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ANPRISA PTY LTD

Geotechnical Investigation

40-76 William Street, Leichhardt, NSW

E24470.G03_Rev8
6 January 2026

Document Control

Report Title: Geotechnical Investigation

Report No: E24470.G03_Rev8

Copies	Recipient
1 Soft Copy (PDF – Secured, issued by email)	Anprisa Pty Ltd 447 Parramatta Road LEICHHARDT NSW 2040
2 Original (Saved to Digital Archives) (Z:\07 - Projects\E24470_Ceerose_Leichhardt_DSI_GI\05_Deliverables\Work in Progress\G03 GI\E24470.G03_Rev8 - Report.docx)	EI Australia Suite 6.01, 55 Miller Street, PYRMONT NSW 2009

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Revision	Details	Date	Amended By
0	Original	23 January 2020	
1	Updated Architectural Drawings	14 April 2020	JW
2	Final Architectural Drawings	3 June 2020	SL
3	Updated Architectural Drawings	29 March 2021	JW
4	Updated Architectural Drawings	2 November 2021	PM/DS
5	Updated Architectural Drawings	8 March 2022	SK
6	Supplementary Geotechnical Investigation and Updated Architectural Drawings	18 September 2025	LL
7	Addressing Client Comments	16 October 2025	GP
8	Updated Client Information	6 January 2026	GP

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1. Introduction

1.1 Background

At the request of Anprisa Pty Ltd (the Client), EI Australia (EI) has carried out a Geotechnical Investigation (GI) for the proposed development at 40-76 William Street, Leichhardt, NSW (the Site).

This GI report has been prepared to provide advice and recommendations to assist in the preparation of designs for the proposed development. The investigation has been carried out in accordance with the agreed scope of works outlined in EI's proposal referenced P17633.1, dated 24 October 2019, and with the Client's emailed authorisation to proceed, dated 18 November 2019.

1.2 Proposed Development

The following documents, supplied by the Client, were used to assist with the preparation of this GI report:

- Survey plan prepared by Total Surveying Solutions – Job No. 192394, Plan No. 192394-1, Sheets 1 to 7 of 7, dated 15 October 2019;
- Updated Architectural drawings prepared by Woods Bagot – Project No. 122105, Drawing No.s SK12098, SK12099, SK-12100, undated;
- Existing site floor plans prepared by Square Meter – Ref. 40-76 William Street, Leichhardt, 3 pages, undated; and
- Flood Depth and Water Surface Contours 1% AEP – Existing" Map prepared by SGC – Figure A2.3, Rev. A, undated.

Based on the provided documents, EI understands the proposed development involves the partial demolition of existing structures whilst retaining the majority of the internal and external fabric to be incorporated in the construction of six, seven to eleven-storey residential buildings (Buildings A, B, C,D and E) with underlying two level basement. The lowest basement level is proposed to have a Finished Floor Level (FFL) of RL 3.5m. A Bulk Excavation Level (BEL) of approximately RL 3.2m is assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths from 5.7m to 11.1m Below Existing Ground Level (BEGL) have been estimated. Locally deeper excavations may be required for footings, lift overrun pits, crane pads, and service trenches.

EI has also prepared the following relevant reports for this site, which should be read in conjunction with this report:

- Groundwater Take Assessment Report – Job No. E24470.G12_Rev4, Dated March 2022
- Dewatering Management Plan – Job No. E24470.E06_Rev4, Dated March 2022
- Remedial Action Plan – Job No. E24470.E06_Rev4, Dated March 2022

1.3 Objectives

The objective of the GI was to assess site surface and subsurface conditions at four borehole locations, and to provide preliminary geotechnical advice and recommendations addressing the following:

- Dilapidation Surveys;

- Excavation methodologies and monitoring requirements;
- Groundwater considerations;
- Vibration considerations;
- Excavation support requirements, including preliminary geotechnical design parameters for retaining walls and shoring systems;
- Building foundation options, including;
  - Preliminary design parameters.
  - Earthquake loading factor in accordance with AS1170.4:2007.
- The requirement for additional geotechnical works.

1.4 Scope of Works

The scope of works for the GI included:

- Preparation of a Work Health and Safety Plan;
- Review of relevant geological maps for the project area;
- Site walkover inspection by a Geotechnical Engineer to assess topographical features and site conditions;
- Scanning of proposed borehole locations for buried conductive services using a licensed service locator with reference to Dial Before You Dig (DBYD) plans;
- Auger drilling of four boreholes (BH1M, BH2, BH3M, BH9M and BH101M) by a track-mounted drill rig using solid-stem, continuous flight augers equipped with 'Tungsten-Carbide' (T-C) bit. BH1M, BH2, BH3M, BH9M and BH101M were auger drilled to depths of about 4.7m BEGL (RL of about 4.8m), 4.2m BEGL (RL of about 9.8m), 3.3m BEGL (RL of about 4.8m), 1.2m BEGL (RL of about 10.8m) and 3.03 BEGL (RL of about 5.72m), respectively.
  - Standard Penetration Testing (SPT) was carried out (as per AS 1289.6.3.1-2004), where possible, during auger drilling of the boreholes to assess soil strength/relative densities.
  - Measurements of groundwater seepage/levels, where possible, in the augered sections of the boreholes during and shortly after completion of auger drilling;
  - The strength of the bedrock in the augered sections of the boreholes was assessed by observation of the auger penetration resistance using a T-C drill bit and examination of the recovered rock cuttings. It should be noted that rock strengths assessed from augered boreholes are approximate and strength variances can be expected.
  - The approximate surface levels shown on the borehole logs were interpolated from spot levels shown on the supplied survey plan. Approximate borehole locations are shown on **Figure 2**;
- Continuation of BH1M, BH2, BH3M, BH9M and BH101M using NMLC diamond coring techniques to termination depths of about 11.23m BEGL (RL of about -1.73m), 10m BEGL (RL of about 4m), 10.2m BEGL (RL of about -2.1m), 9.7m BEGL (RL of about 2.3m) and 15.56 (RL of about -6.81), respectively.
- The rock core photographs are presented in **Appendix A**;

- Boreholes BH1M, BH3M, BH9M and BH101M were converted into groundwater monitoring wells with depths of 11.23m BEGL (RL of about -1.73m), 10.2m BEGL (RL of about -2.1m), 9.7m BEGL (RL of about 2.3m) and 9.0m BEGL (RL of about -0.25m), respectively to allow for long-term groundwater monitoring.
- Borehole BH2 was backfilled with drilling spoil and capped with concrete upon completion;
- Soil and rock samples were sent to Macquarie Geotechnical Pty Ltd (Macquarie) and SGS Australia (SGS), which are National Australian Testing Authority (NATA) accredited laboratories, for testing and storage.
- Preparation of this GI report.

An EI Geotechnical Engineer was present full-time onsite to set out the borehole locations, direct the testing and sampling, log the subsurface conditions and record groundwater levels.

1.5 Constraints

The GI was limited by the intent of the investigation and the presence of existing site structures. The discussions and advice presented in this report are preliminary and intended to assist in the preparation of initial designs for the proposed development. Further additional investigation in the form of two boreholes in the centre and towards the south of the site is required following demolition. Further geotechnical inspections should be carried out during construction to confirm the geotechnical and groundwater models, and the preliminary design parameters provided in this report.

2. Site Description

2.1 Site Description and Identification

The site identification details and associated information are presented in **Table 2-1** below while the site locality is shown on **Figure 1.** An aerial photograph of the site is presented in **Plate 1** below.

Table 2-1 Summary of Site Information

Information	Detail
Street Address	40-76 William Street, Leichhardt, NSW
Lot and Deposited Plan (DP) Identification	Lot 2 in DP 789576
Brief Site Description	At the time of our investigation, the site was occupied by a three, one to four-storey brick warehouse buildings. The building structures appeared to be in reasonable condition based on a cursory inspection, with stepped cracking in the brickwork visible on the exterior walls. A concrete paved driveway and parking area was present at the western end of the site, as well as along the southern half of the eastern site boundary. Vehicular access to the site is via these driveways from North Street on the west side and Francis Street on the east side. A Sydney Water main runs across the site in a north-south direction, extending along the south western portion of the western site boundary and across to the northern site boundary. This site has also been noted to be a flood control site.
Site Area	The site area is approximately 6930m^2 (based on the provided survey plan referenced above).

Plate 1: **Aerial photograph of the site (source: SIX Maps, accessed 20/1/20)**

2.2 Local Land Use

The site is situated within an area of mixed commercial and residential use. Current uses on surrounding land at the time of our presence on site are described in **Table 2-2** below.

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description
North	William Street, a two lane, asphalt-paved road. Beyond this are one to two-storey brick residential and mixed use buildings with no apparent basements, as well as Hubert Street, a two lane, asphalt-paved road which runs perpendicular to William Street.
East	At the northern end of the eastern site boundary is No. 38 William Street, a three-storey brick warehouse building which has been converted to a residential building and abuts the eastern site boundary. Further south are Nos. 78 to 84 Francis Street, which comprise two storey warehouse buildings, converted into residential dwellings. These are setback from the eastern site boundary by about 6m. And further to the south is No. 69 Francis Street, a large residential flat development comprising a total of about 17 buildings. Adjoining the eastern site boundary is one building which comprises five, two to three-storey townhouses with parking and a shed at the rear. The shed and parking area abut the southern end of the eastern site boundary, and the residences are setback about 19m from the eastern site boundary.
South	Two residential flat buildings which form part of No. 69 Francis Street development. The eastern building is setback about 3m, and the western building is setback about 8m from the southern site boundary, respectively.
West	No. 31-47 North Street, which comprises three two to three-storey, rendered townhouse buildings. The residences are setback about 10m from the western site boundary.

2.3 Regional Setting

The site topography and geological information for the locality is summarised in **Table 2-3** below**.**

Table 2-3 Topographic and Geological Information

Attribute	Description
Topography	The site is located on the high south side of William Street in gently (<10^{o}) north dipping topography with site levels varying from R.L. 14.5m at the south-western site corner to R.L. 8.1 at the northern site boundary.
Regional Geology	Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 Geological Series Sheet 9130 (DMR 1983) indicates the site to be underlain by Hawkesbury Sandstone, which consists of medium to coarse-grained quartz sandstone with very minor shale and laminite lenses. An excerpt from this geological map is presented in **Plate 2.**

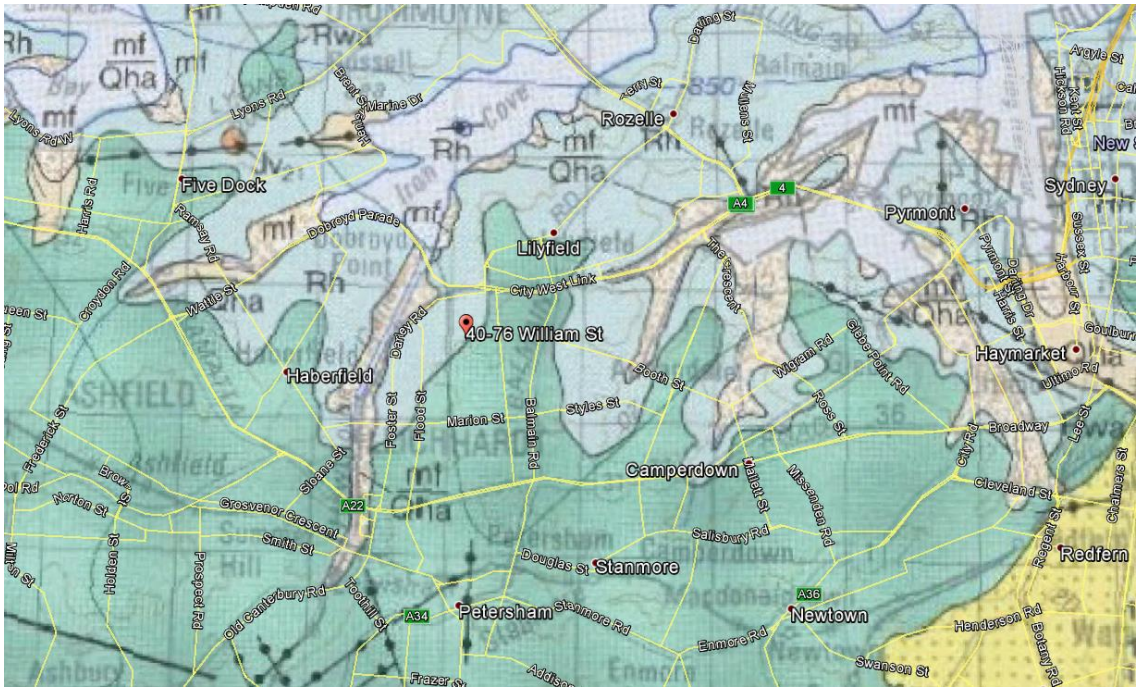


Plate 2: Excerpt of geological map showing location of site.

