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DEICORP PROJECTS SHOWGROUND PTY LTD

Geotechnical Investigation

2 Mandala Parade, Castle Hill, NSW

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Revision	Details	Date	Amended By
	Original	26 August 2020	
1	Updated structural details and architectural drawings	21 May 2021	KX
2	Updated architectural drawings	9 July 2021	AS / BA

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1. Introduction

1.1 Background

At the request of Mr Greg Colbran of Deicorp Projects Showground Pty Ltd (the Client), EI Australia (EI) has carried out a Geotechnical Investigation (GI) for the proposed development at 2 Mandala Parade, Castle Hill, 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 P17907.3, dated 11 June 2020, and with the Client's signed authorisation to proceed, dated 15 June 2020.

1.2 Proposed Development

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

- Architectural Drawings prepared by Turner – Project No. 19068, Drawing No. DA-110-002 to DA-110-007 (Rev_02), DA-110-008 to DA-110-010 (Rev_03), DA-110-020 to DA-110-210 (Rev_04), and DA-210-101 to DA-210-401 (Rev_03), dated 6 July 2021;
- Hills Showground Station Precinct, Urban Design Report, prepared by Cox Architecture – Revision E, dated 4 November 2019;
- Request for Fee Proposal for Mixed Use Development, Doran Drive Precinct, prepared by the Client. The details required for the DA Documentation are as follows:
  - Investigate the location of all underground services;
  - Drilling boreholes for engineering and laboratory testing;
  - On site logging of the soil profile encountered in each borehole by Geotechnical Engineer in accordance with AS1726-1993;
  - Installation of a ground water monitoring well, and carry on well pump testing;
  - On site and laboratory testing;
  - Attend design consultant meetings when is required;
  - Prepare geotechnical assessment report
  - Prepare preliminary site contamination assessment report (if requried);
- Geotechnical Assessment Report prepared by Pells Sullivan Munick (PSM), Reference No. PSM3911-003L, Revision 2, dated 29 October 2019.
- A site survey plan prepared by Daw & Walton Consulting Surveyors – Job No. 5042-20, Revision 1, dated 7 August 2020.

Based on the provided documents, and email correspondence with Ms Poonam Chauhan, EI understands that the proposed development involves the construction of four 20-storey mixed-use building overlying a common podium structure with a stepped 6-storey basement. The lowest basement level (B06) will require a Finished Floor Level (FFL) of RL 70.20m AHD. It is understood that a Bulk Excavation Level (BEL) of RL 69.1m will be required for the lowest basement level, which includes allowance for the construction of the basement slab. To achieve

the BEL, excavation depths of 19.00m Below Existing Ground Level (BEGL) at the Doran Drive end of site to 26.60m BEGL at the Andalusian Way end of site have been estimated. Locally deeper excavations may be required for footings, service trenches, crane pads and lift overrun pits.

1.3 Objectives

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

- Dilapidation Surveys;
- Excavation methodologies and monitoring requirements;
- Groundwater considerations;
- Vibration considerations;
- Excavation support requirements, including geotechnical design parameters for retaining walls and shoring systems;
- Building foundation options, including;
  - Design parameters.
  - Earthquake loading factor in accordance with AS1170.4:2007.

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 six boreholes (BH1, BH2, BH3M, BH4M, BH5M and BH6) by a track-mounted drill rig using solid flight augers equipped with a 'Tungsten-Carbide' (T-C) bit. BH1, BH2, BH3M, BH4M, BH5M and BH6 were auger drilled to depths of about 3.00m BEGL (RL of about 93.50m), 3.95m BEGL (RL of about 91.15m), 2.90m BEGL (RL of about 88.10m), 5.00m BEGL (RL of about 93.00m), 2.00m BEGL (RL of about 92.10m) and 1.50m BEGL (RL of about 89.30m), 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 BH1, BH2, BH3M, BH4M, BH5M and BH6 using NMLC diamond coring techniques to termination depths of about 45.84m BEGL (RL of about 50.66m), 44.12m BEGL (RL of about 50.98m), 40.56m BEGL (RL of about 50.44m), 47.69m BEGL (RL of about 50.31m), 44.76m BEGL (RL of about 49.34m) and 40.00m BEGL (RL of about 50.80m), respectively. The rock core photographs are presented in **Appendix A**;
- Boreholes BH3M, BH4M and BH5M were converted into groundwater monitoring wells with depths of about 27m BEGL (RL of about 64m), 25m BEGL (RL of about 73m) and 6.5m BEGL (RL of about 87.6m), respectively to allow for long-term groundwater monitoring;
  - A pump-out test was carried out within monitoring well BH3M and BH4M to determine the groundwater inflows of the surrounding material;
- Boreholes BH1, BH2 and BH6 were backfilled with drilling spoils 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; and
- 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 intended to assist in the preparation of designs for the proposed development. Further geotechnical inspections should be carried out during construction to confirm the geotechnical and groundwater models, and the 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	2 Mandala Parade, Castle Hill, NSW
Lot and Deposited Plan (DP) Identification	Lot 55 in DP 1253217
Brief Site Description	At the time of our investigation, the site had been recently reinstated by Landcom to a gently sloping area with channels along the site boundaries of up to 1m deep and 6m wide. Previously, the site was used as a construction site for the Metro Northwest link North West project.
Site Area	The site area is approximately 7969m^2 (based on the provided survey plan referenced above).

Plate 1: Aerial photograph of the site (source: Six Maps, accessed 5/8/20)

2.2 Local Land Use

The site is situated within an area of commercial and residential use. Current uses on surrounding land at the time of our presence on site are described in **Table 2-2** below. For the sake of this report, the site boundary adjacent to Mandala Parade shall be adopted as the southern site boundary.

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description
North	De Clambe Drive, a two lane, asphalt-paved road. Beyond this is the Castle Hill Showground which comprises of an oval, a carpark and several brick and metal sheds. No basements were observed on this site.
East	Andalusian Way, a two lane, asphalt-paved road. Beyond this is a construction site for the Hills Showground Precinct East.
South	Mandala Parade, a two lane, asphalt-paved road. Beyond this is the Metro Northwest link Showground Road Station, offset at approximately 25m way from the site boundary. Based on the Northwest Rapid Transit Utilities Information Plan, the proposed boreholes were offset at a minimum of 5m away from the 2nd reserve tunnel boundary.
West	Doran Drive, a two lane, asphalt-paved road. Beyond this is a four to five-storey carpark and a two storey commercial building.

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 north side of Mandala Parade within gently (0° to 5°), west dipping topography with site levels varying from R.L. 98.20m at the north eastern site corner to R.L. 80.80m at the south western site corner. Around the site boundary is a channel approximately 1m deep.
Regional Geology	Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Penrith 1:100,000 Geological Series Sheet 9030 (DMR 1991) indicates the site is underlain by Hawkesbury Sandstone, which typically comprises medium to very coarse-grained quartz sandstone, ,minor laminated mudstone and siltstone lenses .

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**	0.00	90.80 to 98.00	0.60 to 4.00	Gravelly sand fill was observed at the surface of BH4M and BH5M overlying low to medium plasticity silty clay fill. Low plasticity silty clay fill with sandstone and igneous gravels was observed at the surface of BH1, BH2, BH3M and BH6. Fill was assessed, based on our observations during drilling and SPT N Values to be variably compacted with values ranging from 8 to refusal indicated by hammer bounced;
2	**Residual Soil**	0.60 to 4.00	88.40 to 95.90	0.20 to 1.90	Medium plasticity, very stiff to hard silty clay and sandy clay with trace ironstone gravels, grading into weathered sandstone with depth. SPT values ranged from 21 to refusal indicated by hammer bounced;
3	**Class IV/V Sandstone**	2.00 to 4.60	91.80 to 94.40	0.40 to 0.90	Extremely to distinctly weathered, low strength sandstone.
4	**Class II/I Sandstone**	1.50 to 5.00	88.10 to 93.50	- [3]	Slightly weathered to fresh, high strength sandstone with Laminite beds. Laminite consisting of fine to medium grained sandstone interbedded with dark grey shale was encountered in all the boreholes at depths ranging from 23.33m BEGL (RL of about 67.67m) and 28.89m BEGL (RL of about 69.11m) with thickness of up to 3.70m.

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

No groundwater or significant seepage was observed during or after auger drilling of the boreholes. Water circulation due to coring within the boreholes prevented further observations of groundwater levels. Following their completion, groundwater monitoring wells were installed in BH3M, BH4M and BH5M and pumped dry. The groundwater levels were then measured within the monitoring wells as per **Table 3-2** below:

Table 3-2 Groundwater Levels

Borehole ID	Measurement Date	Depth to Groundwater (m BEGL)	Groundwater RL (m AHD)
BH3M	14/7/20	15.4	75.6
BH4M	14/7/20	20.5	77.5
BH5M	29/7/20	4.04	90.5

3.2.1 Rising Head Test

A Rising Head Test was completed on 21 July 2020 in the monitoring well installed in BH3M and BH4M. The following procedure was adopted:

- The groundwater level within the well was initially recorded;
- The well was purged using a PVC bailer / an electrical groundwater pump;

The rising groundwater level within the temporary well was measured at various time intervals for 1 hour.

The results were then used to estimate the permeability of the sandstone bedrock using the Hvorslev Method based on the borehole geometry. The estimated permeability of the sandstone bedrock is calculated to be between 5.2 x 10^{-7} m/s and 5.2x10^{-8} m/s.

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		BH4M_4.6-4.7	BH5M_1.9-2.0	BH6_1.4-1.5
Unit		2	2	2
Material Description [1]		Sandy CLAY	Silty CLAY	Sandy CLAY
Aggressivity	Chloride Cl (ppm)	12	14	18
	Sulfate SO_4 (ppm)	72	31	66
	pH	6.3	5.9	6.2
	Electrical Conductivity (µS/cm)	44	27	56
	Moisture Content (%)	6.8	12.5	6.7

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:

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

195 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 8 MPa to 60 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;
- Rock excavation;
- Groundwater within the depth of the excavation;
- Existing Metro Northwest link Assets; 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 approximately RL 69.1m for the basement, or an excavation depth of between about 20.0m BEGL at the Doran Drive end of site and up to 28.0m BEGL at the Andalusian Way end of site. 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 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.

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 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.

