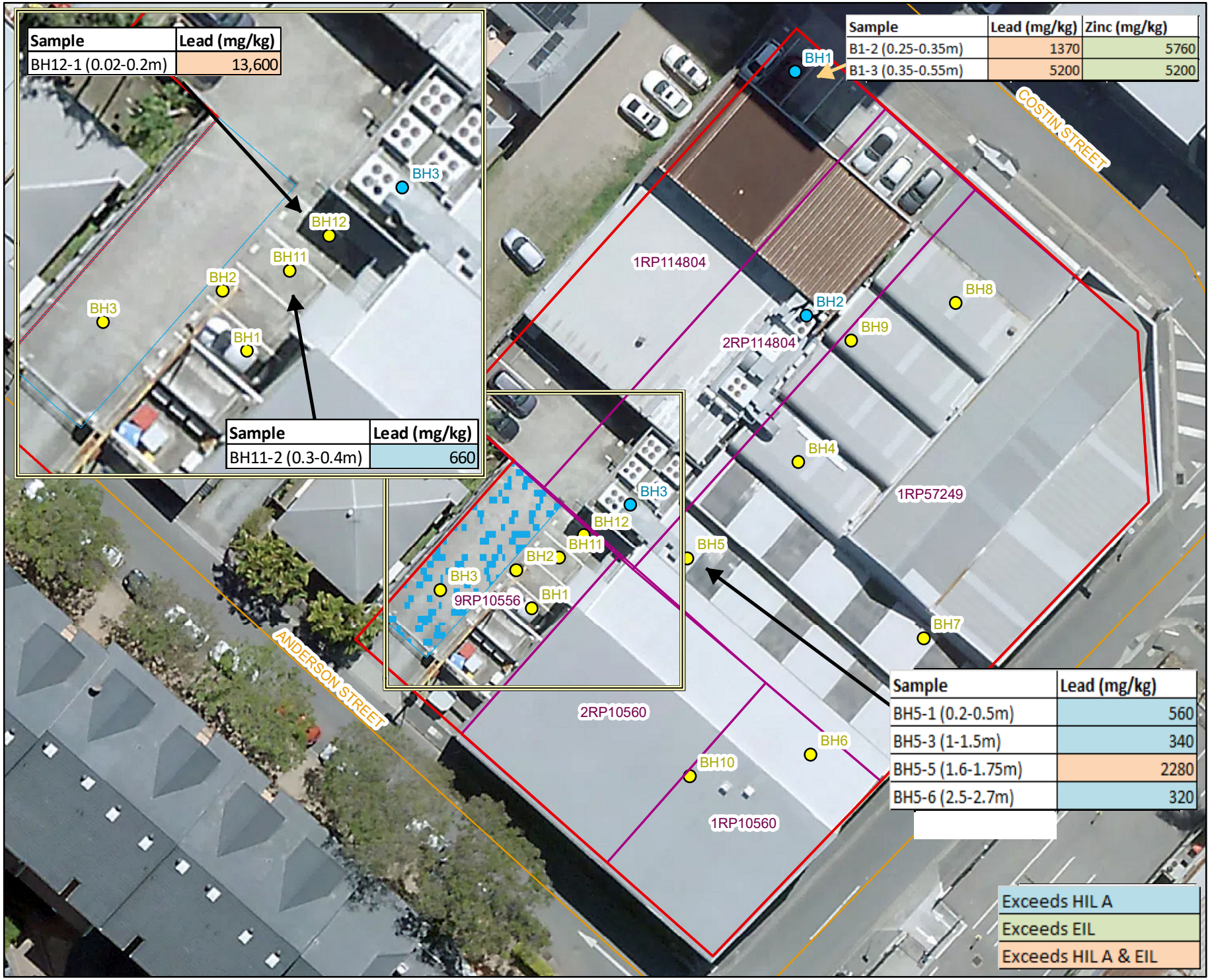

Figure 3
Butler Partner's sample locations (2002 & 2003)

Project: Preliminary Site Investigation

Client: TAL GP Projects

Project No.: J000818

Compiled by: JH Date: 11/02/2022
Approved by: SD Date: 11/02/2022

Metres
0 5 10

Legend

- Roads
- Site boundary
- Historic land parcels
- Disposal permit area to remove 250m3

Sample locations

- Butler Partners, 2002
- Butler Partners, 2003

Source: Cadastral data sourced from DNRME (2022) and aerial imagery sourced from MetroMap (2022).