3. Assessment Results

3.1 Stratigraphy

For the development of a site-specific geotechnical model, the stratigraphy observed in the GA has been grouped into four geotechnical units. A summary of the subsurface conditions across the site, interpreted from the assessment results, is presented in **Table 3-1** below. More detailed descriptions of subsurface conditions at each borehole location are available on the borehole logs presented in **Appendix A**. The details of the methods of soil and rock classifications, explanatory notes and abbreviations adopted on the borehole logs are also presented in **Appendix A.**

Table 3-1 Summary of Subsurface Conditions

Unit	Material[2]	Depth to Top of Unit (m BEGL)[1]	RL of Top of Unit (m AHD)[1]	Observed Thickness (m)	Comments
1	**Fill**	Surface	8.1 to 14.0	1.2 to 2.9	Concrete pavements of 50mm to 240mm thickness, underlain by fine to coarse grained sand with gravels, and sandy gravel. Fill was assessed, based on our observations during drilling and SPT N Values to be poorly compacted.
2	**Residual Soil**	1.2 to 2.9	5.2 to 12.5	0.7 to 2.0	Only present in BH1M and BH2. Consisting of gravelly sand with sandstone gravels in BH1M, and medium plasticity, sandy clay in BH2, grading to extremely weathered sandstone. SPT N-Values in BH2 range from 2 to refusal indicated by hammer bounce.
3	**Very Low to Low Strength Sandstone**	1.2 to 3.5	5.2 to 10.8	0.7 to 2.45	Only present in BH1M, BH2 and BH3M. Fine to medium grained, distinctly weathered, very low to low strength sandstone.
4	**Medium to High Strength Sandstone**	3.03 to 4.67	4.04 to 9.8	-[3]	Fine to medium grained, medium to thickly bedded, distinctly weathered to fresh sandstonewith occasional . Low strength bands, approximately 150 mm to 250 mm thick, were observed in boreholes BH9M and BH101M.

Note 1 Approximate depth and level at the time of our assessment. Depths and levels may vary across the site.
Note 2 For more detailed descriptions of the subsurface conditions, reference should be made to the borehole logs attached to **Appendix A.**
Note 3 Observed up to termination depth in all boreholes.

3.2 Groundwater Observations

Following their completion, groundwater monitoring wells were installed in boreholes BH1M, BH3M, BH9M, and BH101M. The wells were subsequently bailed dry, and groundwater levels were recorded at a later date, as summarized in **Table 3-2** below:

Table 3-2 Groundwater Levels

Borehole ID	Measurement Date	Depth to Groundwater (m BEGL)	Groundwater RL (m AHD)
BH1M	10/01/20	2.9	6.6
BH3M	10/01/20	3.2	4.9
BH9M	10/01/20	4.2	7.8
BH101M	22/8/2025	2.3	6.45

Water circulation due to rock coring within the boreholes prevented further observations of groundwater levels within BH2. We note that the groundwater levels may not have become evident or stabilised in the augered boreholes within the limited observation period. No long term groundwater monitoring was carried out in this report.

3.3 Test Results

Three soil samples were selected for laboratory testing to assess the following:

- Soil aggressivity (pH, Chloride and Sulfate content and electrical conductivity).

A summary of the soil test results is provided in **Table 3-3** below. Laboratory test certificates are presented in **Appendix B**.

Table 3-3 Summary of Soil Laboratory Test Results

Test/ Sample ID		BH1M_1.9-1.95	BH2_1.5-1.95	BH2_3.0-3.26
Unit		2	2	2
Material Description [1]		Gravelly SAND	Sandy CLAY	Sandy CLAY
Aggressivity	Chloride Cl (ppm)	2.8	4.2	1.9
	Sulfate SO_4 (ppm)	17	42	31
	pH	4.9	7.8	6.3
	Electrical Conductivity (µS/cm)	37	69	11
	Moisture Content (%)	13.6	17.3	5.7

Note 1 More detailed descriptions of the subsurface conditions at each borehole location are available on the borehole logs presented in **Appendix A**.

The assessment indicated low permeability soil was present above the groundwater table. In accordance with Tables 6.4.2(C) and 6.5.2(C) of AS 2159:2009 'Piling – Design and Installation', the results of the pH, chloride and sulfate content and electrical conductivity of the soil provided the following exposure classifications:

- 'Mild' to 'Non-aggressive' for buried concrete structural elements; and
- 'Non-Aggressive' for buried steel structural elements.

In accordance with Table 4.8.1 of AS3600-2009 ‘Concrete Structures’ these soils would be classified as exposure classification ‘A2’ to ‘A1’ for concrete in sulfate soils.

25 selected rock core samples were tested by Macquarie to estimate the Point Load Strength Index (Is_{50}) values to assist with rock strength assessment. The results of the testing are summarised on the attached borehole logs.

The point load strength index tests correlated reasonably well with our field assessments of rock strength. The approximate Unconfined Compressive Strength (UCS) of the rock core, estimated from correlations with the point load strength index test results, varied from <4 MPa to >35 MPa.

4. Recommendations

4.1 Geotechnical Issues

Based on the results of the assessment, we consider the following to be the main geotechnical issues for the proposed development:

- Basement excavation and retention to limit lateral deflections and ground loss as a result of excavations, resulting in damage to nearby structures and the Sydney Water asset;
- Rock excavation;
- Groundwater within the depth of the excavation;
- Existing footings of neighbouring properties; and
- Foundation design for building loads.

4.2 Dilapidation Surveys

Prior to excavation and construction, we recommend that detailed dilapidation surveys be carried out on all structures and infrastructures surrounding the site that falls within the zone of influence of the excavation to allow assessment of the recommended vibration limits and protect the client against spurious claims of damage. The zone of influence of the excavation is defined by a distance back from the excavation perimeter of twice the total depth of the excavation. The reports would provide a record of existing conditions prior to commencement of the work. A copy of each report should be provided to the adjoining property owner who should be asked to confirm that it represents a fair assessment of existing conditions. The reports should be carefully reviewed prior to demolition and construction.

4.3 Excavation Methodology

4.3.1 Excavation Assessment

Prior to any excavation commencing, we recommend that reference be made to the Safe Work Australia Excavation Work Code of Practice, dated August 2019.

EI assumes that the proposed development will require a BEL of RL 3.2m for the basement, or an excavation depth between 5.7m to 11.1m BEGL. Locally deeper excavations for footings, service trenches, crane pads and lifts overrun pits may be required.

Based on the borehole logs, the proposed basement excavations will therefore extend through all units as outlined in **Table 3-1** above. As such, an engineered retention system must be installed prior to excavation commencing.

Units 1 and 2 could be excavated using buckets of large earthmoving Hydraulic Excavators, particularly if fitted with ‘Tiger Teeth’. Excavation of Units 3 and Unit 4 may present hard or heavy ripping, or “hard rock” excavation conditions. Ripping would require a high capacity and heavy bulldozer for effective production. Wear and tear should also be allowed for. The use of a smaller size bulldozer will result in lower productivity and higher wear and tear, and this should be allowed for. Alternatively, hydraulic rock breakers, rock saws, ripping hooks or rotary grinders could be used, though productivity would be lower and equipment wear increased, and this should be allowed for.

Due to the presence of the sensitive Sydney Water asset beneath the site, we recommend that excavation of the Unit 3 and Unit 4 sandstone bedrock be completed with care using rock saw

or rotary grinders when excavating close to the asset so as to reduce the transmitted vibrations. Grid sawing techniques with ripping or hammering will also facilitate the excavation.

Should rock hammers be used for the excavation of the bedrock, excavation should commence away from the adjoining structures and the transmitted vibrations monitored to assess how close the hammer can operate to the adjoining structures, including the Sydney Water asset, while maintaining transmitted vibrations within acceptable limits. To fall within these limits, we recommend that the size of rock hammers do not exceed a medium sized rock hammer, say 900 kg, such as a Krupp 580, and be trialled prior to use. The transmitted vibrations from rock hammers should be measured to determine how close each individual hammer can operate to the adjoining buildings.

The vibration measurements can be carried out using either an attended or an unattended vibration monitoring system. An unattended vibration monitoring system must be fitted with an alarm in the form of a strobe light or siren or alerts sent directly to the site supervisor to make the plant operator aware immediately when the vibration limit is exceeded. The vibration monitor must be set to trigger the alarm when the overall Peak Particle Velocity (PPV) exceeds set limits outlined by a vibration monitoring plan. Reference should be made to **Appendix C** for a guide to acceptable limits of transmitted vibrations.

If it is found that the transmitted vibrations by the use of rock hammers are unacceptable, then it would be necessary to change to a smaller excavator with a smaller rock hammer, or to a rotary grinder, rock saws, jackhammers, ripping hooks, chemical rock splitting and milling machines. Although these are likely to be less productive, they would reduce or possibly eliminate risks of damage to adjoining properties through vibration effects transmitted via the ground. Such equipment would also be required for detailed excavation, such as footings or service trenches, and for trimming of faces. Final trimming of faces may also be completed using a grinder attachment rather than a rock breaker in order to assist in limiting vibrations. The use of rotary grinders generally generates dust and this may be supressed by spraying with water.

To assist in reducing vibrations and over-break of the sandstone, we recommend that initial saw cutting of the excavation perimeters through the bedrock may be provided using rock saw attachments fitted to the excavator. Rock sawing of the excavation perimeter has several advantages as it often reduces the need for rock bolting as the cut faces generally remain more stable and require a lower level of rock support than hammer cut excavations, ground vibrations from rock saws are minimal and the saw cuts will provide a slight increase in buffer distance for use of rock hammers. However, the effectiveness of such approach must be confirmed by the results of vibration monitoring.

Groundwater seepage monitoring should be carried out during bulk excavation works and prior to finalising the design of a pump out facility. Outlets into the stormwater system will require Council approval.

Furthermore, any existing buried services, which run below the site, will require diversion prior to the commencement of excavation or alternatively be temporarily supported during excavation, subject to permission or other instructions from the relevant service authorities. Enquiries should also be made for further information and details, such as invert levels, on the buried services.

4.3.2 Excavation Monitoring

Consideration should be made to the impact of the proposed development upon neighbouring structures, roadways and services, such as the Sydney Water asset. Basement excavation retention systems should be designed so as to limit lateral deflections.

Contractors should also consider the following limits associated with carrying out excavation and construction activities:

- Limit lateral deflection of temporary or permanent retaining structures;
- Limit vertical settlements of ground surface at common property boundaries and services easement; and
- Limit Peak Particle Velocities (PPV) from vibrations, caused by construction equipment or excavation, experienced by any nearby structures and services.

Monitoring of deflections of retaining structures and surface settlements should be carried out by a registered surveyor at agreed points along the excavation boundaries and along existing building foundations/ services/ pavements and other structures located within or near the zone of influence of the excavation. Owners of existing services adjacent to the site should be consulted to assess appropriate deflection limits for their infrastructures, including the Sydney Water asset. Measurements should be taken in the following sequence:

- Before commencing installation of retaining structures, where appropriate, to determine the baseline readings. Two independent sets of measurements must be taken confirming measurement consistency;
- After installation of the retaining structures, but before commencement of excavation;
- After excavation to the first row of supports or anchors, but prior to installation of these supports or anchors;
- After excavation to any subsequent rows of supports or anchors, but prior to installation of these supports or anchors;
- After excavation to the base of the excavation;
- After de-stressing and removal of any rows of supports or anchors; and
- One month after completion of the permanent retaining structure or after three consecutive measurements not less than a week apart showing no further movements, whichever is the latter.