Also, there is a potential for poorly oriented defects within the excavated bedrock to result in localized rock slide/topple failure with potential impact to the work site or the adjacent structures. However through selection of suitable excavation equipment, geotechnical inspections and mapping during the excavation works along with the installation of support measures as determined necessary by the inspections, the risk from the proposed works can be maintained within ‘Acceptable’ levels. In addition, we recommend that only excavation contractors with appropriate insurances and experience on similar projects be used. The contractor should also be provided with a copy of this report to make his own judgement on the most appropriate excavation equipment.

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. 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. 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 proposed BEL RL of 69.1m.

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 discharging 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 provided documents, the proposed basement outline extends up to the northern, eastern, western and southern site boundaries. Based on the depth of the excavation, the encountered subsurface conditions and limited setbacks, temporary betters are not recommended for this site. Unsupported vertical cuts of the soil are not recommended for this site as these carry the risk of potential slumping especially after a period of wet weather. Slumping of the material may result in injury to personnel and/or damage to nearby structures/infrastructures and equipment.

A suitable retention system will be required for the support Units 1, 2 and 3. For this site, EI recommends an anchored and/or propped soldier pile wall with mass concrete in between the piles be founded into medium to high strength sandstone (Unit 4). Consideration may be made for some piers, which are not supporting the vertical structural loads of the building, to be terminated at least 0.5m, into Unit 4 material or better, above the base of the bulk excavation levels. Excavation within Unit 4 sandstone should generally be able to be cut vertically and without support, provided an anchor is installed at the toe of the solider pile wall. Anchors/props and mass concrete must be installed progressively as excavation proceeds.

Due to the presence of the Metro Northwest link Tunnel to the south of the site, anchors installation may not be possible along the southern site boundary and internal props may be required. Details of the tunnel and tunnel anchors must be obtained prior to final design.

For vertical cuts, the excavations must be inspected by a geotechnical engineer at regular intervals to check for any inclined joints or weak seams that require stabilisation. Such geotechnical inspections should be carried out at depth intervals of no more than 1.50m. If adverse defects are encountered, the stabilisation measures may comprise rock bolts, shotcrete and mesh or dental treatment of thin weak seams using non-shrink grout, and this should be allowed for.

The existence of significant horizontal in-situ stresses in bedrock, particularly in the Sydney basin, is well established. The release of such stresses during the basement excavation may cause adverse impact on the stability of the excavation faces and thus increase the movements. Monitoring of several deep excavations within sandstone and shale in the Sydney region indicates that the lateral displacement at the top of the excavation is generally between 0.5mm to 2mm per meter depth of excavation. As the maximum depth of excavation into sandstone is of about 20m, a lateral deflection at the crest of the excavation between 10mm to 40mm can be expected which will reduce in a stepped fashion to zero at the bulk excavation level. Monitoring of the lateral movement as the excavation progresses is recommended. An assessment of such movements and their impact can be carried out using finite element software such as PLAXIS.

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.

However, 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. Working platforms may also be required. We can complete the design of the working platform, if commissioned to do so.

4.5.2 Excavation adjacent to Metro Northwest link

Reference should be made to the Sydney Metro Underground Corridor Protection Document No NWRLSRT-PBA-SRT-TU-REP-000008 dated 16 October 2017, with regards to excavation adjacent to Mandala Road. This document outlines requirements for all developments near existing metro underground infrastructure and includes the level of geotechnical investigation required, dilapidation surveying, instrumentation and monitoring during construction, trigger levels and contingency plans.

As the site of the proposed development lies adjacent to Metro Northwest link, Metro Northwest link may require further assessment of the potential impact of the proposed development on their assets. In order to assess the latter, a 3D numerical model using a commercially available computer program, such as PLAXIS, will be required. This model will enable the assessment of the potential impact of the proposed development on the Metro Northwest link and predict the likely movements in the shoring wall. EI can provide such a service if commissioned to do so. A geotechnical monitoring plan may also be required by Metro Northwest link prior to construction for this site.

4.5.3 Retaining Wall Design Parameters

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

- Conventional free-standing cantilever walls which support areas where movement is of little concern (i.e. where only gardens or open areas are to be retained), may be designed using a triangular lateral earth pressure distribution and an 'active' earth pressure coefficient, K_a, as shown in **Table 4-1;**
- Cantilevered walls, where the tops of which are restrained by the floor slabs of the permanent structure or which support movement sensitive elements, should be designed using a triangular lateral earth pressure distribution and an 'at rest' earth pressure coefficient, K_o, as shown in **Table 4-1** below.
- 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;
- For progressively anchored or propped walls where minor movements can be tolerated 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. Strip drains protected with a non-woven geotextile fabric should be used behind the shotcrete infill panels for soldier pile walls;
- 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 Class IV/V Sandstone	Unit 4 Class II/I Sandstone
RL of Top of Unit (m AHD) [2]		90.80 to 98.00	88.40 to 95.90	91.80 to 94.40	88.10 to 93.50
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]		-	-	-	6000
Allowable Shaft Adhesion (kPa) [4, 5]	in Compression	-	-	70	600
	in Uplift	-	-	35	300
Allowable Toe Resistance (kPa)		-	-	-	550
Allowable Bond Stress (kPa)		-	-	50	500
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 sandstone bedrock and in view of the deep excavation and shallow to moderate depths to the bedrock, we recommend that building is supported on shallow footings founded into bedrock.

4.6.1 Shallow Footings in Rock

Following bulk excavation to RL 69.1m, we expect Unit 4 material to be exposed at BEL.

It is recommended that all footings for the building be founded within the 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 6000kPa, based on serviceability.

Footings founded at or near a crest of an excavation (such as the step between Basement 6 and Basement 5) should be founded below the zone of influence of the lower neighbouring retaining walls, which may be taken as founding below a line drawn at 1 Vertical to 1 Horizontal from the base of the excavation. Piles may be required. Specific geotechnical advice should be obtained for such footings.

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.

4.7 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. The basement floor slab should be isolated from columns.

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 previously recommended additional work that needs to be carried out:

- Stability assessment of temporary batters using computer modelling, if required;
- Long term groundwater monitoring and seepage modelling, if required;
- 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 rock faces during excavation by an experienced geotechnical professional at depth intervals of no greater than 1.5m within medium to high strength bedrock, if vertical cut are adopted;
- 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 Greg Colbran and Deicorp Projects Showground 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 Greg Colbran and Deicorp Projects Showground 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 D** 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.

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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.

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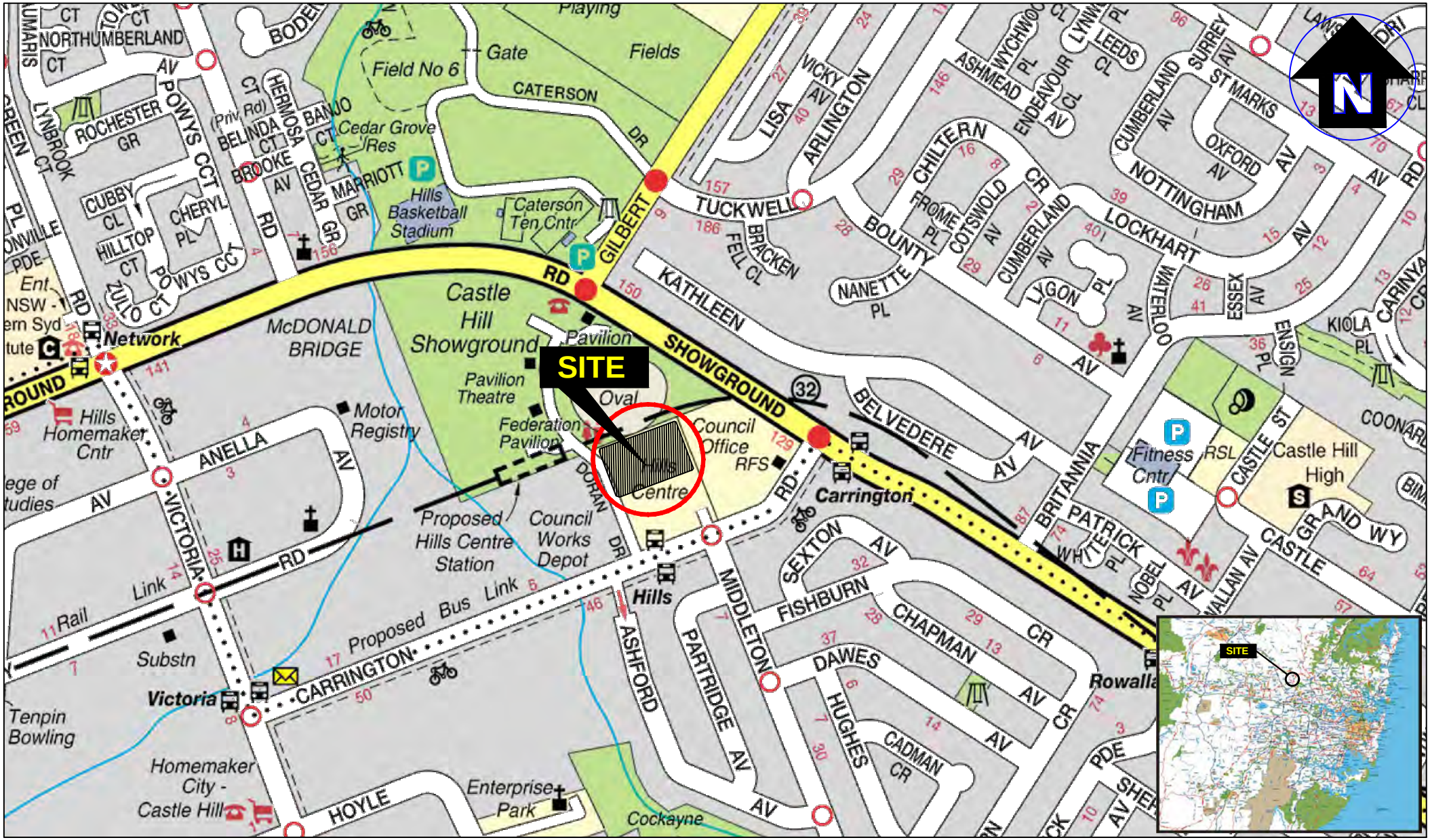
Abbreviations