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range environmental consultants

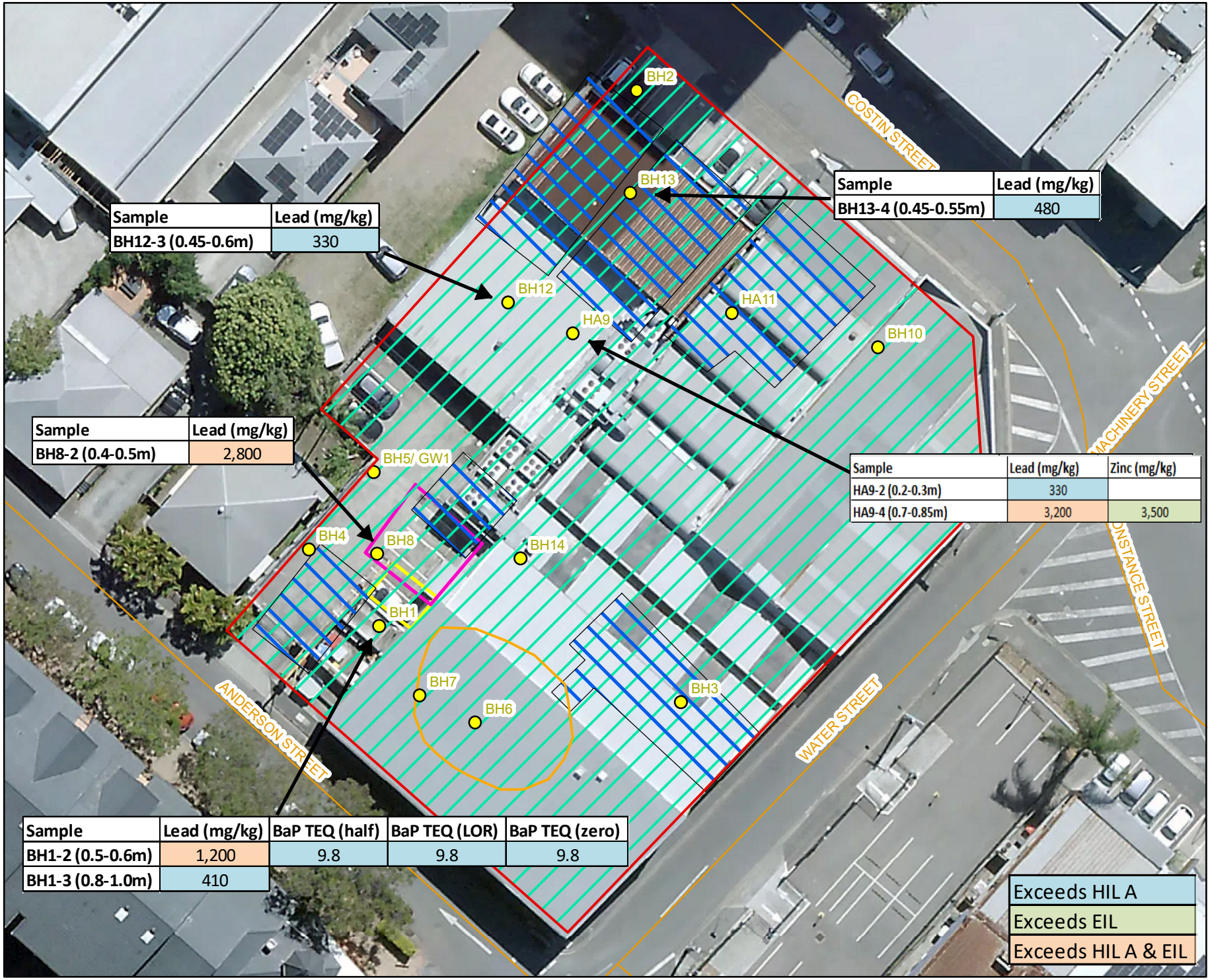

Figure 7 Sample locations

Project: Preliminary Site Investigation

Client: TAL GP Projects

Project No.: J000818

Compiled by: JH Date: 11/02/2022
Approved by: SD Date: 11/02/2022

0 5.5 11 Metres

Legend

- Site boundary
- Roads
- Sample locations

Areas of Environmental Concern

- AEC 1 - UST
- AEC 2 - Historic printing works
- AEC 3 - Historic residential dwellings
- AEC 4 - Fill material
- AEC 5 - Historical Disturbance

Source: Cadastral data sourced from DNRME (2022) and aerial imagery sourced from MetroMap (2022).