4.4 Groundwater Considerations

Groundwater was observed in all monitoring wells as detailed in **Table 3-2**, all of which are above the assumed BEL RL of 3.2m.

Due to the low permeability of the bedrock profile, any groundwater inflows into the excavation should not have an adverse impact on the proposed development or on the neighbouring sites and should be manageable. However, we expect that some groundwater inflows into the excavation along the soil/rock interface and through any defects within the sandstone bedrock (such as jointing, and bedding planes, etc.) particularly following a period of heavy rainfall. The initial flows into the excavation may be locally high, but would be expected to decrease considerably with time as the bedding seams/joints are drained. We recommend that monitoring of seepage be implemented during the excavation works to confirm the capacity of the drainage system.

We expect that any seepage that does occur will be able to be controlled by a conventional sump and pump system. We recommend that a sump-and-pump system be used both during construction and for permanent groundwater control below the basement floor slab.

In the long term, drainage should be provided behind all basement retaining walls, around the perimeter of the basement and below the basement slab. The completed excavation should be inspected by the hydraulic engineer to confirm that adequate drainage has been allowed for. Drainage should be connected to the sump-and-pump system and discharged into the stormwater system. The permanent groundwater control system should take into account any possible soluble substances in the groundwater which may dictate whether or not groundwater can be pumped into the stormwater system.

The design of drainage and pump systems should take the above issues into account along with careful ongoing inspections and maintenance programs.

4.5 Excavation Retention

4.5.1 Support Systems

From a geotechnical perspective, it is critical to maintain the stability of all adjacent structures and infrastructures during demolition, excavation and construction works.

Based on the proposed basement outline, and the encountered subsurface conditions, temporary batters may be feasible for the fill and residual soil profile where space is available. However, considering the depth of excavation required, it may be more cost-efficient to support the entire excavation using a suitable retention system. If batters are to be used, then these must be assessed using computer slope stability analysis software such as Slope/W. We can complete such analysis, if commissioned to do so.

For this site, we consider that an anchored and/or propped soldier pile wall with mass concrete in between the piles installed to below BEL to be the most suitable. Anchors/props and mass concrete must be installed progressively as excavation proceeds.

Bored piles are considered to be the most suitable for this site. Tremie pumps may be required where high groundwater seepage inflows are present during the drilling of the bored piles. Relatively large capacity piling rigs will be required for drilling through the sandstone bedrock. The proposed pile locations should take into account the presence of buried services. Further advice should be sought from prospective piling contractors who should be provided with a copy of this report.

4.5.2 Retaining Wall Design Parameters

The following parameters may be used for static design of temporary and permanent retaining walls at the subject site:

- For progressively anchored or propped walls where minor movements can be tolerated (provided there are no buried movement sensitive services), we recommend the use of a trapezoidal earth pressure distribution of 5H kPa for soil, where H is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system, tapering to nil at top and bottom;
- For progressively anchored or propped walls which support areas which are highly sensitive to movement (such as areas where movement sensitive structures or infrastructures or buried services are located in close proximity), we recommend the use of a trapezoidal earth pressure distribution of 8H kPa for soil, where ‘H’ is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system, tapering to nil at top and bottom;

- All surcharge loading affecting the walls (including from construction equipment, construction loads, adjacent high level footings, etc.) should be adopted in the retaining wall design as an additional surcharge using an 'at rest' earth pressure coefficient, Ko, of 0.58;
- The retaining walls should be designed as drained and measures are to be taken to provide complete and permanent drainage behind the walls. For the contiguous pile walls, weepholes comprising 20mm diameter, slotted PVC pipes installed into holes or gaps between adjacent piles at 1.2m centres (horizontal and vertical), may be used. The embedded pipes must, however, be wrapped with a non-woven geotextile fabric (such as Bidim A34) to act as a filter against subsoil erosion;
- For piles embedded into Unit 4 or better, the allowable lateral toe resistance values outlined in **Table 4-1** below may be adopted. These values assume excavation is not carried out within the zone of influence of the wall toe and the rock does not contain adverse defects etc. The upper 0.3m depth of the socket should not be taken into account to allow for tolerance and disturbance effects during excavation.
- If temporary anchors extend beyond the site boundaries, then permission from the neighbouring properties would need to be obtained prior to installation. Also, the presence of neighbouring basements and/or services and their levels must be confirmed prior to finalising anchor design**.**
- Anchors should have their bond length within Unit 3 or better. For the design of anchors bonded into Unit 3 or better, the allowable bond stress value outlined in **Table 4-1** below may be used, subject to the following conditions:

    1. Anchor bond lengths of at least 3m behind the 'active' zone of the excavation (taken as a 45 degree zone above the base of the excavation) is provided;
    2. Overall stability, including anchor group interaction, is satisfied;
    3. All anchors should be proof loaded to at least 1.33 times the design working load before locked off at working load. Such proof loading is to be witnessed by and engineer independent of the anchoring contractor. We recommend that only experienced contractors be considered for anchor installation with appropriate insurances;
    4. If permanent anchors are to be used, these must have appropriate corrosion provisions for longevity.

Table 4-1 Geotechnical Design Parameters

Material [1]		Unit 1 Fill	Unit 2 Residual Soil	Unit 3 Very Low to Low Strength Sandstone	Unit 4 Medium to High Strength Sandstone
RL of Top of Unit (m AHD) [2]		8.1 to 14	5.2 to 12.5	5.2 to 10.8	4.04 to 9.8
Bulk Unit Weight (kN/m^3)		18	20	23	24
Friction Angle, ϕ' (°)		25	25	35	40
Earth Pressure Coefficients	At rest, K_o [3]	0.58	0.58	0.43	-
	Active, K_a [3]	0.41	0.41	0.27	-
	Passive, K_p [3]	-	-	3.69	-
Allowable Bearing Pressure (kPa) [5]		-	-	700	3500
Allowable Shaft Adhesion (kPa) [4, 5]	in Compression	-	-	70	350
	in Uplift	-	-	35	175
Allowable Toe Resistance (kPa)		-	-	70	350
Allowable Bond Stress (kPa)		-	-	50	300
Earthquake Site Risk Classification		▪ AS 1170.4:2007 indicates an earthquake subsoil class of Class C_e.(Shallow Soil) ▪ AS 1170.4:2007 indicates that the hazard factor (z) for Sydney is 0.08.			

Notes:

1 More detailed descriptions of subsurface conditions are available on the borehole logs presented in **Appendix A.**
2 Approximate levels of top of unit at the time of our investigation. Levels may vary across the site.
3 Earth pressures are provided on the assumption that the ground behind the retaining walls is horizontal.
4 Side adhesion values given assume there is intimate contact between the pile and foundation material and should achieve a clean socket roughness category R2 or better. Design engineer to check both 'piston pull-out' and 'cone liftout' mechanics in accordance with AS4678-2002 Earth Retaining Structures.
5 To adopt these parameters we have assumed that:
- Footings have a nominal socket of at least 0.3m, into the relevant founding material;
- For piles, there is intimate contact between the pile and foundation material (a clean socket roughness category of R2 or better);
- Potential soil and groundwater aggressivity will be considered in the design of piles and footings;
- Piles should be drilled in the presence of a Geotechnical Engineer prior to pile construction to verify that ground conditions meet design assumptions. Where groundwater ingress is encountered during pile excavation, concrete is to be placed as soon as possible upon completion of pile excavation. Pile excavations should be pumped dry of water prior to pouring concrete, or alternatively a tremmie system could be used;
- The bases of all pile, pad and strip footing excavations are cleaned of loose and softened material and water is pumped out prior to placement of concrete;
- The concrete is poured on the same day as drilling, inspection and cleaning.
- The allowable bearing pressures given above are based on serviceability criteria of settlements at the footing base/pile toe of less than or equal to 1% of the minimum footing dimension (or pile diameter).

4.6 Foundations

The most competent foundation stratum at the site is the medium to high strength sandstone. In view of the reactivity of the residual clay and moderate depths to the bedrock, we recommend that building is supported on shallow footings or pile footings founded into medium to high strength bedrock.

4.6.1 Shallow Footings in Rock

Following bulk excavation to RL 3.2m for the basement, we expect Unit 4 material to be exposed at BEL.

It is recommended that all footings for the building be founded within sandstone bedrock of similar strength, of at least Unit 4 or better, to provide uniform support and reduce the potential for differential settlements.

Pad or strip footings founded within Unit 4 may be preliminarily designed for an allowable bearing capacity of 3500kPa, based on serviceability.

Geotechnical inspections of foundations are recommended to determine that the required bearing capacity has been achieved and to determine any variations that may occur between the boreholes and inspected locations.

4.6.2 Pile Footings

Alternatively, where the proposed development does not overly the proposed basement, it may be supported on deep foundations, such as piles, founded into medium to high strength bedrock.

For piles founded into Unit 4 bedrock, these must be embedded a minimum of 0.5m into medium to high strength sandstone, and can be designed for a maximum allowable bearing pressure of 3500kPa. The allowable shaft adhesion in sandstone bedrock may be designed as 10% of the allowable bearing pressure (or 5% for uplift) for the socket length in excess of 0.5m.

We note that Sydney Water may not allow footings over the exclusion and clearance zones of the asset. Piles founded below the depth of the invert level of the asset may be required. Steel casings are recommended above and adjacent to the asset to prevent mobilisation of shaft adhesion within the clearance zone of the asset.

At least the initial drilling of piles should be completed in the presence of a geotechnical engineer to verify that ground conditions meet design assumptions.

Where groundwater ingress is encountered during pile excavation, concrete is to be placed as soon as possible upon completion of pile excavation. Pile excavations should be pumped dry of water prior to pouring concrete, or alternatively a tremmie system could be used. Concrete must be poured on the same day as drilling, inspection and drilling.

The aggressivity of natural soils and groundwater (if encountered) should be taken into consideration in the design.

Footings founded at or near a crest of an excavation (such as the building located to the north, outside of the basement outline) should be founded below the zone of influence of the lower basement retaining walls, which may be taken as founding below a line drawn at 1 Vertical to 1 Horizontal from the base of the retaining walls. Specific geotechnical advice should be obtained for such footings taken into consideration the basement excavation and the quality of sandstone at the particular footing location.

4.7 Basement Floor Slab

Following bulk excavations for the proposed basement, sandstone bedrock is expected to be exposed at the basement floor BEL.

Following the removal of all loose and softened materials, we recommend that underfloor drainage be provided and should comprise a strong, durable, single sized washed aggregate such as ‘blue metal gravel’. Joints in the concrete floor slab should be designed to accommodate shear forces but not bending moments by using dowelled and keyed joints. The basement floor slab should be isolated from columns. The completed excavation should be inspected by the hydraulic engineer to confirm the extent of the drainage required.

In addition, a system of sub-soil drains comprising a durable single sized aggregate with perforated drains/pipes leading to sumps should be provided. Permission may need to be obtained from the NSW Department of Primary Industries (DPI) and possibly Council for any permanent discharge of seepage into the drainage system. Given the subsurface conditions, we expect that seepage volumes would be low and within the DPI limits. However, if permission for discharge is not obtained, the basement may need to be designed as a tanked basement.

5. Further Geotechnical Inputs

Below is a summary of the recommended additional work to be carried out:

- Additional Geotechnical Investigation in the form of two cored boreholes to confirm the depth and quality of Unit 4 sandstone bedrock or better;
- Long term groundwater monitoring and seepage modelling;
- Stability assessment of temporary batters using computer modelling, if required;
- Computer modelling of the potential impact of the proposed development on the underlying Sydney Water asset;
- Monitoring of the Sydney Water asset;
- Dilapidation surveys;
- Design of working platforms (if required) for construction plant by an experienced and qualified geotechnical engineer;
- Classification of all excavated material transported off site;
- Witnessing installation of support measures and proof-testing of anchors (if required);
- Geotechnical inspections of all new footings/piles by an experienced geotechnical professional before concrete or steel are placed to verify their bearing capacity and the in-situ nature of the founding strata; and
- Ongoing monitoring of groundwater inflows into the bulk excavation;

We recommend that a meeting be held after initial structural design has been completed to confirm that our recommendations have been correctly interpreted. We also recommend a meeting at the commencement of construction to discuss the primary geotechnical issues and inspection requirements.