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
FFL	Finishing Floor Level
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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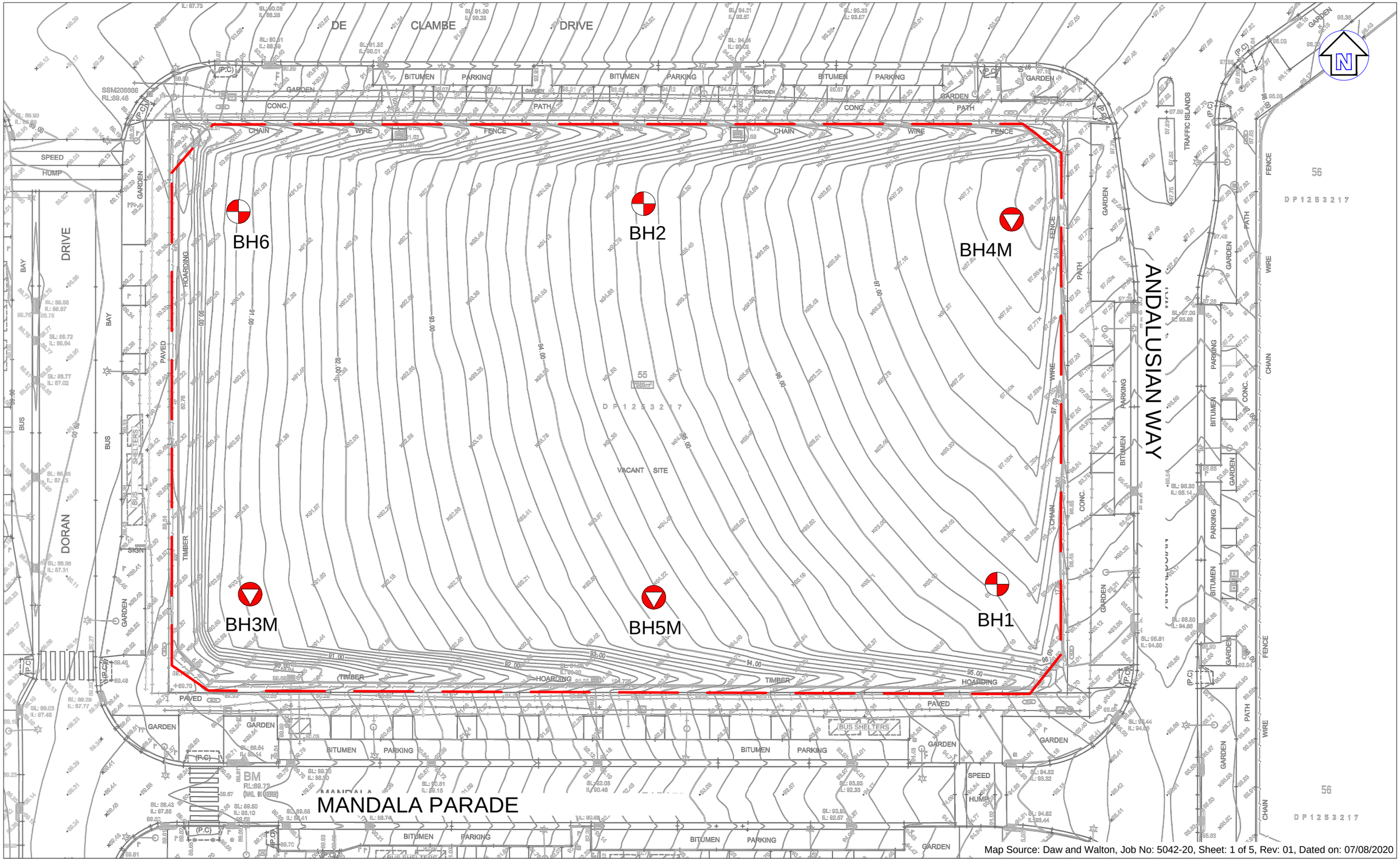
Approved:	S.K.
Date:	21-05-21
Scale:	Not To Scale

Deicorp Projects Showground Pty Ltd
Geotechnical Investigation
2 Mandala Parade, Castle Hill NSW
Site Locality Plan

Figure:
1

Project: E24724.G03



Map Source: Daw and Walton, Job No: 5042-20, Sheet: 1 of 5, Rev: 01, Dated on: 07/08/2020

LEGEND

- Approximate Site Boundary
- Approximate geotechnical borehole location
- Approximate geotechnical borehole/monitoring well location

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Date:	21-05-21

Deicorp Projects Showground Pty Ltd
Geotechnical Investigation
2 Mandala Parade, Castle Hill NSW
Borehole Location Plan

Figure: 2

Project: E24724.G03

Appendix A – Borehole Logs And Explanatory Notes

BOREHOLE LOG

BH NO. BH1

Project	Proposed Development	**Sheet**	1 of 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	96.50	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, pale grey to red-brown, with sandstone and igneous gravel and sand.	M	-	FILL
				0.60	SPT 0.50-0.88 m 3,23,17/75mm HB N>30							
			1	95.90				Cl	Silty CLAY; medium plasticity, pale grey, with ironstone gravel and sand, grading to extremely weathered material.	M (<PL)	H	RESIDUAL SOIL
					DS 1.40-1.50 m SPT 1.50-1.94 m 19/140mm HB N>30							
			2	*2.10*								
	M-H			94.40				-	SANDSTONE; fine to medium grained, pale grey and orange-brown, low to medium strength, slightly to distinctly weathered.	-	-	BEDROCK
			3	*3.00*					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. BH1

Project	Proposed Development	**Sheet**	2 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	*3.00*		Continuation from non-cored borehole				
HQ	100% RETURN				93.50		NO CORE; 300 mm thick.	-			
					3.30						
					93.20		SANDSTONE; fine to medium grained, pale grey and orange-brown, thinly to medium bedded, dark grey siltstone laminations, iron stained.	SW			
		81	62	4							
		100	100	5							
				6	*6.35*						
					90.15		From 6.35 m, pale grey, medium to thickly bedded.	FR			
		100	100	7						7.50: JT, 15°, CN, PR, RF	
				8							
				9							
		100	100	10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH1

Project	Proposed Development	**Sheet**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	100% RETURN	100	100	10	86.50		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
				12							
		100	100	13							
				14						14.28: JT, 10°, Clay VNR, IR, SM	
				15							
		100	100	16							
				17							
				18							
		100	97	19							
				20	*20.00*						

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

CORED BOREHOLE LOG

BH NO. BH1

Project	Proposed Development	**Sheet**	4 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1_Rev1_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	100% RETURN	100	97	20	76.50		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				21							
		100	100	22						22.75: JT, 0°, CN, PR, RF	
				23							
				24							
		100	100	25						25.33: JT, 10°, Clay VNR, PR, SM	
				26							
				27							
					27.85						
				28	68.65		LAMINITE; fine to medium grained, pale grey sandstone interbedded with pale grey siltstone, medium bedded.				
		100	100	29							
				30	*30.00*						

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

CORED BOREHOLE LOG

BH NO. BH1

Project	Proposed Development	**Sheet**	5 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	100% RETURN	100	100	30	66.50		From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with pale grey siltstone, medium bedded.	FR			
				31	*31.07*						
					65.43		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.			31.45: Shale Lense	
		100	100	32							
				33							
				34							
		100	100	35							
				36	*36.30*						
					60.20		From 36.3 m, thickly to very thickly bedded.				
				37							
				38							
		100	100	39							
		100	100	40	*40.00*						

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

CORED BOREHOLE LOG

BH NO. BH1

Project	Proposed Development	**Sheet**	6 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	08/07/2020
Position	Refer to Figure 2	**Date Completed**	09/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 09/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	100% RETURN	100	100	40	56.50		From 40.0 m, sandstone, fine to medium grained, pale grey, thickly to very thickly bedded, with dark grey siltstone laminations.	FR			
				41							
				42							
		100	97	43							
				44							
				45						45.58: JT, 45°, CN, PR, RF 45.62: JT, 40°, CN, PR, RF 45.70: JT, 10°, CN, PR, RF	
					45.84						
				46	50.66		Hole Terminated at 45.84 m Target Depth Reached.				
				47							
				48							
				49							
				50							

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

CORE PHOTOGRAPH OF BOREHOLE: BH1

Project	Proposed Development			**Depth Range**	3.0m to 11.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 96.5m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	09 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH1

Project	Proposed Development			**Depth Range**	11.0m to 19.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 96.5m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	09 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	3-4 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH1

Project	Proposed Development			**Depth Range**	19.0m to 27.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 96.5m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	09 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	5-6 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH1

Project	Proposed Development			**Depth Range**	27.0m to 35.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 96.5m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	09 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	7-8 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH1

Project	Proposed Development			**Depth Range**	35.0m to 45.84m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 96.5m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	09 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	9-11 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

BOREHOLE LOG

BH NO. BH2

Project	Proposed Development	**Sheet**	1 of 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	95.10	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, dark brown, with sub-rounded to angular sandstone and igneous gravel and sand.	M	-	FILL
					SPT 0.50-0.95 m 5,7,9 N=16							
			1	*1.00* 94.10					From 1.0 m, with weak odour.			
					DS 1.20-1.30 m							
				1.40 93.70	SPT 1.50-1.95 m 5,10,11 N=21			CI	Silty CLAY; medium plasticity, pale grey to red-brown, trace ironstone gravels and rootlets, with weak odour.			RESIDUAL SOIL
			2	*2.00* 93.10	DS 1.90-2.00 m				From 2.0 m, no odour.	M (<PL)	VSt	
					DS 2.40-2.50 m							
				3.00 92.10	DS 2.90-3.00 m			CL	Sandy CLAY; low plasticity, pale grey, fine to medium grained sand, grading to extremely weathered sandstone.	M (<PL)	H	BEDROCK
			3	*3.30* 91.80	SPT 3.00-3.29 m 3,25/140mm HB N>30			-	SANDSTONE; fine to medium grained, pale grey and orange-brown, low to medium strength, slightly to distinctly weathered.	-	-	
	M-H			*3.95*								
			4						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 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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							
					3.95		Continuation from non-cored borehole				
HQ	100% RETURN	100	100	4	91.15		SANDSTONE; fine to medium grained, pale grey and orange-brown, thinly to thickly bedded, with dark grey siltstone laminations, iron stained.	DW		3.98: JT, 15°, Fe SN, PR, RF 4.02: XWS, 40 mm 4.13: XWS, 30 mm	
				5				SW			
				6						6.21: XWS, 10 mm	
				7	*7.04*						
					88.06		From 7.04 m, medium to thickly bedded.				
					7.25						
					87.85		From 7.25 m, pale grey.	FR			
		100	88	8							
					8.60						
					86.50		From 8.6 to 8.76 m, dark grey siltstone band.				
					8.82						
					86.28		From 8.82 to 8.85 m, sark grey siltstone band.				
				9							
		100	100	10	*10.00*						