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BORE REPORT

BORE 1

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 101.3m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		101.3					
	ASPHALT					B1-1	
	FILL - dark grey-black mottled orange silty sand, medium to coarse grained, high plasticity, moist	101.0				B1-2	
	- brown-black gravelly silty sand, medium gravel to coarse sand, high plasticity, moist						
1	- light brown mottled red and black sandy silty clay, coarse to medium grained, high plasticity, moist	100.0				B1-3	
	SANDY SILTY CLAY (CL) - mottled yellow-brown, coarse grained, pieces of extremely weathered tuff, moist					B1-4	
2	*TUFF (XW)* - grey-brown, fine to medium grained, with sandy silt	99.0				B1-5	
						B1-6	
	Rig Refusal at 2.6m						
3		98.0					
4		97.0					
5							

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

E Environmental Sample
S Standard Penetrometer Test (SPT)
SPT Hammer Bouncing
( ) No Sample Recovery

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

BORE 2

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 101.2m *

BUTLER PARTNERS
GEOTECHNICAL • GEO-ENVIRONMENTAL

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	*ASPHALT*	101.2					
	FILL - dark grey-brown silty sand, coarse grained, medium plasticity fines, with pieces of porcelain, moist					B2-1	
	- grey-brown sandy silt, medium plasticity, moist					B2-2	
1	- mottled red and brown sandy silty clay, coarse grained, high plasticity, moist	100.0				B2-3	
	TUFF (XW) - mottled red-brown-black, medium to fine grained, with sandy silty clay, moist					B2-4	
2	Rig Refusal at 2.1m	99.0					
3		98.0					
4		97.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 3

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 101.4m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
		101.4					
0	*ASPHALT*					B3-1	
	FILL - dark grey-brown mottled red-orange gravelly silty sand, fine to medium grained, high plasticity, moist	101.0				B3-2	
	SILTY CLAY (CH) - grey-brown, high plasticity, moist, with fine to medium grained tuff					B3-3	
1	- brown mottled red, high plasticity, moist, with fine grained tuff						
	TUFF (XW) - light brown yellow, dry, fine to medium grained	100.0				B3-4	
	Rig Refusal at 1.5m						
2		99.0					
3		98.0					
4		97.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 4

BUTLER PARTNERS
GEOTECHNICAL • GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
		100.1					
0	*ASPHALT*					B4-1	
	EPOXY SEAL						
	CONCRETE					B4-2	
	FILL - brown mottled red and yellow silty clay, moist						
	- grey-brown mottled red and yellow silty clay, medium plasticity, moist, with fine grained tuff					B4-3	
1		99.0				B4-4	
	TUFF (XW) - grey, fine to medium grained, with some clay, moist					B4-5	
	- grey-white, fine to medium grained, with clayey silt, moist						
	- weathering decreases with depth						
2		98.0					
	Rig Refusal at 2.1m						
3		97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked sch4p4(6)

BORE REPORT

BORE 5

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderston Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
		100.1					
0	*ASPHALT*						
	CONCRETE					B5-1	
	FILL - dark brown gravelly sand, medium to fine grained, pieces of brick and concrete, low plasticity, moist, with some clayey silt					B5-2	
	- grey-black silty sand, coarse grained, medium plasticity, moist						
1	- dark grey-brown silty sand, coarse grained, with bits of rust from a nail, medium plasticity, moist	99.0				B5-3	
	- brown gravelly sand with some silt, pieces of broken porcelain, wet					B5-4	
	- black-brown silty sand, coarse grained, medium plasticity fines						
2	Unable to take sample from 1.75 to 2.5m	98.0				B5-5	
	SANDY SILTY CLAY (ML) - yellow-brown, low plasticity, wet					B5-6	
	Rig Refusal at 2.7m						
3		97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: Groundwater observed at 1.6m depth
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 6

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	*ASPHALT*	100.1				B6-1	
	CONCRETE						
	FILL - brown gravelly silty clay, medium to fine grained, low plasticity, moist					B6-2	
	- black-brown sandy clay, coarse grained, low plasticity, moist						
1	- black-brown gravelly clay, fine grained, low plasticity, with pieces of porcelain, moist	99.0				B6-3	
	- black-brown gravelly clay, medium plasticity, moist, with some fine grained tuff					B6-4	
2	*CLAYEY SILTY SAND (SM)* - red-brown, high plasticity, moist, with fine grained tuff	98.0				B6-5	
	SILTY SAND (SM) - grey-brown, medium plasticity, moist, with fine grained extremely weathered tuff					B6-6	
3	*TUFF (XW)* - grey-brown, high plasticity, moist, with silty clay	97.0				B6-7	
	- grey mottled red-brown, fine to medium grained, high plasticity, moist, with trace of clay					B6-8	
4		96.0					
	End of Bore at 4.5m						
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 7