6. Statement of Limitations

This report has been prepared for the exclusive use of and Anprisa Pty Ltd who is the only intended beneficiary of EI's work. The scope of the assessment carried out for the purpose of this report is limited to those agreed with and Anprisa Pty Ltd

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling and test locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during construction. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

We draw your attention to the document "Important Information", which is included in **Appendix C** of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by EI, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

Should you have any queries regarding this report, please do not hesitate to contact EI.

References

AS1289.6.3.1:2004, *Methods of Testing Soils for Engineering Purposes,* Standards Australia.

AS1726:2017, *Geotechnical Site Investigations*, Standards Australia.

AS2159:2009, *Piling – Design and Installation*, Standards Australia.

AS3600:2009, *Concrete Structures,* Standards Australia

Safe Work Australia Excavation Work Code of Practice, dated August 2019 – WorkCover NSW

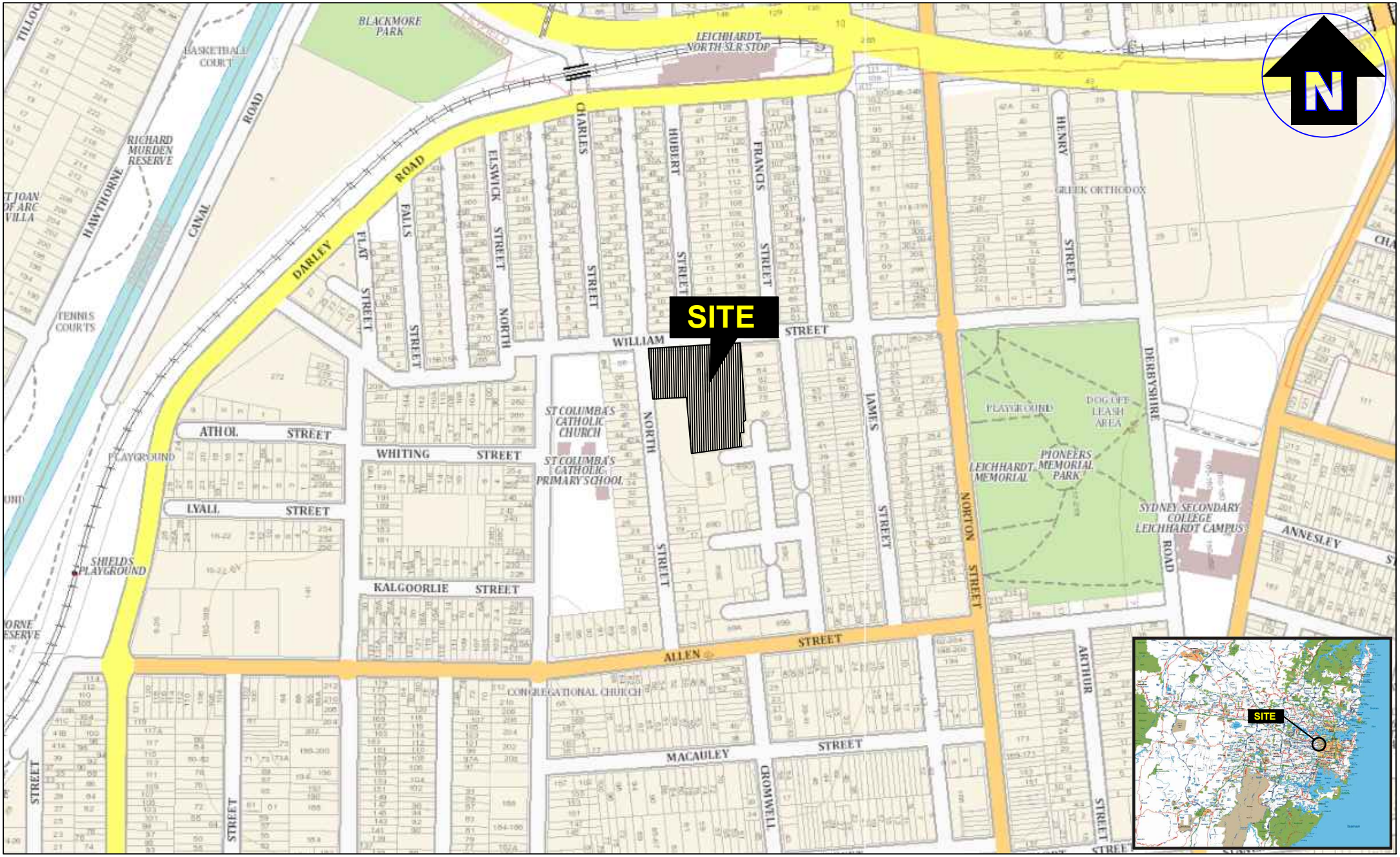
NSW Department of Finance and Service, Spatial Information Viewer, maps.six.nsw.gov.au.

NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1). Geological Survey of New South Wales, Department of Mineral Resources.

Abbreviations

AHD	Australian Height Datum
AS	Australian Standard
BEL	Bulk Excavation Level
BEGL	Below Existing Ground Level
BH	Borehole
DBYD	Dial Before You Dig
DP	Deposited Plan
EI	EI Australia
GI	Geotechnical Investigation
NATA	National Association of Testing Authorities, Australia
RL	Reduced Level
SPT	Standard Penetration Test
T-C	Tungsten-Carbide
UCS	Unconfined Compressive Strength

Figures



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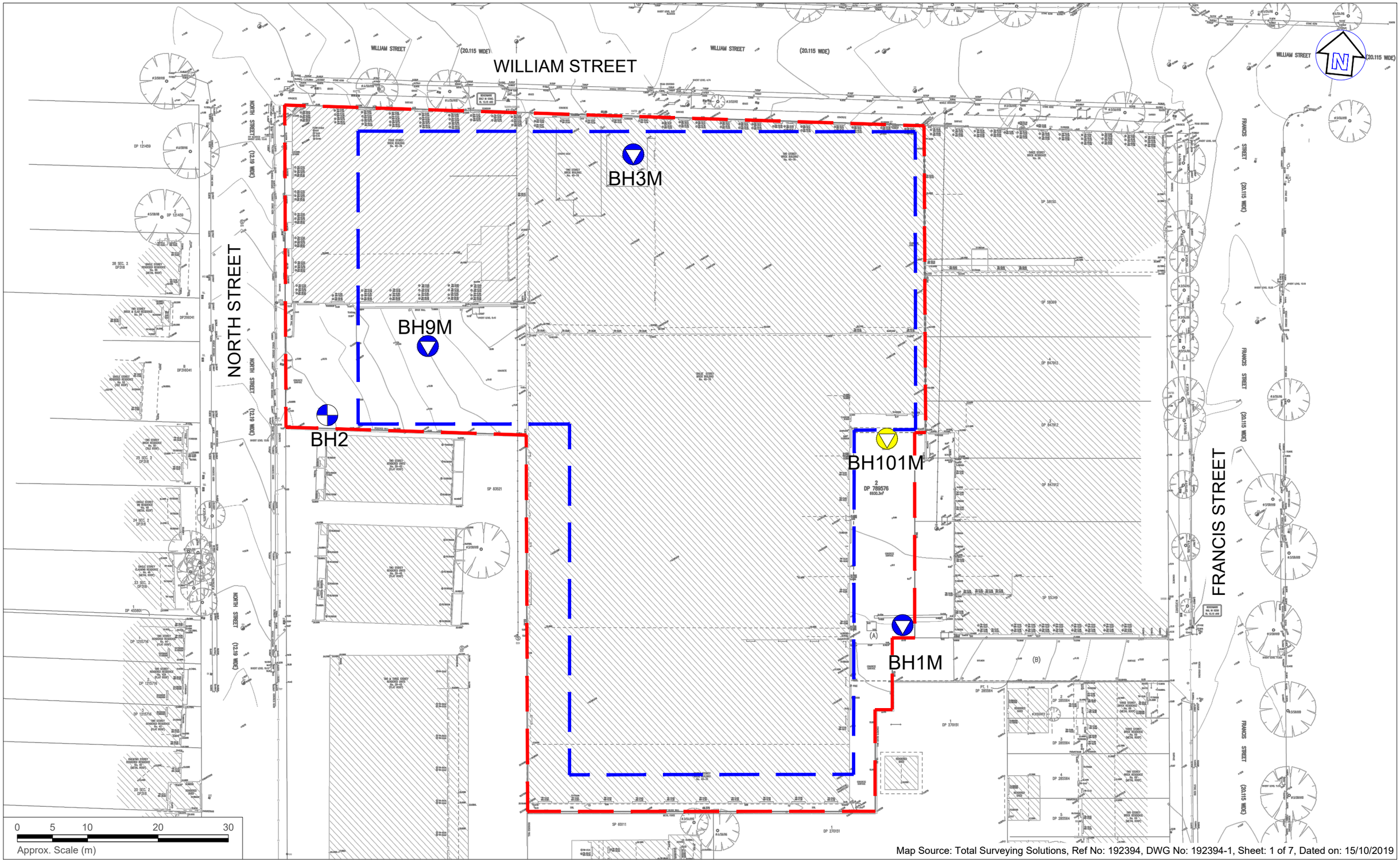
Approved:	B.L.
Date:	22/01/20
Scale:	Not To Scale

Ceerose Pty Ltd

Geotechnical Investigation
40-76 William Street, Leichhardt NSW
Site Locality Plan

Figure:
1

Project: E24470.G03



Map Source: Total Surveying Solutions, Ref No: 192394, DWG No: 192394-1, Sheet: 1 of 7, Dated on: 15/10/2019

LEGEND

- Approximate site boundary
- Approximate basement boundary
- Approximate previous borehole location (EI, 2022)
- Approximate previous borehole/monitoring well location (EI, 2022)
- Approximate additional borehole/monitoring well location (EI, 2025)

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Approved:	G.P
Date:	17/9/2025

Ceerose Pty Ltd
Geotechnical Investigation
40-76 William Street, Leichhardt NSW
Borehole Location Plan

Figure: 2

Project: E24470.G03_Rev6

Appendix A – Borehole Logs And Explanatory Notes

BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	1 of 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	16/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈9.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			0	9.50 *0.21*				-	FILL/CONCRETE; 210 mm thick.	-	-	CONCRETE
AD/T	-			9.29 *0.80* 8.70	SPT 0.50-0.95 m 10,9,4 N=13			-	FILL: SAND; fine to medium grained, dark grey, with fine to coarse gravels, trace slag and silt, with slight hydrocarbon odour. From 0.8 m, moderate hydrocarbon odour.	M	-	FILL
			1		SPT 1.50-1.95 m 3,3,6 N=9							
				1.90 7.60				SP	Gravelly SAND; fine to medium grained, dark grey, with fine to coarse, red-brown to pale grey sandstone gravels, with moderate hydrocarbon odour.	M	-	RESIDUAL SOIL
			2	*2.60*								
	L	10/01/20		6.90 *3.20* 6.30				-	SANDSTONE; fine to medium grained, red-brown, very low strength, distinctly weathered. From 3.2 m, pale grey to red-brown, very low to low strength.	-	-	BEDROCK
	L-M		3		BH1M_3.7-3.8 DS							
			4	*4.67*					Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	2 OF 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	16/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈9.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
					4.67		Continuation from non-cored borehole				
NMLC	100% RETURN				4.83		SANDSTONE; fine to medium grained, pale grey to orange-brown, thinly to medium bedded, sub-horizontal bedding, with ironstaining.	SW		4.75: JT, 30°, Clay, PR, RF 4.98: JT, 0°, Fe SN, PR, RF	
		100	82	5							
					5.90					5.70: BP, 0°, Clay VNR, PR, RF 5.78: BP, 0°, Clay VNR, PR, RF 5.85: BP, 0°, Clay VNR, PR, RF	
				6	3.60		From 5.9 m, fine to medium grained, pale grey, medium to thickly bedded, with sub-horizontal grey clay laminations.	FR		6.36: JT, 10°, CN, PR, RF 6.45: JT, 15°, Clay VNR, PR, RF	
				7							
		100	100	8						8.60: JT, 20°, Fe SN, PR, RF	
				9							
		100	80	10							