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**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	100% RETURN	100	100	10	85.10		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
				12							
	95% RETURN	100	100	13							
				14							
		100	100	15						15.55: JT, 45°, CN, ST, RF	
				16							
				17							
		100	100	18	*18.30* 76.80		From 18.3 m, slightly iron stained.	SW		18.65: JT, 60°, CN, PR, RF	
				19							
		100	100	20	*20.00*			FR			

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**	4 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	95% RETURN	100	100	20	75.10		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
		100	97	23							
		100	100	26	*26.64*						
					68.46		LAMINITE; fine to medium grined, pale grey sandstone interbedded with dark grey siltstone, medium bedded.				
		100	100	29							

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**	5 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	95% RETURN	100	100	30	*30.10* 65.00		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR		30.07: XWS, 10 mm	
		100	99	31						32.46: JT, 45°, CN, PR, RF	
		100	100	32							
				33							
				34							
				35							
				36							
		99	99	37	*36.70* 58.40		From 36.7 m, very thickly bedded.				
				38							
				39							
				40	*40.00*						

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**	6 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	09/07/2020
Position	Refer to Figure 2	**Date Completed**	10/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 10/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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)
HQ	95% RETURN	100	97	40	55.10		From 40.0 m, sandstone, fine to medium grained, pale grey, thickly to very thickly bedded, with dark grey siltstone laminations.	FR			
				41							
				42	*42.15*						
					52.95		From 42.15 m, medium to thickly bedded.				
		100	100	43							
				44	*44.12*						
					50.98		Hole Terminated at 44.12 m Target Depth Reached.				
				45							
				46							
				47							
				48							
				49							
				50							

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**	3.95m to 11.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 95.1m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	10 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project	Proposed Development			**Depth Range**	11.0m to 19.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 95.1m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	10 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	3-4 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project	Proposed Development			**Depth Range**	19.0m to 27.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 95.1m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	10 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	5-6 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project	Proposed Development			**Depth Range**	27.0m to 35.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 95.1m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	10 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	7-8 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project	Proposed Development			**Depth Range**	35.0m to 44.12m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 95.1m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	10 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	9-11 of 11	**Checked**	SR	**Date**	24 / 08 / 2020

BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	1 of 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	-	▽	0	91.00	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, brown-dark grey to dark brown, with sub-rounded to angular, sandstone and igneous gravel and sand, trace rubber fragments.	M	-	FILL
			1		SPT 0.50-0.95 m 2,3,5 N=8 DS 0.70-0.80 m							
					DS 1.20-1.30 m							
			2		SPT 1.50-1.95 m 8,7,8 N=15 DS 1.70-1.80 m							
					DS 2.20-2.30 m							
				2.60								
				88.40				CI	Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.	M	VSt	RESIDUAL SOIL
			3	*2.90*	DS 2.80-2.90 m				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 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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							
					2.90		Continuation from non-cored borehole				
NMLC	100% RETURN	100	97	3	88.10		SANDSTONE; fine to medium grained, pale grey and orange-brown, medium to thickly bedded, with dark grey siltstone laminations, iron stained.	SW		3.34: XWS, 10 mm	
				4						4.47: XWS, 20 mm	
					4.90						
		100	99	5	86.10		From 4.9 to 10.53 m, pale grey.	FR			
				6							
		100	100	7							
				8							
		100	100	9							
				10							

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CORED BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	100	10	*10.30* 80.70		From 10.3 m, sandstone, fine to medium grained, brown and pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
								SW			
		100		11							
				12						12.60: XWS, 20 mm	
		100		13						13.52: XWS, 20 mm	
				14							
				15							
		100		16							
				17							
		100		18	*18.65* 72.35		From 18.65 m, pale grey.	FR			
				19							
				20	*20.00*						

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**	4 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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		20	71.00		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				21							
		100	100	22						22.04: JT, 5°, CN, IR, RF	
				23	*23.33*						
					67.67		LAMINITE; fine to medium grained, pale grey sandstone (70%) interbedded with dark grey siltstone (30%), medium bedded.			23.31: XWS, 20 mm	
				24						23.90: XWS, 20 mm 24.11: XWS, 40 mm	
		100	97	25							
				26							
				27	*27.00*					26.81: XWS, 10 mm	
					64.00		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.				
		100	100	28							
				29							
				30	*30.00*						

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**	5 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	100	30	61.00		From 30.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				31							
		100	100	32							
				33							
		100	100	34							
				35							
				36							
		100	100	37							
				38							
				39							
		100	100	40	*40.00*						

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**	6 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**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	100	40	51.00		From 40.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
					40.56						
					50.44		Hole Terminated at 40.56 m T/C Bit Refusal on Sandstone. Target Depth Reached.				
				41							
				42							
				43							
				44							
				45							
				46							
				47							
				48							
				49							
				50							

MONITORING WELL LOG

MW NO. BH3M

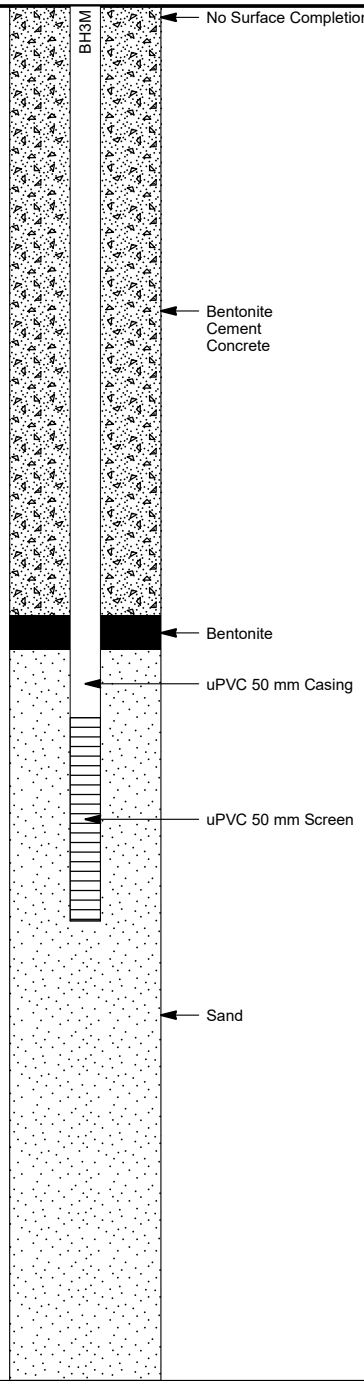
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T		0	90		FILL: Silty CLAY; low plasticity, brown-dark grey to dark brown, with sub-rounded to angular, sandstone and igneous gravel and sand, trace rubber fragments.
					Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
		5	85		SANDSTONE; fine to medium grained, pale grey and orange-brown, medium to thickly bedded, with dark grey siltstone laminations, iron stained.
					From 4.9 to 10.53 m, pale grey.
NMLC	100% RETURN	10	80		From 10.3 m, sandstone, fine to medium grained, brown and pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		15	75		
					From 18.65 m, pale grey.
		20	70		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		25	65		LAMINITE; fine to medium grained, pale grey sandstone (70%) interbedded with dark grey siltstone (30%), medium bedded.
					SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		30	60		From 30.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		35	55		
		40			From 40.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
			50		Hole Terminated at 40.56 m T/C Bit Refusal on Sandstone. Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date Static Water Level
BH3M	Standpipe	-1.00 m 92.00 m	27.00 m 64.00 m	



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

MONITORING WELL LOG

MW NO. BH3M-a

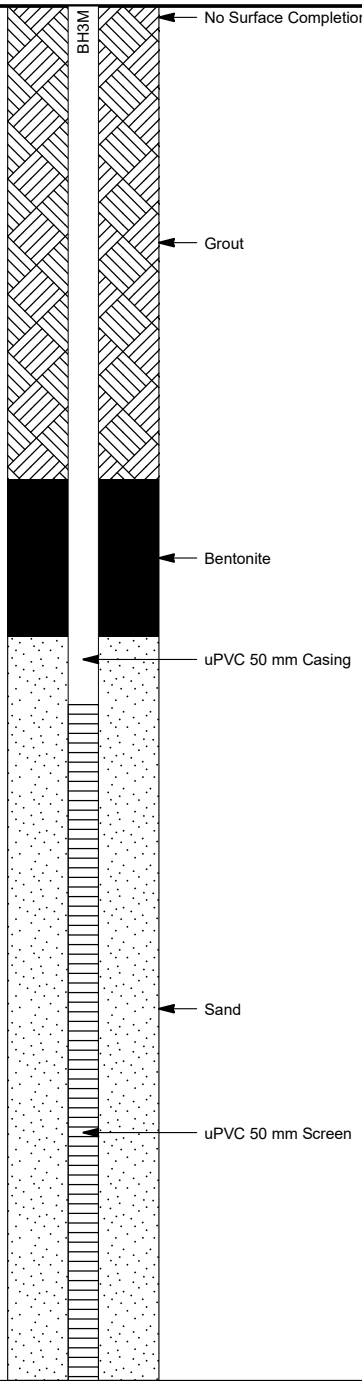
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By**	**Date**

Drilling Contactor	Hagstrom	**Surface RL**	≈91.00 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T		0	91		FILL: Silty CLAY; low plasticity, brown-dark grey to dark brown, with sub-rounded to angular, sandstone and igneous gravel and sand, trace rubber fragments.
		1	90		
		2	89		
	▽				Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
NMLC	100% RETURN	3	88		SANDSTONE; fine to medium grained, pale grey and orange-brown, medium to thickly bedded, with dark grey siltstone laminations, iron stained.
		4	87		
		5	86		From 4.9 to 10.53 m, pale grey.
		6	85		Hole Terminated at 6.10 m T/C Bit Refusal on Sandstone. Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date Static Water Level
BH3M	Standpipe	-1.00 m 92.00 m	6.10 m 84.90 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**	2.9m to 12.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 91.0m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 8	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH3M