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		100.1					
	CONCRETE					B7-1	
	FILL - dark brown gravelly silt, fine to medium grained, with pieces of glass, medium plasticity, moist					B7-2	
	SILTY SANDY CLAY (ML) - grey-brown, fine grained, low plasticity, moist, with fine tuff					B7-3	
1	*TUFF (XW)* - brown, fine to medium grained, low plasticity, moist, with some silty clay	99.0				B7-4	
2	- grey, fine grained, high plasticity, moist, with some clayey silt	98.0				B7-5	
	End of Bore at 2.5m						
3		97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 8

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	*CONCRETE*	100.1					
	ASPHALT					B8-1	
	CONCRETE						
	FILL - dark brown sandy silt, fine grained, medium plasticity, moist					B8-2	
	- grey-brown sandy silt, coarse grained, high plasticity, moist						
1	- grey-brown sandy silt, coarse grained, high plasticity, moist	99.0				B8-3	
	SILTY CLAY (ML) - mottled grey and orange, fine grained, high plasticity, moist, XW-RS tuff					B8-4	
2	*TUFF (XW)* - grey, fine grained, moist, with trace of clayey silt	98.0				B8-5	
	- grey, fine grained, low plasticity, moist					B8-6	
3	Rig Refusal at 3.0m	97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked sch4p4(6)

BORE REPORT

BORE 9

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		100.1					
	ASPHALT					B9-1	
	CONCRETE						
	FILL - dark brown gravelly silt, fine grained, high plasticity, moist					B9-2	
	- orange-brown gravelly clay, fine grained, low plasticity, moist						
1	*TUFF (RS-XW)* - grey and red-brown, fine grained, medium plasticity, moist, with clay	99.0				B9-3	
	TUFF (XW) - grey mottled red-brown, fine grained, low plasticity, moist, with trace of clay					B9-4	
2	- grey, fine to medium grained	98.0				B9-5	
	Rig Refusal at 2.6m						
3		97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 10

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 100.1m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		100.1					
	CONCRETE					B10-1	
	FILL - black-brown sandy silty clay, coarse grained, with fine gravel, medium plasticity, wet					B10-2	
	- orange-brown silty gravel, medium to fine gravel, low plasticity, wet, with organic odour						
1	- orange-brown sandy silt, coarse grained, high plasticity, wet, with organic odour	99.0				B10-3	
	SANDY CLAY (SC) - brown with grey and red flecks, coarse grained, low plasticity, moist					B10-4	
2	*TUFF (RS)* - grey, fine grained, with silty clay, low plasticity, moist	98.0				B10-5	
	End of Bore at 2.5m						
3		97.0					
4		96.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6) P

BORE REPORT

BORE 11

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 101.3m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		101.3					
	CONCRETE					B11-1	
	FILL					B11-2	
	- brown-grey sand, fine grained, low plasticity, moist					B11-3	
	- mottled black and brown silty sand, fine grained, medium plasticity, moist						
	- mottled orange-brown and black gravelly silt, medium to fine grained, low plasticity						
	End of Bore at 0.5m						
1		100.0					
2		99.0					
3		98.0					
4		97.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6)

BORE REPORT

BORE 12

BUTLER PARTNERS
GEOTECHNICAL ▪ GEO-ENVIRONMENTAL

Client: Liverland Pty Ltd
Project: Environmental Site Assessment
Location: Corner Water, Costin and Anderson Streets, Fortitude Valley
Project No: 02628

Page No: 1 of 1
Date: 5 February 2002
Ground Surface Level: 101.4m *

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		101.4					
	FILL - grey to light brown gravel, medium to fine grained, dry - black-brown sandy silt, fine grained, medium plasticty, moist - dark brown silty gravel, medium to fine grained, moist	101.0				B12-1 B12-2 B12-3 B12-4	
	End of Bore at 0.5m						
1		100.0					
2		99.0					
3		98.0					
4		97.0					
5							

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HP7
Drilling Method: Solid Auger
Groundwater: None observed
Remarks: * Based on assumed TBM (RL 100m)

Logged: CMB
Checked: sch4p4(6

BUTLER PARTNERS
GEOTECHNICAL ■ GEO-ENVIRONMENTAL

Notes on Description and Classification of Soil

The methods of description and classification of soils used in this report are generally based on Australian Standard AS1726-1993 "Geotechnical Site Investigations".

Soil description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures or in undisturbed samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

In the case of cone or piezocone penetrometer tests, actual soil samples are not recovered and soil description is inferred based on published correlations, past experience and comparison with bore and/or test pit data (if available).

Soil classification is based on the particle size distribution of the soil and the plasticity of the portion of the material finer than 0.425mm. The description of particle size distribution and plasticity is based on the results of visual field estimation, laboratory testing or both. When assessed in the field, the properties of the soil are estimated; precise description will always require laboratory testing to define soil properties.