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	3 OF 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	16/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈9.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	80	10				FR		10.09: JT, 10°, Clay VNR, PR, RF	
										10.59: JT, 5°, CN, PR, RF	
				11						10.75: JT, 20°, CN, PR, RF	
					11.23 -1.73		Borehole Terminated at 11.23 m, Target Depth Reached.			11.22: JT, 45°, CN, PR, RF	
				12							
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

MONITORING WELL LOG

MW NO. BH1M

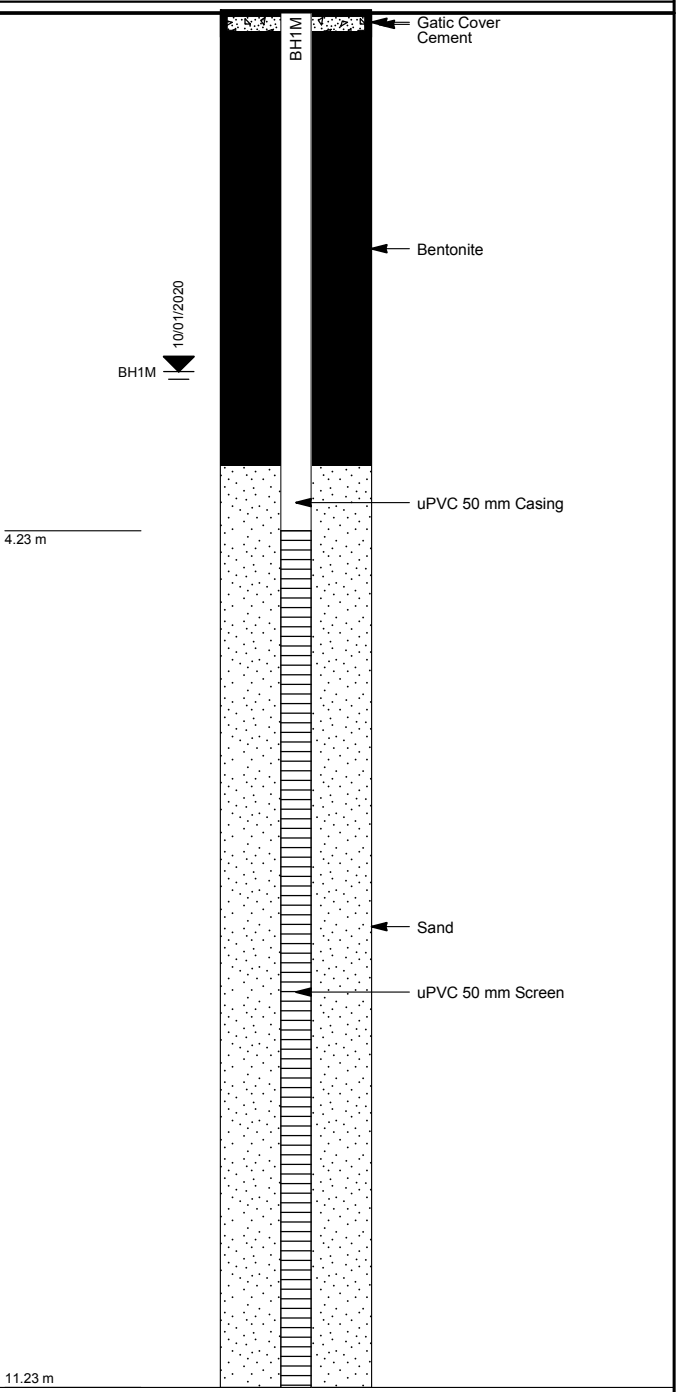
Project	Proposed Development	**Sheet**	1 of 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	16/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈9.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
DT		0			FILL/CONCRETE; 210 mm thick.
					FILL: SAND; fine to medium grained, dark grey, with fine to coarse gravels, trace slag and silt, with slight hydrocarbon odour.
			8		From 0.8 m, moderate hydrocarbon odour.
		2			Gravelly SAND; fine to medium grained, dark grey, with fine to coarse, red-brown to pale grey sandstone gravels, with moderate hydrocarbon odour.
AD/T	10/01/20				SANDSTONE; fine to medium grained, red-brown, very low strength, distinctly weathered.
			6		From 3.2 m, pale grey to red-brown, very low to low strength.
		4			
			4		SANDSTONE; fine to medium grained, pale grey to orange-brown, thinly to medium bedded, sub-horizontal bedding, with ironstaining.
		6			From 5.9 m, fine to medium grained, pale grey, medium to thickly bedded, with sub-horizontal grey clay laminations.
NMLC	100% RETURN		2		
		8			
			0		
		10			
			-2		Borehole Terminated at 11.23 m, Target Depth Reached.
		12			

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH1M	Standpipe	0.10 m 9.40 m	11.23 m -1.73 m		



This well log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH1M

Project	Proposed Development			**Depth Range**	4.67m to 11.23m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	BG Drilling		
Position	See Figure 2	**Surface RL**	≈ 9.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	DS	**Date**	16 / 12 / 2019
Client	Anprisa Pty Ltd	**Box**	1-2 of 2	**Checked**	BL	**Date**	22 / 01 / 2020

BOREHOLE LOG

BH NO. BH2

Project	Proposed Development	**Sheet**	1 of 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	17/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈14.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	13.95				-	FILL/CONCRETE; 50 mm thick.	-	-	CONCRETE
								-	FILL: Sandy GRAVEL; fine to coarse and angular to sub-angular gravels, grey, with fine to coarse grained sand.	M	-	FILL
				0.80	SPT 0.50-0.95 m 3,4,4 N=8							
			1	13.20				-	FILL: Gravelly SAND; fine to coarse grained, pale grey-grey, with fine to coarse and angular to sub-angular gravels.	M	-	
				1.50								
				12.50	SPT 1.50-1.95 m 1,1,1 N=2			Cl	Sandy CLAY; medium plasticity, yellow-brown, trace ironstone gravels.		S	RESIDUAL SOIL
			2	*2.00*								
				12.00					From 2.0 m, grading into extremely weathered material.	M (<PL)	H	
			3		SPT 3.00-3.26 m 15,25/110mm HB							
				3.50								
	L-M			10.50				-	SANDSTONE; fine to medium grained, pale grey to red-brown, very low to low strength, distinctly weathered.	-	-	BEDROCK
			4	*4.20*								
									Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH2

Project	Proposed Development	**Sheet**	2 OF 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	16/12/2019
Position	Refer to Figure 2	**Date Completed**	17/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 16/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈14.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.20*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	100	5	9.80 *5.20* 8.80		SANDSTONE; fine to medium grained, pale grey-red, medium to thickly bedded, with sub-horizontal bedding, trace ironstaining. From 5.2 m, pale grey.	SW - FR		5.12: JT, 40°, Closed 5.17: JT, 5°, Fe SN, PR, RF 5.21-5.32: XWSx5	
		100	92	6				FR		6.50: JT, 45°, PR, RF	
				7						7.37-7.38: XWS	
				8						8.32: JT, 10°, Clay VNR, PR, RF 8.45-8.68: JTx5, 0 - 10°, CN, PR, RF	
		100	94	9						9.20-9.21: XWS	
				10	*10.00*		Borehole Terminated at 10.00 m, Target Depth Reached.				

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project	Proposed Development			**Depth Range**	4.2m to 10.0m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	BG Drilling		
Position	See Figure 2	**Surface RL**	≈ 14.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	DS	**Date**	16 / 12 / 2019
Client	Anprisa Pty Ltd	**Box**	1-2 of 2	**Checked**	BL	**Date**	22 / 01 / 2020

BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	1 of 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	18/12/2019
Position	Refer to Figure 2	**Date Completed**	18/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 18/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈8.10 m AHD
Drill Rig	Christie (Rig 16)	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			0	8.10				-	FILL/CONCRETE; 200 mm thick.	-	-	CONCRETE
				0.20								
AD/T	-	GWNE during augering		7.90				-	FILL: SAND; fine to medium grained, yellow-brown, with fine to coarse and angular to sub-angular sandstone gravels, red-brown.	D - M	-	FILL
			1	*1.20*								
				6.90					From 1.2 m, with sandstone cobbles.			
			2	***2.90***								
	M-H	10/01/20	3	5.20				-	SANDSTONE; fine to medium grained, red-brown, low strength, distinctly weathered.	-	-	BEDROCK
				3.30								
									Continued as Cored Borehole			
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	2 OF 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	18/12/2019
Position	Refer to Figure 2	**Date Completed**	18/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 18/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈8.10 m AHD
Drill Rig	Christie (Rig 16)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
					3.30		Continuation from non-cored borehole				
NMLC	100% RETURN	50	37	4	4.80		SANDSTONE; fine to medium grained, pale grey to orange-brown, medium to thickly bedded, with ironstaining.	SW			
					3.63						
					4.47		NO CORE; 450 mm thick.	-			
					4.08						
		100	100	5	4.02			SW		4.08-4.20: XWZ 4.34-4.35: XWS	
		100	100	6							
		100	100	7	*7.12*		From 7.12 m, pale grey, with sub-horizontal laminations.	FR		7.21-7.22: XWS 7.45: JT, 15°, CN, PR, RF	
		100	100	8	0.98						
		100	73	9						9.10: JT, 10°, Clay VNR, PR, RF	
				10							

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	3 OF 3
Location	40-76 William Street, Leichhardt NSW	**Date Started**	18/12/2019
Position	Refer to Figure 2	**Date Completed**	18/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 18/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈8.10 m AHD
Drill Rig	Christie (Rig 16)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
		100	73	10	*10.20*			FR		9.93-9.98: JT, 45°, Fe SN, PR, RF 10.10-10.11: XWS 10.18-10.20: XWS	
					-2.10		Borehole Terminated at 10.20 m, Target Depth Reached.				
				11							
				12							
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

MONITORING WELL LOG

MW NO. BH3M

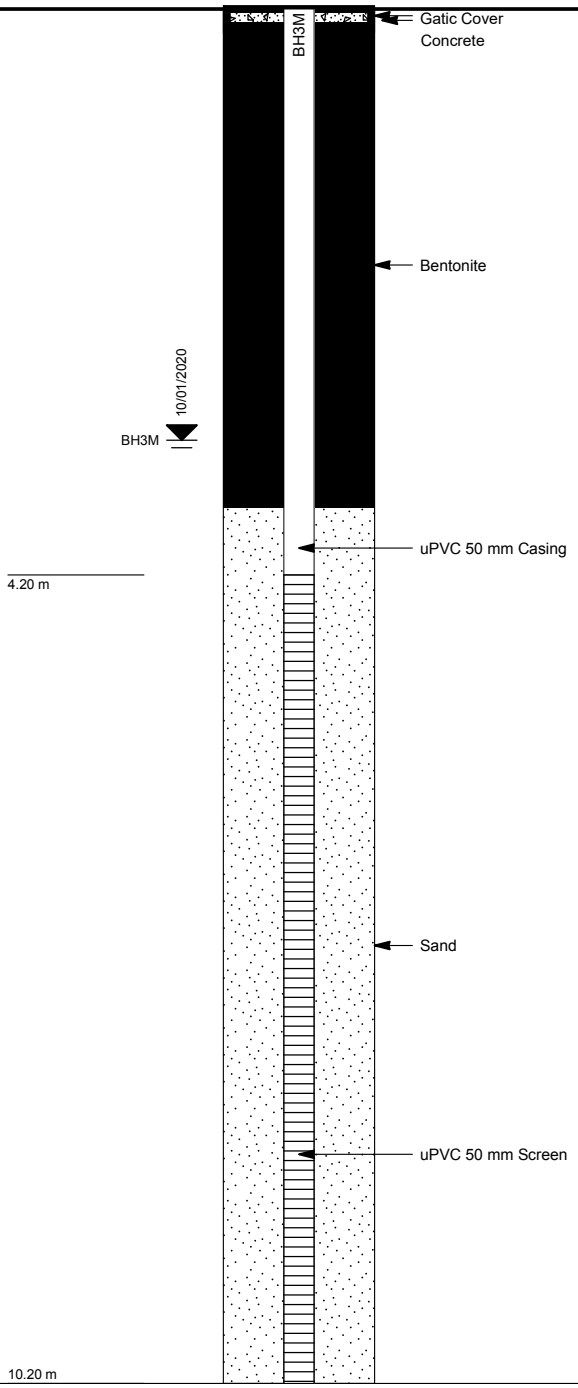
Project	Proposed Development	**Sheet**	1 of 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	18/12/2019
Position	Refer to Figure 2	**Date Completed**	18/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 18/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈8.10 m AHD
Drill Rig	Christie (Rig 16)	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
DT		0	8		FILL/CONCRETE; 200 mm thick.
AD/T	GWNE during augering	1	7		FILL: SAND; fine to medium grained, yellow-brown, with fine to coarse and angular to sub-angular sandstone gravels, red-brown.
	10/01/20				From 1.2 m, with sandstone cobbles.
		2	6		
		3	5		SANDSTONE; fine to medium grained, red-brown, low strength, distinctly weathered.
NMLC	100% RETURN				SANDSTONE; fine to medium grained, pale grey to orange-brown, medium to thickly bedded, with ironstaining.
		4	4		NO CORE; 450 mm thick.
		5	3		
		6	2		
		7	1		From 7.12 m, pale grey, with sub-horizontal laminations.
		8	0		
		9	-1		
		10	-2		
		11	-3		Borehole Terminated at 10.20 m, Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH3M	Standpipe	0.08 m 8.02 m	10.20 m -2.10 m		