Project	Proposed Development			**Depth Range**	12.0m to 22.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 91.0m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	3-4 of 8	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH3M

Project	Proposed Development			**Depth Range**	22.0m to 32.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 91.0m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	5-6 of 8	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH3M

Project	Proposed Development			**Depth Range**	22.0m to 32.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 91.0m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	7-8 of 8	**Checked**	SR	**Date**	24 / 08 / 2020

BOREHOLE LOG

BH NO. BH4M

Project	Proposed Development	**Sheet**	1 of 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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	L	GWNE	0	98.00	DS 0.30-0.50 m SPT 0.50-0.95 m 10,12/150HB N>12			-	FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.			FILL
			1	*1.10* 96.90	DS 0.90-1.00 m				Fom 1.1 m, orange-brown, with medium sandstone gravel.	-	-	
	H			*1.60* 96.40	DS 1.40-1.50 m SPT 1.50-1.95 m 3,4,4 N=8				From 1.6 m, grey.			
			2	*2.00* 96.00	DS 1.90-2.00 m			-	FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.			
	L				DS 2.40-2.50 m							
			3		DS 2.90-3.00 m SPT 3.00-3.45 m 15,16,18 N=34					-	-	
			4	*4.00* 94.00	DS 3.90-4.00 m			CI	Silty CLAY; medium plasticity, red mottled grey.	M (<PL)	VSt - H	RESIDUAL SOIL
	M			*4.60* 93.40	DS 4.40-4.50 m DS 4.60-4.70 m			CI	Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.	D	VSt - H	
			5	*5.00*	DS 4.90-5.00 m				Continued as Cored Borehole			
			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. BH4M

Project	Proposed Development	**Sheet**	2 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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							
				5	*5.00*		Continuation from non-cored borehole				
NMLC	70% RETURN	100	100	6	93.00		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.	SW		5.34-5.35: XWS, Gravels 5.37: XWS, Clay, Gravels, 6 mm 5.45: JT, 55°, CN, PR, RF	
				7	*6.32* 91.68		From 6.32 m, thinly to medium bedded.			6.04-6.05: XWS, Clay, Gravels 6.05-6.23: JT, 70 - 85°, CN, IR, RF 6.16-6.26: JT, 80 - 85°, CN, IR, RF 6.26-6.32: XWS, Clay	
				8				FR			
	100% RETURN	100	100	9				SW			
				10	*9.44* 88.56 *10.00*		From 9.44 m, pale grey, fresh.	FR			

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

CORED BOREHOLE LOG

BH NO. BH4M

Project	Proposed Development	**Sheet**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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)
NMLC	70% RETURN	100	100	10	88.00		From 10.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey shale laminations.	FR			
				11							
		100	100	12							
				13							
				14							
		100	94	15	*14.92* 83.08		From 14.92 to 15.16 m, dark grey siltstone band.				
				16							
				17							
		100	100	18							
				19							
				20	*20.00*						

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

CORED BOREHOLE LOG

BH NO. BH4M

Project	Proposed Development	**Sheet**	4 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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)
NMLC	70% RETURN	100	100	20	78.00		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
		100	100	21							
		100	95	22							
				23							
				24							
				25							
				26						25.72: SS 25.79: SS, Clay	
				27							
		100	99	28						27.44: JT, 55°, CN, PR, RF	
					28.89						
				29	69.11		LAMINITE; fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.			28.89-28.91: XWS, Clay	
		100	97	30	*30.00*						

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

CORED BOREHOLE LOG

BH NO. BH4M

Project	Proposed Development	**Sheet**	5 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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)
NMLC	70% RETURN	100	97	30	68.00		From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.	FR			
				31							
				32	*32.28*					32.22-32.26: XWS, Clay	
		99	99		65.72		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.				
				33							
				34							
				35							
				36							
		100	99	37	*37.33*						
					60.67		From 37.33 to 37.36 m, dark grey, siltstone band.				
				38							
				39							
		100	100	40	*40.00*						

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

CORED BOREHOLE LOG

BH NO. BH4M

Project	Proposed Development	**Sheet**	6 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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)
NMLC	70% RETURN	100	100	40	58.00		From 40.0 m, sandstone, medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				41							
		100	100	42						43.64: XWS, Clay	
				43							
				44							
				45							
		100	100	46							
				47						47.20: XWS, Clay	
					47.69						
				48	50.31		Hole Terminated at 47.69 m T/C Bit Refusal. Target Depth Reached.				
				49							
				50							

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

MONITORING WELL LOG

MW NO. BH4M

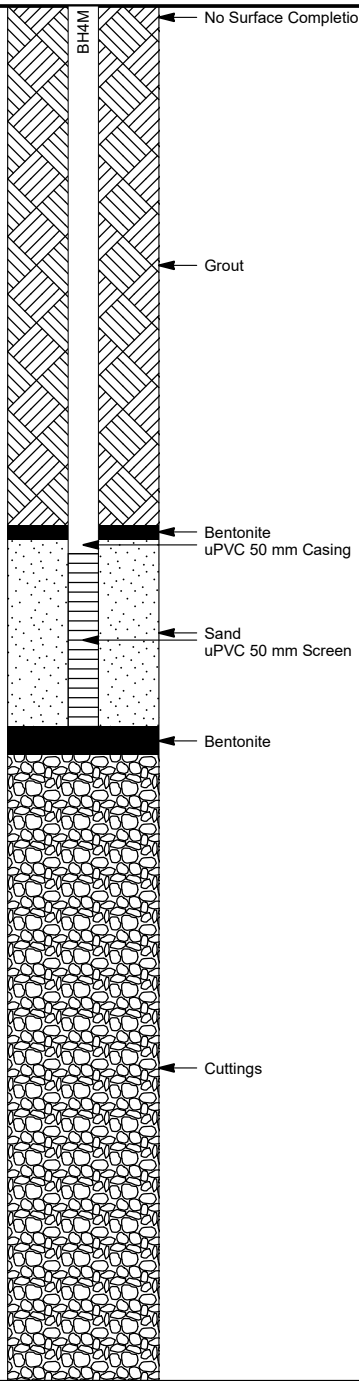
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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			FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.
					Fom 1.1 m, orange-brown, with medium sandstone gravel.
			95		From 1.6 m, grey.
					FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.
		5			Silty CLAY; medium plasticity, red mottled grey.
NMLC	100% RETURN				Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
			90		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.
					From 6.32 m, thinly to medium bedded.
		10			From 9.44 m, pale grey, fresh.
					From 10.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey shale laminations.
			85		
		15			From 14.92 to 15.16 m, dark grey siltstone band.
			80		
		20			From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
			75		
		25			
	70% RETURN		70		LAMINITE; fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded. From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.
		30			
			65		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		35			
			60		From 37.33 to 37.36 m, dark grey, siltstone band.
		40			From 40.0 m, sandstone, medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
			55		
		45			
		50	50		Hole Terminated at 47.69 m T/C Bit Refusal. Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date Static Water Level
BH4M	Standpipe	0.69 m 97.31 m	25.00 m 73.00 m	



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

MONITORING WELL LOG

MW NO. BH4M-a

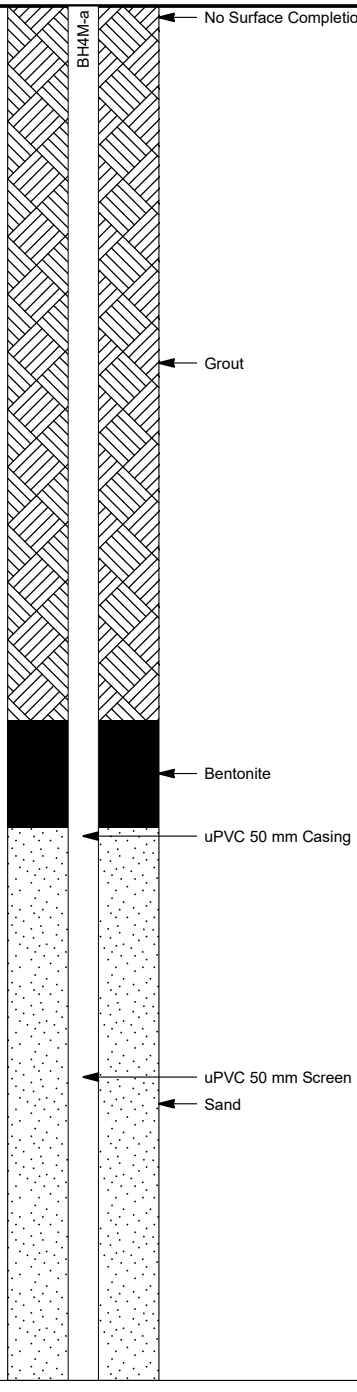
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By**	**Date**

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 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	98		FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.
		1	97		Fom 1.1 m, orange-brown, with medium sandstone gravel.
					From 1.6 m, grey.
		2	96		FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.
		3	95		
		4	94		Silty CLAY; medium plasticity, red mottled grey.
					Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
NMLC	70% RETURN	5	93		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.
		6	92		
		7	91		
		8	90		Hole Terminated at 7.70 m T/C Bit Refusal. Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH4M-a	Standpipe	0.69 m 97.31 m	7.70 m 90.30 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project	Proposed Development			**Depth Range**	5.0m to 14.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 98.0m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project	Proposed Development			**Depth Range**	14.0m to 24.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 98.0m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	3-4 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH4M