Where soil can be clearly identified as FILL this will be noted as the main soil type followed by a description of the composition of the fill (eg. FILL – yellow-brown, fine to coarse grained gravelly clay fill with concrete rubble). If the soil is assessed as possibly being fill this will be noted as an additional observation.

Soils are generally described using the following sequence of terms. In certain instances, not all of the terms will be included in the soil description.

MAIN SOIL TYPE (CLASSIFICATION GROUP SYMBOL)
- strength/density, colour, structure/grain size, secondary and minor components, additional observations

Information on the definition of descriptive and classification terms follows.

SOIL TYPE and CLASSIFICATION GROUP SYMBOLS

	Major Divisions	Particle Size	Classification Group Symbol	Typical Names
COARSE GRAINED SOILS (more than half of material is larger than 0.075 mm)	BOULDERS	> 200mm		
	COBBLES	63 – 200mm		
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	Coarse: 20 – 63 mm Medium: 6 – 20 mm Fine: 2.36 – 6 mm	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels.
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than 2.36mm)	Coarse: 0.6 – 2.36 mm Medium: 0.2 – 0.6 mm Fine: 0.075 – 0.2 mm	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands.
			SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (more than half of material is smaller than 0.075 mm)	SILTS & CLAYS (liquid limit <50 %)		ML	Inorganic silts and very fine sands, silty/clayey fine sands or clayey silts with low plasticity.
			CL and CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS (liquid limit >50 %)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils.
			CH	Inorganic clays of high plasticity.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Release

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GEOTECHNICAL ■ GEO-ENVIRONMENTAL

Notes on Description and Classification of Rock

The methods of description and classification of rock used in this report are generally based on Australian Standard AS1726-1993 "Geotechnical Site Investigations".

Rock description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures, or in core samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

Notes outlining the method and terminology adopted for the description of rock defects are given below, however, detailed information on defects can generally only be determined where rock core is taken, or excavations or exposures allow detailed observation and measurement.

Rocks are generally described using the following sequence of terms. In certain instances not all of the terms will be included in the rock description.

ROCK TYPE (WEATHERING SYMBOL), strength, colour, grain size, defect frequency

Information on the definition of descriptive and classification terms follows.

ROCK TYPE

In general, simple rock names are used rather than precise geological classifications.

ROCK MATERIALS WEATHERING CLASSIFICATION

Term	Weathering Symbol	Definition
Residual soil	RS	Soil developed from extremely weathered rock; the mass structure and substance fabrics are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered	XW	Rock is weathered to such an extent that it has 'soil' properties, ie. it either disintegrates or can be remoulded in water.
Distinctly weathered *	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Highly weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock, usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately weathered	MW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock may be no longer recognisable.
Slightly weathered	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh	FR	Rock shows no sign of decomposition or staining.

** Subdivision of this weathering grade into highly and moderately may be used where applicable.*

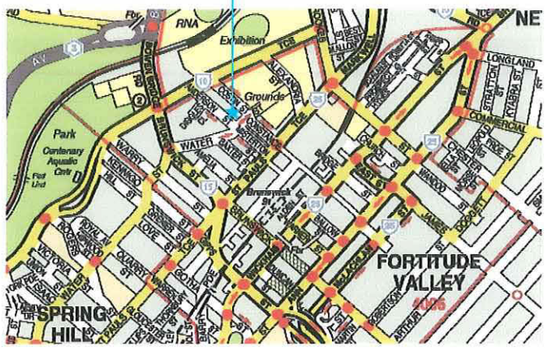
STRENGTH OF ROCK MATERIAL

Term	Symbol	Point Load Index I_s (50)	Field guide to strength
Extremely low	EL	< 0.03 MPa	Easily remoulded by hand to a material with soil properties.
Very low	VL	0.03 – 0.1 MPa	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low	L	0.1 – 0.3 MPa	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	0.3 – 1.0 MPa	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	1.0 – 3.0 MPa	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very high	VH	3.0 – 10.0 MPa	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely high	EH	> 10 MPa	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

1. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
2. The field guide visual assessment for rock strength may be used for preliminary assessment or when point load testing is not available.
3. Anisotropy of rock may affect the field assessment of strength.

SITE



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UBD Reference: Map 18 Ref R6 (46th Edition) N.T.S.