This well log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH3M

Project	Proposed Development			**Depth Range**	3.3m to 10.2m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	BG Drilling		
Position	See Figure 2	**Surface RL**	≈ 8.1m	**Drill Rig**	Christie (Rig 16)		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	DS	**Date**	18 / 12 / 2019
Client	Anprisa Pty Ltd	**Box**	1-2 of 2	**Checked**	BL	**Date**	22 / 01 / 2020

BOREHOLE LOG

BH NO. BH9M

Project	Proposed Development	**Sheet**	1 of 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	17/12/2019
Position	Refer to Figure 2	**Date Completed**	17/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 17/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈12.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	11.95				-	FILL/CONCRETE; 50 mm thick.	-	-	CONCRETE
								-	FILL: SAND; fine to coarse grained, brown, with fine to medium gravels, with slight hydrocarbon odour.	M	-	FILL
			1	*1.20*					Continued as Cored Borehole			
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORED BOREHOLE LOG

BH NO. BH9M

eiaustralia
Contamination | Remediation | Geotechnical

Project	Proposed Development	**Sheet**	2 OF 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	17/12/2019
Position	Refer to Figure 2	**Date Completed**	17/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 17/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈12.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1	*1.20*		Continuation from non-cored borehole				
NMLC	10/01/20	100	56	2	10.80		SANDSTONE; fine to medium grained, pale grey to orange-brown, thinly to medium bedded, with grey clay laminations.	DW - SW		1.29: JT, 20°, Clay, PR, RF 1.29-1.36: XWS 1.61-1.62: XWS 2.08-2.13: JT, 45°, CN, PR, RF 2.26-2.33: JT, 60°, CN, CU, RF 2.75: JT, 0°, CN, PR, RF 3.17: JT, 20°, Clay VNR, PR, RF 3.28-3.45: XWZ 3.57-3.58: XWS	
	100% RETURN	100	92	3	*3.65* 8.35		From 3.65 m, medium to high strength, medium to thickly bedded.	SW		3.60-3.62: XWS 4.31-4.32: XWS 4.49-4.50: XWS	
		100	100	4	*5.20* 6.80		From 5.2 m, pale grey.	FR			
		100	96	5							
		100	94	6	*8.58* 3.42		From 8.58 to 8.69 m, dark grey claystone bedding.			9.39-9.40: XWS	
				7	*9.70* 2.30		Borehole Terminated at 9.70 m, Target Depth Reached.				
				8							
				9							
				10							

This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

MONITORING WELL LOG

MW NO. BH9M

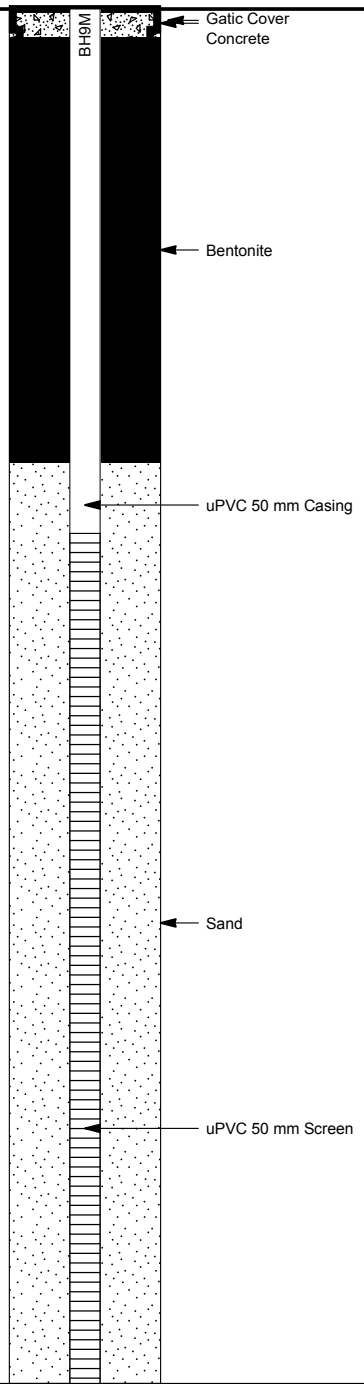
Project	Proposed Development	**Sheet**	1 of 2
Location	40-76 William Street, Leichhardt NSW	**Date Started**	17/12/2019
Position	Refer to Figure 2	**Date Completed**	17/12/2019
Job No.	E24470.G03	**Logged By** DS	**Date** 17/12/2019
Client	Anprisa Pty Ltd	**Reviewed By** BL	**Date** 22/01/2020

Drilling Contactor	BG Drilling	**Surface RL**	≈12.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	GWNE	0	12		FILL/CONCRETE; 50 mm thick.
					FILL: SAND; fine to coarse grained, brown, with fine to medium gravels, with slight hydrocarbon odour.
		1	11		
NMLC	10/01/20				SANDSTONE; fine to medium grained, pale grey to orange-brown, thinly to medium bedded, with grey clay laminations.
		2	10		
		3	9		
	100% RETURN				From 3.65 m, medium to high strength, medium to thickly bedded.
		4	8		
		5	7		From 5.2 m, pale grey.
		6	6		
		7	5		
		8	4		From 8.58 to 8.69 m, dark grey claystone bedding.
		9	3		
		10	2		Borehole Terminated at 9.70 m, Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH9M	Standpipe	0.10 m 11.90 m	9.70 m 2.30 m		



This well log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH9M

Project	Proposed Development			**Depth Range**	1.2m to 9.7m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	BG Drilling		
Position	See Figure 2	**Surface RL**	≈ 12.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	DS	**Date**	17 / 12 / 2019
Client	Anprisa Pty Ltd	**Box**	1-2 of 2	**Checked**	BL	**Date**	22 / 01 / 2020

BOREHOLE LOG

BH ID: BH101M

Location	40-76 William Street, Leichhardt, NSW	**Started**	15 August 2025
Client	Ceerose	**Completed**	15 August 2025
Job No.	E24470.G03	**Logged By**	LL **Date** 15 August 2025
Sheets	1 of 3	**Review By**	GP **Date** 17 September 2025
Drilling Contractor	Geosense Drilling Engineers	**Surface RL**	≈8.75 m (AHD)
Plant	Hanjin D&B 8-D	**Inclination**	90°
Northing	6249839.0 (MGA 2020 Zone 56)		
Easting	329278.0 (MGA 2020 Zone 56)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
DT				0.00		8.75	CONCRETE: 240mm thick	-	-	CONCRETE
AD/T		BH101M_0.50-0.95 SPT 0.50-0.95 2,2,6 N=8		0.24		8.51	FILL: Sandy GRAVEL: gravels are grained, dark grey	M	-	FILL
		BH101M_1.20-1.30		1.00		7.75	FILL: Clayey SAND: fine grained, dark brown, trace brick fragments			FILL
	▷	BH101M_1.50-1.95 SPT 1.50-1.95 RW/450 mm N=0		2				M > PL	-	
		BH101M_2.50-2.60		2.50		6.25	From 2.50m, dark grey			
		BH101M_3.00-3.03 SPT 3.00-3.03 3/30 mm HB N=R		3		5.72	*Log continued on next page.*			
				3.03						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

BOREHOLE CORE LOG

BH ID: BH101M

Location	40-76 William Street, Leichhardt, NSW			**Started**	15 August 2025
Client	Ceerose			**Completed**	15 August 2025
Job No.	E24470.G03			**Logged By**	LL **Date** 15 August 2025
Sheets	2 of 3			**Review By**	GP **Date** 17 September 2025
Drilling Contractor	Geosense Drilling Engineers	**Surface RL**	≈8.75 m (AHD)	**Northing**	6249839.0 (MGA 2020 Zone 56)
Plant	Hanjin D&B 8-D	**Inclination**	90°	**Easting**	329278.0 (MGA 2020 Zone 56)

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral (VL 0-1, L 0-3, M 1, H 3, VH 10, EH)	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING (30, 100, 300, 1000, 3000)
				0			*Log continued from previous page.*				
NMLC	50%	100	86	3			SANDSTONE: fine to medium grained, pale grey / dark red / yellow brown, with iron staining	DW		4.38-4.62: XWS 4.78: JT 0° PR RO Fe SN 5.15-5.24: XWS 5.25: BP 10° PR RO CN 6.28: BP 30° PR RO CN 6.61: BP 5° PR RO CN	
		100	98	7				SW		7.84-7.87: XWS	
	10%			9						8.84: BP 5° PR RO CN 8.88: BP 5° PR RO CN 9.08: BP 0-0° PR RO	
				10							

BOREHOLE CORE LOG

BH ID: BH101M

Location	40-76 William Street, Leichhardt, NSW			**Started**	15 August 2025
Client	Ceerose			**Completed**	15 August 2025
Job No.	E24470.G03			**Logged By**	LL **Date** 15 August 2025
Sheets	3 of 3			**Review By**	GP **Date** 17 September 2025
Drilling Contractor	Geosense Drilling Engineers	**Surface RL**	≈8.75 m (AHD)	**Northing**	6249839.0 (MGA 2020 Zone 56)
Plant	Hanjin D&B 8-D	**Inclination**	90°	**Easting**	329278.0 (MGA 2020 Zone 56)

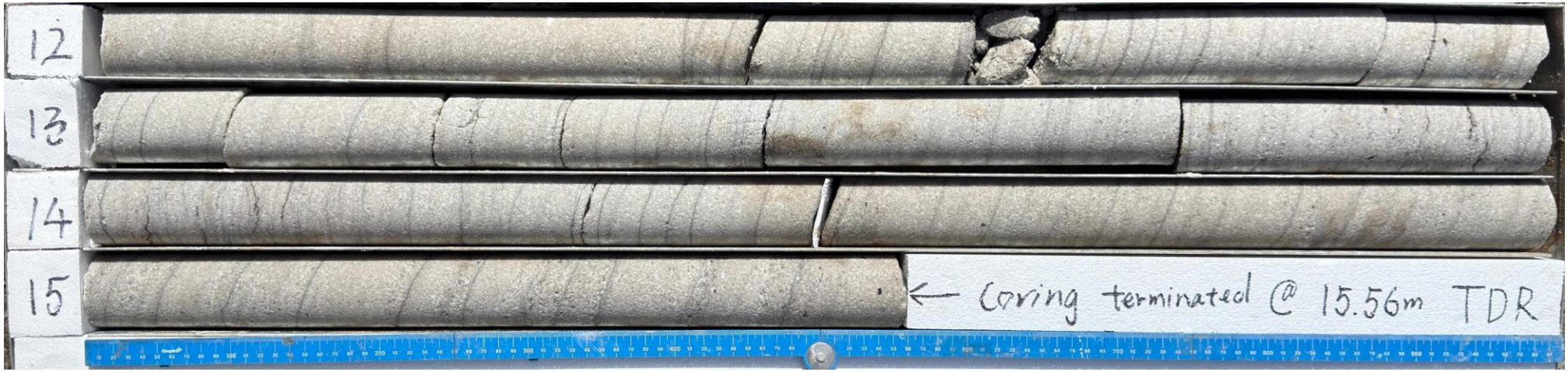
METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral (VL 0-1, L 0-3, M 1, H 3, VH 10, EH)	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING (30, 100, 300, 1000, 3000)
NMLC	10%	100	90	11			SANDSTONE: fine to medium grained, pale grey / dark red / yellow brown, with iron staining	SW		11.00: JT 60° ST RO Fe SN	
										11.32-11.36: XWS	
		100	96	12						11.74: BP 0° PR RO CN	
				13				FR		12.60-12.66: FS	
				14							
		100	100	15		-6.81	Terminated at 15.56m. Target Depth Reached.				
				16							
				17							
				18							
				19							
				20							