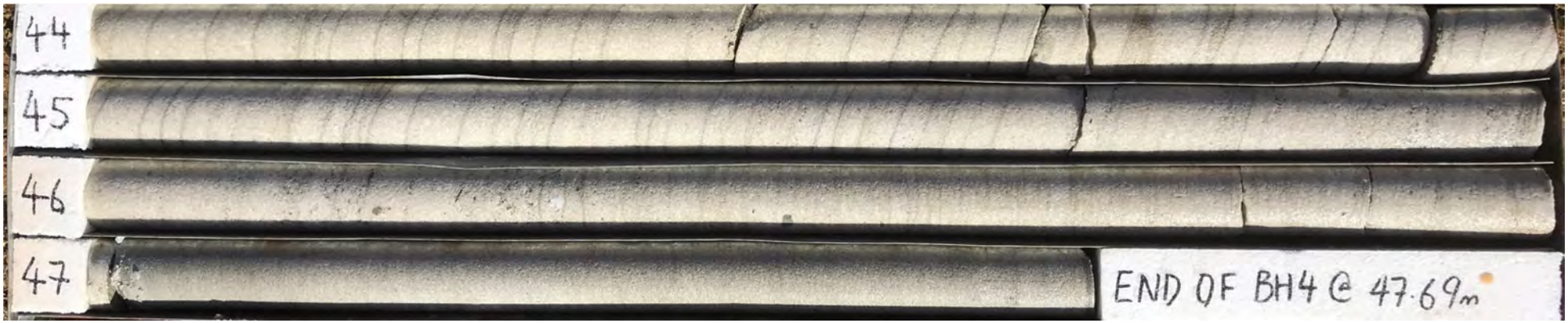
Project	Proposed Development			**Depth Range**	24.0m to 34.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 98.0m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	5-6 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project	Proposed Development			**Depth Range**	34.0m to 44.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 98.0m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	7-8 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project	Proposed Development			**Depth Range**	44.0m to 47.69m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 98.0m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	9 of 9	**Checked**	SR	**Date**	24 / 08 / 2020



BOREHOLE LOG

BH NO. BH5M

Project	Proposed Development	**Sheet**	1 of 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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	L	GWNE	0	94.10	DS 0.00-0.10 m			-	FILL: Gravelly SAND; fine to medium grained, brown, fine to medium, sub-angular to sub-rounded gravels, with clay, plastic fragments.			FILL
			1		DS 0.50-0.60 m SPT 0.50-0.95 m 1,5,9 N=14 DS 1.00-1.10 m					-	-	
					DS 1.50-1.60 m SPT 1.50-1.90 m 12/100mm HB N>12 DS 1.90-2.00 m							
			2	92.30				CI	Silty CLAY; medium plasticity, red-brown.	M (<PL)	VSt	RESIDUAL SOIL
									From 1.9 m, grey, grading to extremely weathered sandstone.			
									Continued as Cored Borehole			
			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. BH5M

Project	Proposed Development	**Sheet**	2 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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	*2.00*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	0		92.10		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, distinctly weathered.	DW			
					2.41 91.69		From 2.41 m, thinly to medium bedded, with dark grey siltstone laminations.	SW			
				3							
		100	93	4						4.06: XWS, Clay	
				5						4.89: XWS, Clay, 10 mm 4.98: XWS, Clay and Gravels, 20 mm	
				6							
		100	100		*6.75* 87.35		From 6.75 m, pale grey, medium bedded.	FR			
				7							
				8							
		100	100	9						9.32: XWS, Clay	
				10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH5M

Project	Proposed Development	**Sheet**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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	100	10	84.10		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
				11							
					11.40						
		100	99		82.70		From 11.4 m, dark grey siltstone band.			11.92: SS, 30°, Clay and Gravels 12.34-12.37: XWS, Clay, 30 mm 12.75: XWS, Clay	
				12							
				13							
				14							
		100	100	15							
				16							
				17							
		100	100	18							
				19							
				20	20.00						

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

CORED BOREHOLE LOG

BH NO. BH5M

Project	Proposed Development	**Sheet**	4 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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	100	20	74.10		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
		100	100	21							
		100	100	22							
		100	100	23							
		100	100	24							
		100	100	25							
		100	100	26							
		100	100	27	*26.32* 67.78		LAMINITE; fine to medium grained, pale grey, sandstone interbedded with dark grey siltstone, thinly to medium bedded.				
		100	100	28							
		100	100	29	*29.14* 64.96		SANDSTONE; fine to medium grained, pale grey, with dark grey shale laminations.				
		100	100	30	*30.00*						

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

CORED BOREHOLE LOG

BH NO. BH5M

Project	Proposed Development	**Sheet**	5 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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	100	30	64.10		From 30.0 m, sandstone, fine to medium grained, pale grey, with dark grey shale laminations.	FR			
				31							
				32							
		100	100	33							
				34						34.51: XWS, Clay	
				35							
				36							
		100	100	37							
				38							
				39							
		100	100	40	*40.00*						

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

CORED BOREHOLE LOG

BH NO. BH5M

Project	Proposed Development	**Sheet**	6 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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^{10})	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	40	54.10		From 40.0 m, medium grained, pale grey, thickly bedded, with dark grey shale laminations.	FR			
				41							
				42						41.94-42.07: JT, 80 - 85°, CN, PR, RF	
		100	100	43						42.88-43.20: JT, 75 - 85°, CN, PR, RF	
				44	*44.76*						
				45	49.34		Hole Terminated at 44.76 m T/C Bit Refusal. Target Depth Reached.				
				46							
				47							
				48							
				49							
				50							

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

MONITORING WELL LOG

MW NO. BH5M

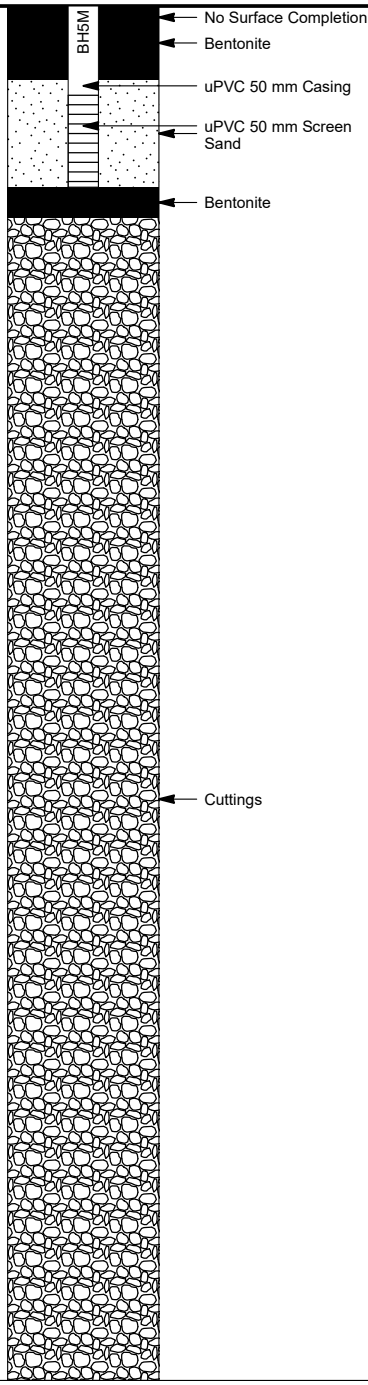
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 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			FILL: Gravelly SAND; fine to medium grained, brown, fine to medium, sub-angular to sub-rounded gravels, with clay, plastic fragments.
					Silty CLAY; medium plasticity, red-brown.
					From 1.9 m, grey, grading to extremely weathered sandstone.
			90		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, distinctly weathered.
		5			From 2.41 m, thinly to medium bedded, with dark grey siltstone laminations.
					From 6.75 m, pale grey, medium bedded.
			85		
		10			From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.
					From 11.4 m, dark grey siltstone band.
			80		
		15			
			75		
		20			From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.
NMLC	100% RETURN	25	70		
					LAMINITE; fine to medium grained, pale grey, sandstone interbedded with dark grey siltstone, thinly to medium bedded.
			65		SANDSTONE; fine to medium grained, pale grey, with dark grey shale laminations.
		30			From 30.0 m, sandstone, fine to medium grained, pale grey, with dark grey shale laminations.
			60		
		35			
			55		
		40			From 40.0 m, medium grained, pale grey, thickly bedded, with dark grey shale laminations.
			50		
		45			Hole Terminated at 44.76 m T/C Bit Refusal. Target Depth Reached.
			45		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH5M	Standpipe	-1.00 m 95.10 m	5.90 m 88.20 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Development			**Depth Range**	2.0m to 11.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 94.1m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	16 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Development			**Depth Range**	11.0m to 21.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 94.1m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	16 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	3-4 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Development			**Depth Range**	21.0m to 31.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 94.1m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	16 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	5-6 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Development			**Depth Range**	31.0m to 41.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 94.1m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	16 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	7-8 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Development			**Depth Range**	41.0m to 44.76m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 94.1m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	16 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	9 of 9	**Checked**	SR	**Date**	24 / 08 / 2020

BOREHOLE LOG

BH NO. BH6

Project	Proposed Development	**Sheet**	1 of 5
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	20/07/2020
Position	Refer to Figure 2	**Date Completed**	20/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 20/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 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	90.80	SPT 0.50-0.95 m 7,8,8 N=16			-	FILL: Silty CLAY; low plasticity, pale grey mottled red-brown, with gravels and sand.	-	-	FILL
			1	*1.20*								
	M			89.60 *1.50*	DS 1.40-1.50 m			Cl	Sandy CLAY; medium plasticity, pale grey, fine to medium grained sand, grading to extremely weathered sandstone.	D	VSt	RESIDUAL SOIL
			2						Continued as Cored Borehole			
			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. BH6

Project	Proposed Development	**Sheet**	2 OF 5
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	20/07/2020
Position	Refer to Figure 2	**Date Completed**	20/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 20/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 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							
					1.50		Continuation from non-cored borehole				
NMLC	100% RETURN	100	92	2	89.30		SANDSTONE; fine to medium grained, pale grey-orange, thinly bedded, ironstained, with dark grey siltstone laminations.	SW		2.42: JT, 85°, CN, PR, RF	
				3						3.17-3.21: XWS, Clay, Gravels	
		100	95	4						3.95: XWS, Clay	
					4.70					4.55: XWS	
				5	86.10		From 4.7 m, pale grey, medium bedded.	FR			
		100	100	6	*6.18*						
				7	84.62		From 6.18 m, medium to thickly bedded.				
				8							
		100	100	9							
				10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH6

Project	Proposed Development	**Sheet**	3 OF 5
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	20/07/2020
Position	Refer to Figure 2	**Date Completed**	20/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 20/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 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	100	10	80.80		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
		100	98	12							
				13							
				14							
		100	100	15							
				16							
				17							
		100	98	18							
				19						19.64-19.67: SS 19.80: XWS, Clay	
				20	*20.00*						

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

CORED BOREHOLE LOG

BH NO. BH6

Project	Proposed Development	**Sheet**	4 OF 5
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	20/07/2020
Position	Refer to Figure 2	**Date Completed**	20/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 20/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 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	98	20	70.80		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
		100	100	21							
				22							
				23							
					23.94						
				24	66.86		LAMINITE; fine to medium grained, pale grey siltstone interbedded with dark grey siltstone, thinly to medium bedded.				
		100	100	25							
				26							
				27							
					27.44						
					63.36		SANDSTONE; fine to medium grained, pale grey, thickly bedded.				
		100	100	28							
				29							
		100	100	30	*30.00*						

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

CORED BOREHOLE LOG

BH NO. BH6

Project	Proposed Development	**Sheet**	5 OF 5
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	20/07/2020
Position	Refer to Figure 2	**Date Completed**	20/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 20/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 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 10)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	30	60.80		From 30.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey siltstone laminations.	FR			
				31							
				32							
		100	100	33							
				34							
				35							
				36							
				37							
		100	100	38							
				39						39.47: JT, 50 - 70°, CN, CU, RF	
		93	93	40	*40.00*		Hole Terminated at 40.00 m T/C Bit Refusal. Target Depth Reached.				