LEGEND

- 1 Bore
- Site Boundary
- Previous Investigation Site Boundary
- Lot Boundary

CLIENT:
PAUL LINDSAY & ASSOCIATES PTY LTD

BUTLER PARTNERS
GEOTECHNICAL ■ GEO-ENVIRONMENTAL
38 Doggett Street, Fortitude Valley
Queensland 4006 Australia
Telephone 61 7 3852 3800
Facsimile 61 7 3852 3808

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT
18-20 COSTIN STREET, FORTITUDE VALLEY

LOCALITY PLAN & TEST LOCATIONS

0 10 20m

SCALE: 1:500 (A3)

NORTH

DATE: JANUARY 2003
DRAWN BY: CB
APPROVED:
PROJECT No: 02628A
DRAWING No: 1 REV: B

BORE REPORT

BUTLER PARTNERS

Client: Paul Lindsay & Associates Pty Ltd
Project: Preliminary Environmental Site Assessment
Location: 18-20 Costin Street, Fortitude Valley
Project No: 02628A

BORE 1

Page No: 1 of 1
Date: 13 December 2002

Depth (m)	Description	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	***CONCRETE***					
	FILL - grey brown silty gravelly sand, moist with pieces of rock		E	0.15		B1-1
			E	0.25		B1-2
	SILTY CLAY (CL) - red brown, fine, moist		E	0.35		B1-3
	End of Bore at 0.55 m			0.55		
1						

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

E Environmental Sample
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hand Tools
Drilling Method: Hand Auger
Groundwater: None observed whilst drilling
Remarks:

BORE REPORT

BUTLER PARTNERS

Client: Paul Lindsay & Associates Pty Ltd
Project: Preliminary Environmental Site Assessment
Location: 18-20 Costin Street, Fortitude Valley
Project No: 02628A

BORE 2

Page No: 1 of 1
Date: 13 December 2002

Depth (m)	Description	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	***CONCRETE***					
	FILL - grey brown sandy gravel		E	0.15		B2-1
	- red brown gravelly sandy clay		E	0.30		B2-2
	- grey ash			0.40		
			E	0.50		B2-3
1				1.00		
	SILTY SANDY CLAY (CL) - red brown, fine, moist		E	1.10		B2-4
	End of Bore at 1.3 m			1.30		

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
E Environmental Sample
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hand Tools
Drilling Method: Hand Auger
Groundwater: None observed whilst drilling
Remarks:

BORE REPORT

BUTLER PARTNERS

Client: Paul Lindsay & Associates Pty Ltd
Project: Preliminary Environmental Site Assessment
Location: 18-20 Costin Street, Fortitude Valley
Project No: 02628A

BORE 3

Page No: 1 of 1
Date: 13 December 2002

Depth (m)	Description	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	***CONCRETE***					
	TUFF (HW)		E	0.15		B3-1
				0.30		
1	End of Bore at 1 m					

D	Disturbed Sample	E	Environmental Sample	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	HB	SPT Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test

Rig: Gemco HS7
Drilling Method: Solid Flight Auger
Groundwater: None observed whilst drilling
Remarks:

ENVIRONMENTAL BOREHOLE / TESTPIT BH01

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 4.5m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 140mm thick.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
0	1.1	BH1-1 (0-0.2m)	Y		FILL. Dark brown sandy silty clay, small to medium gravel, small pocket of ash, dry to moist	
0.5	1.9	BH1-2 (0.5-0.6m)	Y			
1	1.3	BH1-3 (0.8-1.0m)	Y		FILL. Dark brown mottled orange silty clay, small to medium gravel, dry to moist	
1.5					FILL. Grey brown silty clay	
2	1.2	BH1-4 (1.9-2m)	N			
2.5					Pale brown sandy clay, possibly Brisbane Tuff, loose, dry	Porcelain fragments observed during drilling. It was unclear whether these fragments occurred at depth or were forced up from the sides of the borehole during the drilling process.
3	1.4	BH1-5 (2.9-3m)	Y			
3.5						
4						
4.5	1.6	BH1-6 (4.4-4.5m)	Y			
					Termination Depth at: 4.5m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH02

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 2m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 210mm thick.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.8	BH2-1 (0-0.1m)	N		FILL. Grey brown silty sandy clay with gravel, moist to wet.	
					FILL. Yellow brown sandy clay, moist	
	1.9	BH2-2 (0.4-0.5m)	Y			
0.5						
1	1.4	BH2-3 (1.0-1.1m)	N		Grey mottled red silty clay, stiff	
	1.8	BH2-4 (1.4-1.5m)	Y			
1.5						
	2.1	BH2-5 (1.9-2m)	N			
2					Termination Depth at: 2m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH03