CORE PHOTOGRAPH OF BOREHOLE: BH101M

Project	Proposed Development			**Depth Range**	1.2m to 9.7m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	Geosense Drilling Engineers		
Position	See Figure 2	**Surface RL**	≈ 8.75m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	LL	**Date**	15 / 08 / 2025
Client	Ceerose Pty Ltd	**Box**	1-2 of 2	**Checked**	GP	**Date**	17 / 09 / 2025

CORE PHOTOGRAPH OF BOREHOLE: BH101M

Project	Proposed Development			**Depth Range**	3.03m to 15.56m BEGL		
Location	40-76 William Street, Leichhardt NSW			**Contractor**	Geosense Drilling Engineers		
Position	See Figure 2	**Surface RL**	≈ 8.75	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24470.G03	**Inclination**	-90°	**Logged**	LL	**Date**	15 / 08 / 2025
Client	Ceerose Pty Ltd	**Box**	2 of 2	**Checked**	GP	**Date**	17 / 09 / 2025



MONITORING WELL LOG

BH ID: BH101M

Location	40-76 William Street, Leichhardt, NSW			**Started**	15 August 2025
Client	Ceerose			**Completed**	15 August 2025
Job No.	E24470.G03			**Logged By**	LL **Date** 15 August 2025
Sheets	1 of 2			**Review By**	GP **Date** 17 September 2025
Drilling Contractor	Geosense Drilling Engineers	**Surface RL**	≈8.75 m (AHD)	**Northing**	6249839.0 (MGA 2020 Zone 56)
Plant	Hanjin D&B 8-D	**Inclination**	90°	**Easting**	329278.0 (MGA 2020 Zone 56)

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION
		0.00	8.75	CONCRETE: 240mm thick	-
	BH101M_0.50-0.95 SPT 0.50-0.95 2,2,6 N=8	0.24	8.51	FILL: Sandy GRAVEL: gravels are grained, dark grey	M
	BH101M_1.20-1.30	1.00	7.75	FILL: Clayey SAND: fine grained, dark brown, trace brick fragments	M > PL
▷	BH101M_1.50-1.95 SPT 1.50-1.95 RW/450 mm N=0				
	BH101M_2.50-2.60	2.50	6.25	From 2.50m, dark grey	
	BH101M_3.00-3.03 SPT 3.00-3.03 3/30 mm HB N=R	3.03	5.72	SANDSTONE: fine to medium grained, pale grey / dark red / yellow brown, with iron staining	
50%					
10%					

BACKFILL DETAILS

- Grout 0.00m - 4.00m
- Bentonite 4.00m - 4.50m
- Sand 4.50m - 9.00m

STANDPIPE DETAILS

- Well Stickup =0.0m (RL 8.75m)
- 0.0m - 5.0m PVC casing (50mm Ø)
- 5.0m - 8.0m PVC screen (50mm Ø)

MONITORING WELL LOG

BH ID: BH101M

Location	40-76 William Street, Leichhardt, NSW			**Started**	15 August 2025
Client	Ceerose			**Completed**	15 August 2025
Job No.	E24470.G03			**Logged By**	LL **Date** 15 August 2025
Sheets	2 of 2			**Review By**	GP **Date** 17 September 2025
Drilling Contractor	Geosense Drilling Engineers	**Surface RL**	≈8.75 m (AHD)	**Northing**	6249839.0 (MGA 2020 Zone 56)
Plant	Hanjin D&B 8-D	**Inclination**	90°	**Easting**	329278.0 (MGA 2020 Zone 56)

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
10%		11			SANDSTONE: fine to medium grained, pale grey / dark red / yellow brown, with iron staining		Bentonite 9.00m - 15.56m	
		12						
		13						
		14						
		15						
				-6.81	Terminated at 15.56m. Target Depth Reached.			
		16						
		17						
		18						
		19						
		20						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.

EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT LOGS

DRILLING/EXCAVATION METHOD

HA	Hand Auger	**ADH**	Hollow Auger	**NQ**	Diamond Core - 47 mm
DT	Diatube Coring	**RT**	Rotary Tricone bit	**NMLC**	Diamond Core - 52 mm
NDD	Non-destructive digging	**RAB**	Rotary Air Blast	**HQ**	Diamond Core - 63 mm
AD*	Auger Drilling	**RC**	Reverse Circulation	**HMLC**	Diamond Core - 63 mm
***V**	V-Bit	**PT**	Push Tube	**EX**	Tracked Hydraulic Excavator
***T**	TC-Bit, e.g. AD/T	**WB**	Washbore	**HAND**	Excavated by Hand Methods

PENETRATION RESISTANCE

L	**Low Resistance**	Rapid penetration/ excavation possible with little effort from equipment used.
M	**Medium Resistance**	Penetration/ excavation possible at an acceptable rate with moderate effort from equipment used.
H	**High Resistance**	Penetration/ excavation is possible but at a slow rate and requires significant effort from equipment used.
R	**Refusal/Practical Refusal**	No further progress possible without risk of damage or unacceptable wear to equipment used.

These assessments are subjective and are dependent on many factors, including equipment power and weight, condition of excavation or drilling tools and experience of the operator.

WATER

Standing Water Level — **Partial water loss**

Water Seepage — **Complete Water Loss**

GWNO	GROUNDWATER NOT OBSERVED - Observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave-in of the borehole/ test pit.
GWNE	GROUNDWATER NOT ENCOUNTERED - Borehole/ test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/ test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following a 150mm seating drive
30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported, N is not reported
RW	Penetration occurred under the rod weight only, N<1
HW	Penetration occurred under the hammer and rod weight only, N<1
HB	Hammer double bouncing on anvil, N is not reported
Sampling	
DS	Disturbed Sample
ES	Sample for environmental testing
BDS	Bulk disturbed Sample
GS	Gas Sample
WS	Water Sample
U50	Thin walled tube sample - number indicates nominal sample diameter in millimetres
Testing	
FP	Field Permeability test over section noted
FVS	Field Vane Shear test expressed as uncorrected shear strength (sv= peak value, sr= residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket Penetrometer test expressed as instrument reading in kPa
WPT	Water Pressure tests
DCP	Dynamic Cone Penetrometer test
CPT	Static Cone Penetration test
CPTu	Static Cone Penetration test with pore pressure (u) measurement

GEOLOGICAL BOUNDARIES

———— = Observed Boundary (position known)

– – – – – – – – – – = Observed Boundary (position approximate)

– –?– –?– –?– – = Boundary (interpreted or inferred)

ROCK CORE RECOVERY

TCR=Total Core Recovery (%)

$$= \frac{\textit{Length of core recovered}}{\textit{Length of core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\sum \textit{Axial lengths of core} > 100mm}{\textit{Length of core run}} \times 100$$

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

	FILL		ORGANIC SOILS (OL, OH or Pt)		CLAY (CL, CI or CH)
	COUBLES or BOULDERS		SILT (ML or MH)		SAND (SP or SW)
	GRAVEL (GP or GW)	Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay			

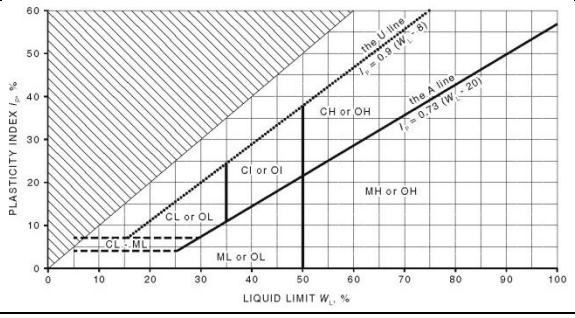
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS 1726:2017, Section 6.1 – Soil description and classification.

PARTICLE SIZE CHARACTERISTICS

Fraction	Components	Sub Division	Size mm
Oversize	BOULDERS		>200
	COBBLES		63 to 200
Coarse grained soil	GRAVEL	Coarse	19 to 63
		Medium	6.7 to 19
		Fine	2.36 to 6.7
	SAND	Coarse	0.6 to 2.36
		Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine grained soil	SILT		0.002 to 0.075
	CLAY		<0.002

PLASTICITY PROPERTIES



GROUP SYMBOLS

Major Divisions		Symbol	Description
COARSE GRAINED SOILS More than 65% of soil excluding oversize fraction is greater than 0.075mm	GRAVEL More than 50% of coarse fraction is >2.36mm	GW	Well graded gravel and gravel-sand mixtures, little or no fines, no dry strength.
		GP	Poorly graded gravel and gravel-sand mixtures, little or no fines, no dry strength.
		GM	Silty gravel, gravel-sand-silt mixtures, zero to medium dry strength.
		GC	Clayey gravel, gravel-sand-clay mixtures, medium to high dry strength.
	SAND More than 50% of coarse fraction is <2.36 mm	SW	Well graded sand and gravelly sand, little or no fines, no dry strength.
		SP	Poorly graded sand and gravelly sand, little or no fines, no dry strength.
		SM	Silty sand, sand-silt mixtures, zero to medium dry strength.
		SC	Clayey sand, sandy-clay mixtures, medium to high dry strength.
FINE GRAINED SOILS More than 35% of soil excluding oversized fraction is less than 0.075mm	Liquid Limit less < 50%	ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands, zero to medium dry strength.
		CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, medium to high dry strength.
		OL	Organic silts and organic silty clays of low plasticity, low to medium dry strength.
	Liquid Limit > than 50%	MH	Inorganic silts of high plasticity, high to very high dry strength.
		CH	Inorganic clays of high plasticity, high to very high dry strength.
		OH	Organic clays of medium to high plasticity, medium to high dry strength.
Highly Organic soil		PT	Peat muck and other highly organic soils.

MOISTURE CONDITION

Symbol	Term	Description
D	Dry	Non- cohesive and free-running.
M	Moist	Soils feel cool, darkened in colour. Soil tends to stick together.
W	Wet	Soils feel cool, darkened in colour. Soil tends to stick together, free water forms when handling.

Moisture content of cohesive soils shall be described in relation to plastic limit (PL) or liquid limit (LL) for soils with higher moisture content as follows: Moist, dry of plastic limit (w < PL); Moist, near plastic limit (w ≈ PL); Moist, wet of plastic limit (w < PL); Wet, near liquid limit (w ≈ LL), Wet, wet of liquid limit (w > LL),

CONSISTENCY

Symbol	Term	Undrained Shear Strength (kPa)	SPT "N" #
VS	Very Soft	≤ 12	≤ 2
S	Soft	>12 to ≤ 25	>2 to ≤ 4
F	Firm	>25 to ≤ 50	>4 to 8
St	Stiff	>50 to ≤ 100	>8 to 15
VSt	Very Stiff	>100 to ≤ 200	>15 to 30
H	Hard	>200	>30
Fr	Friable	-	

DENSITY

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	≤ 15	0 to 4
L	Loose	>15 to ≤ 35	4 to 10
MD	Medium Dense	>35 to ≤ 65	10 to 30
D	Dense	>65 to ≤ 85	30 to 50
VD	Very Dense	>85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.
SPT correlations are not stated in AS1726:2017, and may be subject to corrections for overburden pressure, moisture content of the soil, and equipment type.

MINOR COMPONENTS

Term	Assessment Guide	Proportion by Mass
Add 'Trace'	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 soil: ≤ 15%
Add 'With'	Presence easily detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: 5 - 12% Fine grained soil: 15 - 30%
Prefix soil name	Presence easily detectable by feel or eye in conjunction with the general properties of primary component	Coarse grained soils: >12% Fine grained soil: >30%

TERMS FOR ROCK MATERIAL STRENGTH AND WEATHERING

CLASSIFICATION AND INFERRED STRATIGRAPHY

Rock is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 2017, Section 6.2 – Rock identification, description and classification.