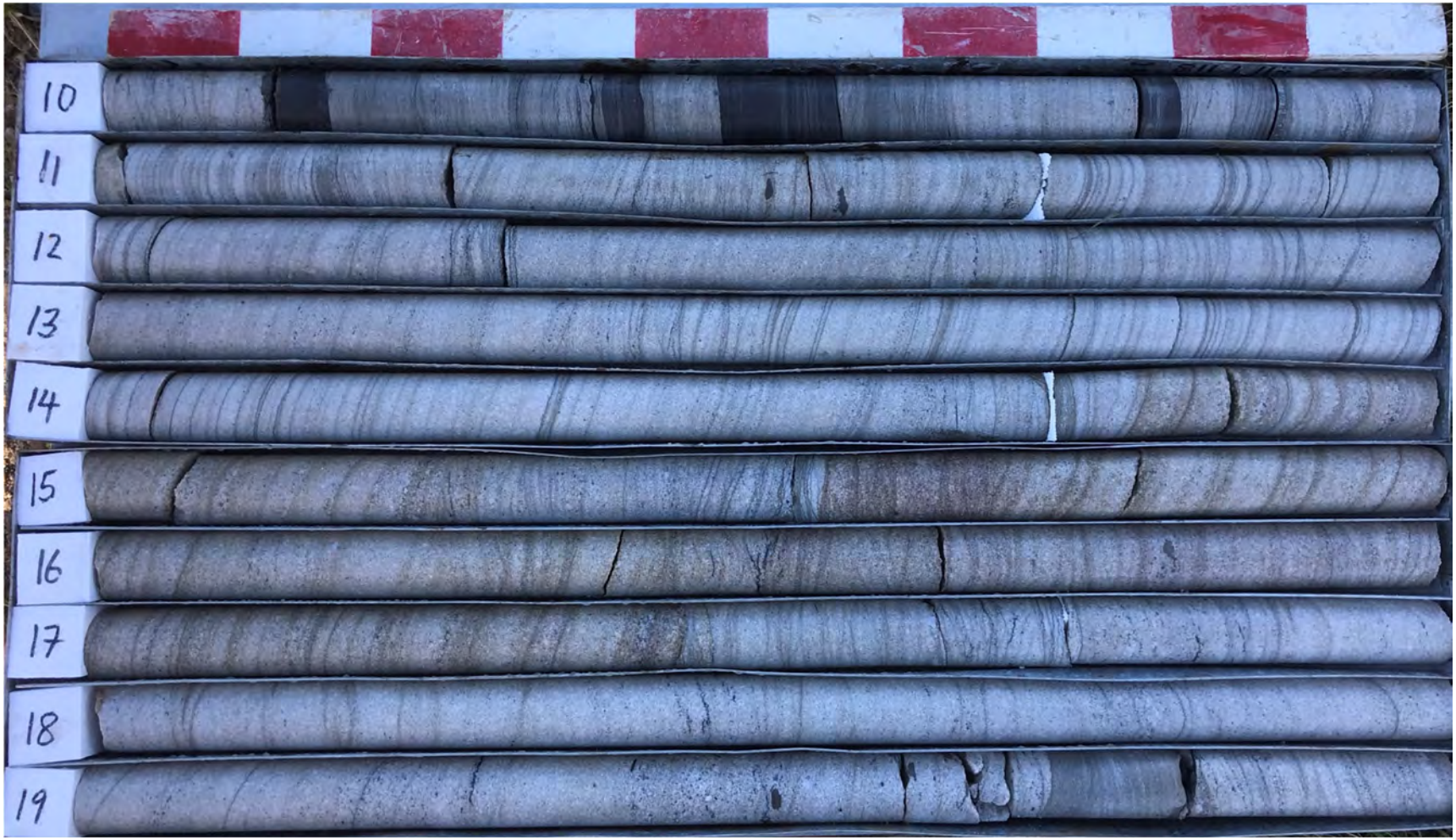
This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	1.5m to 10.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 90.8m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	20 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 7	**Checked**	SR	**Date**	24 / 08 / 2020

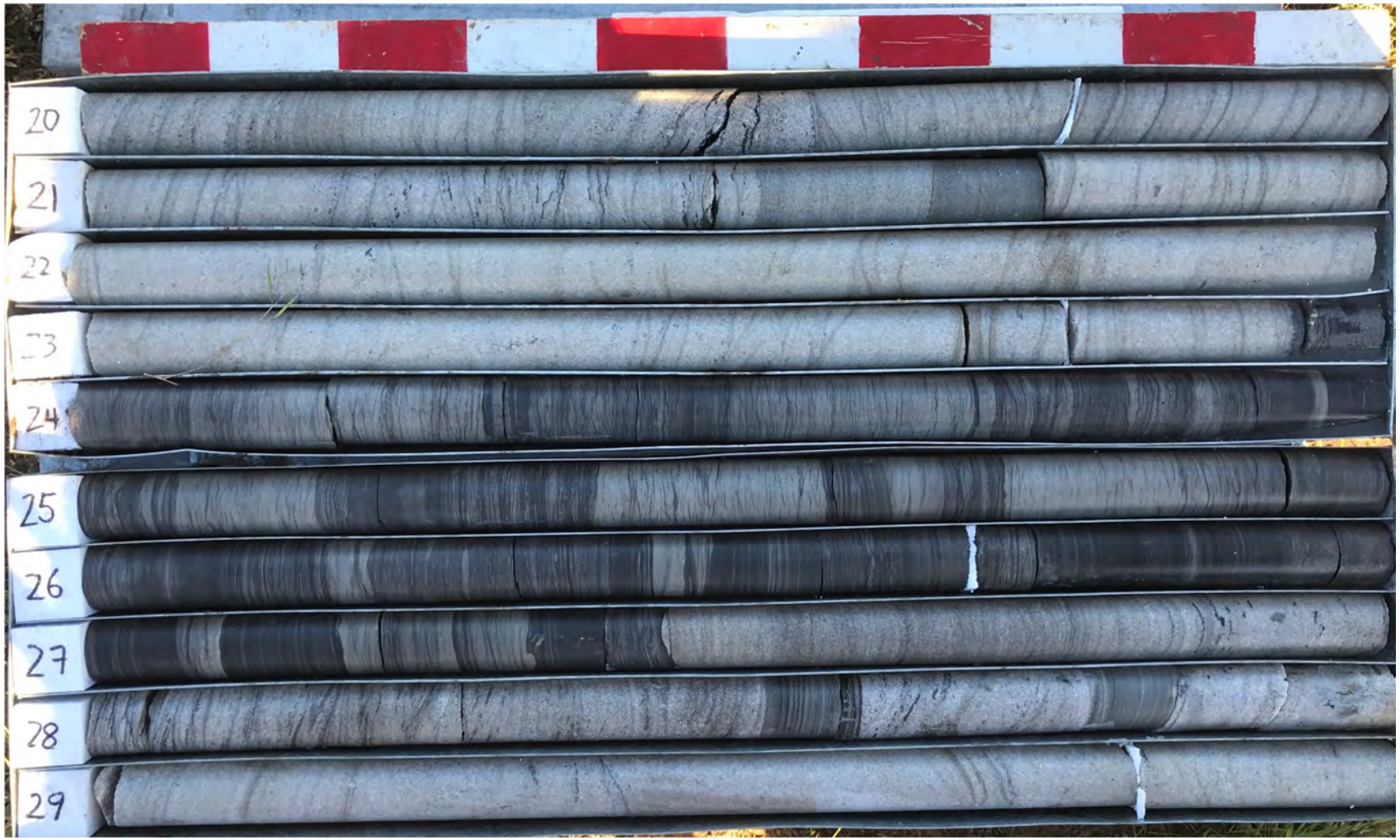
CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	10.0m to 20.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 90.8m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	20 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	2-3 of 7	**Checked**	SR	**Date**	24 / 08 / 2020



CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	20.0m to 30.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 90.8m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	20 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	4-5 of 7	**Checked**	SR	**Date**	24 / 08 / 2020



CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	30.0m to 40.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Geosense Drilling		
Position	See Figure 2	**Surface RL**	≈ 90.8m	**Drill Rig**	Hanjin DB8		
Job No.	E24724.G03 _Rev1	**Inclination**	-90°	**Logged**	SL	**Date**	20 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	6-7 of 7	**Checked**	SR	**Date**	24 / 08 / 2020

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 (%)

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

RQD = Rock Quality Designation (%)

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

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			

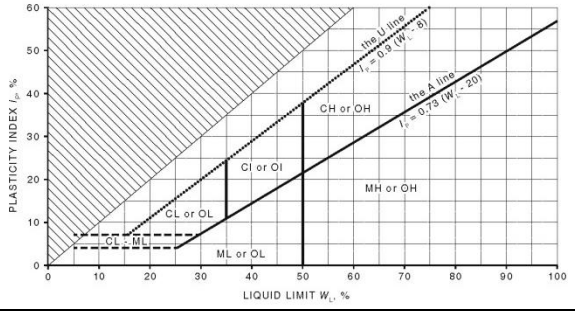
CLASSIFICATION AND INFERRED STRATIGRAPHY

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.

ABBREVIATIONS AND DESCRIPTIONS FOR ROCK MATERIAL AND DEFECTS

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.