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 3m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS An overlying layer of asphalt measured 40mm thick followed by a concrete slab 100mm thick.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.5	BH3-1 (0-0.1m)	Y		FILL. Dark brown silty clay, gravel and quartz/rock fragments observed, loose, moist	A glass fragment was observed during drilling, it was unclear whether it occurred at depth or was forced up by the auger bit during the drilling process.
0.5	0.8	BH3-2 (0.4-0.5m)	N			
1	1.1	BH3-3 (0.9-1.0m)	Y			
1.5	4.2	BH3-4 (1.4-1.5m)	N			
2	1.3	BH3-5 (1.9-2m)	Y			
2.5					Light brown/grey sandy clay, moist	
3	1.2	BH3-6 (2.9-3m)	Y		Termination Depth at: 3m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH04

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 0.45m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 180mm thick. I/S = Insufficient sample

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	I/S	BH3-1 (0-0.1m)	Y		FILL. Grey gravelly sandy clay, very gravelly and wet	
					Termination Depth at: 0.45m due to refusal on concrete slab	

ENVIRONMENTAL BOREHOLE / TESTPIT BH05

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 2m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 180mm thick. I/S = Insufficient sample

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.7	BH5-1 (0-0.1m)	Y		FILL. Grey mottled dark brown sandy clay, small gravel, moist to wet	
	3.6	BH5-2 (0.4-0.5m)	N		FILL. Brown sandy clay, some small to medium gravel/rock fragments, moist	
0.5					Brown mottled grey sandy clay, some small gravel, dry to moist	
	3.4	BH5-3 (0.9-1.0m)	Y			
1					Light brown sandy clay, moist, very sticky	
	2.8	BH5-4 (1.4-1.5m)	Y			
1.5						
	I/S	BH5-5 (1.9-2m)	N		Light brown sandy clay, very dry, loose, likely Brisbane Tuff	
2					Termination Depth at: 2m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH06

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 4.5m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 340mm thick

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	0.6	BH6-1 (0-0.1m)	N		FILL. Dark grey silty clay with gravel	
	0.5	BH6-2 (0.1-0.2m)	Y		FILL. Brown silty clay, stiff	
	0.2	BH6-3 (0.3-0.4m)	N		FILL. Grey brown sandy gravel	
0.5	0.2	BH6-4 (0.5-0.6m)	Y		FILL. Grey brown sandy silty clay with coarse orange mottles, gravel at 1-1.2m	
1	0.4	BH6-5 (1.0-1.1m)	N			
	1.2	BH6-6 (1.2-1.3m)	N		FILL. Grey red silty clay with coarse red mottles and irregular sized gravel	
1.5	0.5	BH6-7 (1.8-1.9m)	Y		Grey sandy clay, coarse orange mottles, stiff	
2					Termination Depth at: 2m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH07

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Range Environmental
DRILLER SD
DRILLING METHOD Hand auger
TOTAL DEPTH 1.7m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 440mm thick

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	0.9	BH7-1 (0-0.1m) Duplicate 1 Triplicate 1	Y		Grey mottled orange and red silty clay, minor charcoal observed at 0-0.2m)	
	0.5	BH7-2 (0.4-0.5m)	N			
0.5						
1	0.4	BH7-3 (0.9-1.0m)	Y			
	0.8	BH7-4 (1.2-1.3m)	N		Brown sandy clay with gravel and abundant coarse red mottles	
1.5	0.7	BH7-5 (1.6-1.7m)	Y			
					Termination Depth at: 1.7m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH08

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Serivces
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 2.4m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 185mm thick

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.8	BH8-1 (0-0.1m)	N		FILL. Dark brown gravelly sandy clay with small to medium sized gravel	
					FILL. Dark brown sandy clay with small gravel and ash	
	0.8	BH8-2 (0.4-0.5m)	Y			
0.5						
					FILL. Light brown mottled red silty sandy clay, moist	
	1.3	BH8-3 (0.9-1.0m)	N			
1						
					Grey with yellow-orange mottling silty clay, gravel fines, stiff	
1.5						
	1.6	BH8-4 (1.9-2.0m)	Y			
2						
					Light brown sandy clay/weathered sandstone, dry, loose, likely Brisbane Tuff	
		BH8-5 (2.3-2.4m)	Y			
					Termination Depth at: 2.4m	
2.5						

ENVIRONMENTAL BOREHOLE / TESTPIT BH12

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Range Environmental
DRILLER SD
DRILLING METHOD Hand auger
TOTAL DEPTH 1.85m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.2	BH12-1 (0-0.1m) Duplicate 4 Triplicate 4	Y		FILL. Reddish brown sandy gravelly clay, moist	
	1.3	BH12-2 (0.35-0.45m)	N			
0.5	5.0	BH12-3 (0.45-0.6m)	Y		FILL. Black sandy clay with ash, moist	
	1.9	BH12-4 (0.6-0.7m)	Y		Grey silty clay with orange mottling and minor gravel, moist	
1	2.9	BH12-5 (1.0-1.1m)	N			
1.5	3.2	BH12-6 (1.7-1.8m)	N			
2					Termination Depth at: 1.85m	