ROCK MATERIAL STRENGTH CLASSIFICATION

Symbol	Term	Point Load Index, $Is_{(50)}$ (MPa) #	Field Guide
VL	Very Low	0.03 to 0.1	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 30 mm can be broken by finger pressure.
L	Low	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
M	Medium	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
H	High	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer.
VH	Very High	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
EH	Extremely High	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

 # Rock Strength Test Results

▼ Point Load Strength Index, $Is_{(50)}$, Axial test (MPa)

● Point Load Strength Index, $Is_{(50)}$, Diametral test (MPa)

Relationship between rock strength test result ($Is_{(50)}$) and unconfined compressive strength (UCS) will vary with rock type and strength, and should be determined on a site-specific basis. However UCS is typically 20 x $Is_{(50)}$.

ROCK MATERIAL WEATHERING CLASSIFICATION

Symbol		Term	Field Guide
RS		Residual Soil	Soil developed on extremely weathered 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.
XW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. In some environments it is convenient to subdivide into Highly Weathered and Moderately Weathered, with the degree of alteration typically less for MW.
	MW		
SW		Slightly Weathered	Rock slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

Appendix B - Laboratory Certificates

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia Pty Ltd	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	40-76 William Street Leichhardt (E24470 G03)	**Report No:**	S57119-PL
Job No:	S19623	**Date Tested:**	23/12/2019

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 18/12/2019

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Failure Mode
S57119	BH1M 4.86 - 4.95m	Sandstone							
			Axial	51.7	39.0	3.18	1.24	1.25	1
S57120	BH1M 5.58 - 5.67m	Sandstone							
			Axial	51.9	42.0	3.23	1.16	1.19	1
S57121	BH1M 6.62 - 6.72m	Sandstone							
			Axial	51.8	45.0	4.49	1.51	1.57	1
S57122	BH1M 7.58 - 7.69m	Sandstone							
			Axial	52.2	39.0	4.01	1.55	1.56	1
S57123	BH1M 8.44 - 8.53m	Sandstone							
			Axial	52.1	39.0	1.21	0.47	0.47	1
S57124	BH1M 9.71 - 9.80m	Sandstone							
			Axial	51.8	38.0	2.78	1.11	1.11	1
S57125	BH1M 10.75 - 10.84m	Sandstone							
			Axial	52.2	36.0	2.85	1.19	1.18	1
S57126	BH2 4.33 - 4.44m	Sandstone							
			Axial	52.5	39.0	4.85	1.86	1.88	1
S57127	BH2 5.33 - 5.42m	Sandstone							
			Axial	52.3	42.0	1.83	0.65	0.67	1
S57128	BH2 6.30 - 6.41m	Sandstone							
			Axial	51.8	37.0	4.44	1.82	1.81	1

Failure Modes

1 - Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.

2 - Fracture along bedding.

3 - Fracture influenced by pre-existing plane, microfracture, vein or chemical alteration.

4 - Chip or partial fracture.

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

6/01/2020

Date

MACQUARIE GEOTECH

Macquarie Geotechn
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia Pty Ltd	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	40-76 William Street Leichhardt (E24470 G03)	**Report No:**	S57129-PL
Job No:	S19623	**Date Tested:**	23/12/2019

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 18/12/2019

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Failure Mode
S57129	BH2 7.24 - 7.35m	Sandstone							
			Axial	51.8	44.0	3.31	1.14	1.18	1
S57130	BH2 8.37 - 8.46m	Sandstone							
			Axial	51.9	39.0	2.84	1.10	1.11	1
S57131	BH2 9.35 - 9.46m	Sandstone							
			Axial	51.9	40.0	3.16	1.20	1.21	1
S57132	BH3M 4.46 - 4.56m	Sandstone							
			Axial	51.8	45.0	2.35	0.79	0.82	1
S57133	BH3M 5.40 - 5.50m	Sandstone							
			Axial	51.9	46.0	3.16	1.04	1.09	1
S57134	BH3M 6.45 - 6.56m	Sandstone							
			Axial	51.8	44.0	4.36	1.50	1.55	1
S57135	BH3M 7.46 - 7.55m	Sandstone							
			Axial	51.9	47.0	3.80	1.22	1.29	1
S57136	BH3M 8.45 - 8.55m	Sandstone							
			Axial	51.9	44.0	5.09	1.75	1.81	1
S57137	BH3M 9.45 - 9.56m	Sandstone							
			Axial	51.8	45.0	4.43	1.49	1.55	1
S57138	BH9M 1.49 - 1.58m	Sandstone							
			Axial	52.0	45.0	1.99	0.67	0.69	1

Failure Modes

1 - Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.

2 - Fracture along bedding.

3 - Fracture influenced by pre-existing plane, microfracture, vein or chemical alteration.

4 - Chip or partial fracture.

NATA

Accredited for compliance with ISO/IEC 17025 - Testing.

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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

6/01/2020

Date

MACQUARIE GEOTECH

Macquarie Geotechn
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia Pty Ltd	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	40-76 William Street Leichhardt (E24470 G03)	**Report No:**	S57139-PL
Job No:	S19623	**Date Tested:**	23/12/2019

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 18/12/2019

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Failure Mode
S57139	BH9M 3.45 - 3.55m	Sandstone							
			Axial	51.8	45.0	0.52	0.18	0.18	1
S57140	BH9M 3.77 - 3.86m	Sandstone							
			Axial	51.9	46.0	3.52	1.16	1.21	1
S57141	BH9M 4.57 - 4.67m	Sandstone							
			Axial	51.9	40.0	2.02	0.76	0.77	1
S57142	BH9M 7.47 - 7.58m	Sandstone							
			Axial	51.9	36.0	3.28	1.38	1.36	1
S57143	BH9M 9.08 - 9.17m	Sandstone							
			Axial	51.8	34.0	3.05	1.36	1.33	1

Failure Modes

1 - Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.

2 - Fracture along bedding.

3 - Fracture influenced by pre-existing plane, microfracture, vein or chemical alteration.

4 - Chip or partial fracture.

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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

6/01/2020

Date

MACQUARIE GEOTECH

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Alexandria NSW

STS GEOTECHNICS PTY LTD
CONSULTING GEOTECHNICAL ENGINEERS

STS Geotechnics Pty Ltd
14/1 Cowpasture Place, Wetherill Park NSW 2164
Phone: (02)9756 2166 | Email: enquiries@stsgeo.com.au

Point Load Strength Index Report

Project: E24470.G04 40-76, WILLIAM STREET,LEICHHARDT, NSW
Client: EI AUSTRALIA PTY LTD
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS 4133.4.1
Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Project No.: 31380/1156E-L
Report No.: 25/2120
Report Date: 20/08/2025
Page: 1 of 1

Borehole / Sample No.	Depth (m)	Date Sampled	Date Tested	Test Type	Is (MPa)	$Is_{(50)}$ (MPa)	Rock Type	Failure Type	Moisture
BH101M	3.09	15/08/2025	20/08/2025	A	**0.73**	**0.74**	SS	3	M
BH101M	4.71	15/08/2025	20/08/2025	A	**0.67**	**0.67**	SS	3	M
BH101M	6.10	15/08/2025	20/08/2025	A	**1.7**	**1.7**	SS	3	M
BH101M	6.83	15/08/2025	20/08/2025	A	**1.9**	**1.9**	SS	3	M
BH101M	7.28	15/08/2025	20/08/2025	A	**1.8**	**1.8**	SS	3	M
BH101M	7.75	15/08/2025	20/08/2025	A	**1.5**	**1.5**	SS	3	M
BH101M	8.56	15/08/2025	20/08/2025	A	**0.86**	**0.87**	SS	3	M
BH101M	9.46	15/08/2025	20/08/2025	A	**2.1**	**2.1**	SS	3	M
BH101M	10.68	15/08/2025	20/08/2025	A	**1.3**	**1.3**	SS	3	M
BH101M	11.46	15/08/2025	20/08/2025	A	**0.82**	**0.83**	SS	3	M
BH101M	13.62	15/08/2025	20/08/2025	A	**2.1**	**2.1**	SS	3	M
BH101M	15.47	15/08/2025	20/08/2025	A	**1.4**	**1.4**	SS	3	M

Failure Type
1 = Fracture through bedding or weak plane
2 = Fracture along bedding
3 = Fracture through rock mass
4 = Fracture influenced by natural defect or drilling
5 = Partial fracture or chip (invalid result)

Test Type
A = Axial
D = Diametrial
I = Irregular
C = Cube

Moisure Condition
W = Wet
M = Moist
D = Dry

Rock Type
SS = Sandstone
ST = Siltstone
SH = Shale
YS = Claystone
IG = Igneous

Remarks:

Approved Signatory.....

Technician: NL

Mrigesh Tamang - Manager

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	David Saw
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	david.saw@eiaustralia.com.au
Project	**E24470.G03 40-76 William St, Leichhardt**
Order Number	**E24470.G03**
Samples	3

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE201413 R0**
Date Received	19/12/2019
Date Reported	30/12/2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 23/12/2019

PARAMETER	UOM	LOR	BH1M_1.9-1.95 SOIL - 18/12/2019 SE201413.001	BH2_1.5-1.95 SOIL - 18/12/2019 SE201413.002	BH2_3.0-3.26 SOIL - 18/12/2019 SE201413.003
Chloride	mg/kg	0.25	**2.8**	**4.2**	**1.9**
Sulfate	mg/kg	5	**17**	**42**	**31**

pH in soil (1:5) [AN101] Tested: 23/12/2019

PARAMETER	UOM	LOR	BH1M_1.9-1.95 SOIL - 18/12/2019 SE201413.001	BH2_1.5-1.95 SOIL - 18/12/2019 SE201413.002	BH2_3.0-3.26 SOIL - 18/12/2019 SE201413.003
pH	pH Units	0.1	**4.9**	**7.8**	**6.3**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 23/12/2019

PARAMETER	UOM	LOR	BH1M_1.9-1.95 SOIL - 18/12/2019 SE201413.001	BH2_1.5-1.95 SOIL - 18/12/2019 SE201413.002	BH2_3.0-3.26 SOIL - 18/12/2019 SE201413.003
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**37**	**69**	**11**

Moisture Content [AN002] Tested: 20/12/2019

PARAMETER	UOM	LOR	BH1M_1.9-1.95 SOIL - 18/12/2019 SE201413.001	BH2_1.5-1.95 SOIL - 18/12/2019 SE201413.002	BH2_3.0-3.26 SOIL - 18/12/2019 SE201413.003
% Moisture	%w/w	1	**13.6**	**17.3**	**5.7**

Appendix C – Vibration Limits

German Standard DIN 4150 – Part 3: 1999 provides guideline levels of vibration velocity for evaluating the effects of vibration in structures. The limits presented in this standard are generally considered to be conservative.

The DIN 4150 values (maximum levels measured in any direction at the foundation, OR, maximum levels measured in (x) or (y) directions, in the plane of the uppermost floor), are summarised in **Table A** below.

It should be noted that peak vibration velocities higher than the minimum figures in **Table A** for low frequencies may be quite 'safe', depending on the frequency content of the vibration and the actual conditions of the structures.

It should also be noted that these levels are 'safe limits', up to which no damage due to vibration effects has been observed for the particular class of building. 'Damage' is defined by DIN 4150 to include even minor non-structural cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls. Should damage be observed at vibration levels lower than the 'safe limits', then it may be attributed to other causes. DIN 4150 also states that when vibration levels higher than the 'safe limits' are present, it does not necessarily follow that damage will occur. Values given are only a broad guide.

Table A DIN 4150 – Structural Damage – Safe Limits for Building Vibration

Group	Type of Structure	Peak Vibration Velocity (mm/s)			
		At Foundation Level at a Frequency of:			Plane of Floor of Uppermost Storey
		Less than 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 and 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note: For frequencies above 100 Hz, the higher values in the 50 Hz to 100 Hz column should be used.

Appendix D – Important Information

Important Information

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client And EI Australia ("EI"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

EI has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. EI has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, EI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to EI.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. EI should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that EI be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. EI assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of EI or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

EI will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.