ENVIRONMENTAL BOREHOLE / TESTPIT BH13

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Range Environmental
DRILLER SD
DRILLING METHOD Hand auger
TOTAL DEPTH 0.85m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS I/S = Insufficient sample

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	I/S	BH13-1 (0-0.05m)	N		FILL. Brown gravelly sand	
	1.5	BH13-2 (0.05-0.2m)	Y		FILL. Reddish brown silty clay with gravel	
	1.4	BH13-3 (0.2-0.4m)	N		FILL. Dark grey clayey sand with gravel	
0.5	1.1	BH13-4 (0.45-0.55m)	Y		FILL. Dark grey clayey sand with gravel	
	1.0	BH13-5 (0.55-0.7m)	N		FILL. Reddish grey sandy clay with gravel	
					Termination Depth at: 0.85m due to refusal on concrete slab	

ENVIRONMENTAL BOREHOLE / TESTPIT BH14

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Soiltech Testing Services
DRILLER Tom
DRILLING METHOD SA
TOTAL DEPTH 2.4m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS An overlying layer of asphalt 40mm thick followed by a concrete slab 140mm thick occurred.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	1.6	BH14-1 (0-0.1m)	N		FILL. Dark brown gravelly sandy clay, moist to wet	
					FILL. Light brown sandy clay, dry to moist	
	1.3	BH14-2 (0.4-0.5m)	Y			
0.5						
		BH14-3 (0.9-1.0m) Duplicate 2 Triplicate 2	Y		Orange grey sandy silty clay with gravel fragments	
	1.7					
1					Orange red gravelly sandy clay with lots of quartz/rock fragments	
	2.4	BH14-4 (1.4-1.5m)	Y			
1.5					Red brown to light red brown sandy clay/weathered sandstone, loose, dry, likely Brisbane Tuff	
	40.1	BH14-5 (1.9-2.0m)	Y			
2						
	21.5	BH14-6 (2.3-2.4m)	N			
2.5					Termination Depth at: 2.4m	

Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 16 Feb 2022

ENVIRONMENTAL BOREHOLE / TESTPIT HA09

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Range Environmental
DRILLER AN
DRILLING METHOD Hand auger
TOTAL DEPTH 1.65m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 150mm thick.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	3.0	HA9-1 (0-0.1m)	N		FILL. Brown mottled orange grey silty clay with gravel	
	1.5	HA9-2 (0.2-0.3m)	Y		FILL. Dark brown sandy clay with gravel (aggregate) and cobble	
0.5	1.1	HA9-3 (0.5-0.6m)	N		FILL. Light brown mottled red silty clay - white siltstone type material	
	3.6	HA9-4 (0.7-0.85m)	Y		FILL. Black sandy clay with ash and minor gravel	
	2.0	HA9-5 (0.9-1m)	N		FILL. Dark brown sandy clay with silt	
1	2.7	HA9-6 (1.0-1.1m)	Y		Dark brown mottled orange and grey silty clay, stiff, minor mottles	
1.5	2.9	HA9-7 (1.5-1.6m)	N			
					Termination Depth at: 1.65m	

ENVIRONMENTAL BOREHOLE / TESTPIT HA11

PROJECT NUMBER J000818
PROJECT NAME PSI
CLIENT TAL GP Projects
ADDRESS 15 Anderson Street, Fortitude Valley

DRILLING DATE 08/02/2022
DRILLING COMPANY Range Environmental
DRILLER AN
DRILLING METHOD Hand auger
TOTAL DEPTH 2m

LOGGED BY Miranda Wyeth
CHECKED BY Jemma Heap

COMMENTS Overlying concrete slab measured 300mm thick.

Depth (m)	PID	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	0.7	HA11-1 (0-0.1m) PFAS Dup PFAS Trip	Y		FILL. Dark grey silty sandy gravelly clay, wet	
	0.6	HA11-2 (0.2-0.35m)	Y		FILL. Light brown silty sandy gravelly clay, wet	
0.5	1.0	HA11-3 (0.35-0.55m) Duplicate 3 Triplicate 3	N		FILL. Brown silty clay with coarse orange and red mottles, gravel	
1	1.7	HA11-4 (0.9-1.0m)	Y			
1.5	1.4	HA11-5 (1.5-1.6m)	N			
	1.7	HA11-6 (1.7-1.8m)	N		Grey mottled red and orange silty clay with fine gravel	
2					Termination Depth at: 2m	

Appendix B
Limitations

LIMITATIONS

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