DETAILED ROCK DEFECT SPACING

Defect Spacing	
Term	**Description**
Massive	No layering apparent
Indistinct	Layering just visible; little effect on properties
Distinct	Layering (bedding, foliation, cleavage) distinct; rock breaks more easily parallel to layering

Bedding Thickness (Stratification)	
Term	**Spacing (mm)**
Thinly laminated	<6
Laminated	6 – 20
Very thinly bedded	20 – 60
Thinly bedded	60 – 200
Medium bedded	200 – 600
Thickly bedded	600 – 2,000
Very thickly bedded	> 2,000

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT TYPES

Defect Type	Abbr.	Description
Joint	JT	Surface of a fracture or parting, formed without displacement, across which the rock has little or no tensile strength. May be closed or filled by air, water or soil or rock substance, which acts as cement.
Bedding Parting	BP	Surface of fracture or parting, across which the rock has little or no tensile strength, parallel or sub-parallel to layering/ bedding. Bedding refers to the layering or stratification of a rock, indicating orientation during deposition, resulting in planar anisotropy in the rock material.
Contact	CO	The surface between two types or ages of rock.
Sheared Surface	SSU	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.
Sheared Seam/ Zone (Fault)	SS/SZ	Seam or zone with roughly parallel almost planar boundaries of rock substance cut by closely spaced (often <50 mm) parallel and usually smooth or slickensided joints or cleavage planes.
Crushed Seam/ Zone (Fault)	CS/CZ	Seam or zone composed of disoriented usually angular fragments of the host rock substance, with roughly parallel near-planar boundaries. The brecciated fragments may be of clay, silt, sand or gravel sizes or mixtures of these.
Extremely Weathered Seam/ Zone	XWS/XWZ	Seam of soil substance, often with gradational boundaries, formed by weathering of the rock material in places.
Infilled Seam	IS	Seam of soil substance, usually clay or clayey, with very distinct roughly parallel boundaries, formed by soil migrating into joint or open cavity.
Vein	VN	Distinct sheet-like body of minerals crystallised within rock through typically open-space filling or crack-seal growth.

NOTE: Defects size of <100mm SS, CS and XWS. Defects size of >100mm SZ, CZ and XWZ.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT SHAPE AND ROUGHNESS

Shape	Abbr.	Description	Roughness	Abbr.	Description
Planar	PR	Consistent orientation	Polished	POL	Shiny smooth surface
Curved	CU	Gradual change in orientation	Slickensided	SL	Grooved or striated surface, usually polished
Undulating	UN	Wavy surface	Smooth	SM	Smooth to touch. Few or no surface irregularities
Stepped	ST	One or more well defined steps	Rough	RO	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper
Irregular	IR	Many sharp changes in orientation	Very Rough	VR	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper

Orientation: **Vertical Boreholes –** The dip (inclination from horizontal) of the defect.
Inclined Boreholes – The inclination is measured as the acute angle to the core axis.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT COATING

Coating	Abbr.	Description
Clean	CN	No visible coating or infilling
Stain	SN	No visible coating but surfaces are discoloured by staining, often limonite (orange-brown)
Veneer	VNR	A visible coating of soil or mineral substance, usually too thin to measure (< 1 mm); may be patchy

DEFECT APERTURE

Aperture	Abbr.	Description
Closed	CL	Closed.
Open	OP	Without any infill material.
Infilled	-	Soil or rock i.e. clay, silt, talc, pyrite, quartz, etc.

Appendix B - Laboratory Certificates

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Stephanie Liew
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	stephanie.liew@eiaustralia.com.au
Project	**E24724.G03 2 Mandala Parade, Castle Hill**
Order Number	**E24724.G03**
Samples	3

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE209034 R0**
Date Received	22/7/2020
Date Reported	29/7/2020

COMMENTS

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

SIGNATORIES

Shane MCDERMOTT
Inorganic/Metals Chemist

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 28/7/2020

PARAMETER	UOM	LOR	BH4_4.6-4.7 SOIL - 21/7/2020 SE209034.001	BH5_1.9-2.0 SOIL - 21/7/2020 SE209034.002	BH6_1.4-1.5 SOIL - 21/7/2020 SE209034.003
Chloride	mg/kg	0.25	12	14	18
Sulfate	mg/kg	5	72	31	66

pH in soil (1:5) [AN101] Tested: 28/7/2020

PARAMETER	UOM	LOR	BH4_4.6-4.7 SOIL - 21/7/2020 SE209034.001	BH5_1.9-2.0 SOIL - 21/7/2020 SE209034.002	BH6_1.4-1.5 SOIL - 21/7/2020 SE209034.003
pH	pH Units	0.1	**6.3**	**5.9**	**6.2**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 28/7/2020

PARAMETER	UOM	LOR	BH4_4.6-4.7 SOIL - 21/7/2020 SE209034.001	BH5_1.9-2.0 SOIL - 21/7/2020 SE209034.002	BH6_1.4-1.5 SOIL - 21/7/2020 SE209034.003
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	44	27	56

Moisture Content [AN002] Tested: 24/7/2020

PARAMETER	UOM	LOR	BH4_4.6-4.7 SOIL - 21/7/2020 SE209034.001	BH5_1.9-2.0 SOIL - 21/7/2020 SE209034.002	BH6_1.4-1.5 SOIL - 21/7/2020 SE209034.003
% Moisture	%w/w	1	**6.8**	**12.5**	**6.7**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract of as received sample with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S61986-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S61986	BH1 3.38 - 3.47m	Sandstone	Axial	61.0	45.0	4.89	1.40	1.51	1
S61987	BH1 4.40 - 4.50m	Sandstone	Axial	61.2	45.0	4.71	1.34	1.45	1
S61988	BH1 5.50 - 5.60m	Sandstone	Axial	61.4	55.0	6.78	1.58	1.78	1
S61989	BH1 6.51 - 6.61m	Sandstone	Axial	61.1	46.0	5.96	1.66	1.80	1
S61990	BH1 7.58 - 7.68m	Sandstone	Axial	61.0	45.0	4.37	1.25	1.35	1
S61991	BH1 8.58 - 8.68m	Sandstone	Axial	61.1	41.0	4.71	1.48	1.56	1
S61992	BH1 9.55 - 9.65m	Sandstone	Axial	61.2	45.0	3.63	1.04	1.12	1
S61993	BH1 10.55 - 10.65m	Sandstone	Axial	61.2	52.0	4.26	1.05	1.17	1
S61994	BH1 11.60 - 11.70m	Sandstone	Axial	61.0	47.0	4.74	1.30	1.41	1
S61995	BH1 12.60 - 12.70m	Sandstone	Axial	61.0	45.0	5.67	1.62	1.75	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.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. This document shall not be reproduced, except in full.

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

29/07/2020

Date

MACQUARIE GEOTECH

Macquarie Geotech
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S61996-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S61996	BH1 13.70 - 13.80m	Sandstone	Axial	61.0	40.0	1.23	0.40	0.42	1
S61997	BH1 14.60 - 14.70m	Sandstone	Axial	61.1	44.0	5.36	1.57	1.68	1
S61998	BH1 15.55 - 15.65m	Sandstone	Axial	61.2	45.0	4.53	1.29	1.39	1
S61999	BH1 17.00 - 17.12m	Sandstone	Axial	61.1	41.0	7.41	2.32	2.45	1
S62000	BH1 18.58 - 18.68m	Sandstone	Axial	61.1	45.0	5.61	1.60	1.73	1
S62001	BH1 19.63 - 19.73m	Sandstone	Axial	61.2	44.0	4.84	1.41	1.52	1
S62002	BH1 21.10 - 21.20m	Sandstone	Axial	61.2	50.0	7.36	1.89	2.09	1
S62003	BH1 22.30 - 22.40m	Sandstone	Axial	61.1	45.0	4.18	1.19	1.29	1
S62004	BH1 23.53 - 23.60m	Sandstone	Axial	61.3	50.0	7.42	1.90	2.10	1
S62005	BH1 24.66 - 24.76m	Sandstone	Axial	61.2	41.0	8.84	2.77	2.92	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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Authorised Signatory:

Chris Lloyd

29/07/2020

Date

MACQUARIE GEOTECH

Macquarie Geotech
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62006-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62006	BH1 26.00 - 26.10m	Sandstone							
			Axial	61.0	46.0	6.11	1.71	1.85	1
S62007	BH1 27.19 - 27.29m	Sandstone							
			Axial	61.3	43.0	4.94	1.47	1.57	1
S62008	BH1 28.30 - 28.39m	Sandstone							
			Axial	61.1	40.0	6.51	2.09	2.20	1
S62009	BH1 29.50 - 29.60m	Sandstone							
			Axial	61.0	36.0	3.61	1.29	1.32	1
S62010	BH1 30.50 - 30.63m	Shale							
			Axial	61.1	32.0	3.22	1.29	1.29	1
S62011	BH1 31.79 - 31.89m	Sandstone							
			Axial	61.2	44.0	3.57	1.04	1.12	1
S62012	BH1 33.00 - 33.10m	Sandstone							
			Axial	61.1	41.0	3.91	1.23	1.30	1
S62013	BH1 34.70 - 34.80m	Sandstone							
			Axial	61.2	53.0	4.65	1.13	1.26	1
S62014	BH1 35.80 - 35.90m	Sandstone							
			Axial	61.1	39.0	4.02	1.32	1.38	1
S62015	BH1 37.12 - 37.23m	Sandstone							
			Axial	61.0	44.0	4.23	1.24	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62016-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62016	BH1 39.02 - 39.12m	Sandstone							
			Axial	61.1	50.0	3.75	0.96	1.06	1
S62017	BH1 41.08 - 41.18m	Sandstone							
			Axial	61.1	50.0	4.40	1.13	1.25	1
S62443	BH1 42.00-42.11m	Sandstone							
			Axial	61.3	42.0	4.63	1.41	1.50	1
S62444	BH1 43.00-43.10m	Sandstone							
			Axial	61.0	46.0	4.71	1.32	1.43	1
S62445	BH1 44.00-44.10m	Sandstone							
			Axial	60.9	48.0	5.02	1.35	1.47	1
S62446	BH1 45.00-45.10m	Sandstone							
			Axial	61.0	54.0	5.21	1.24	1.40	1
S62447	BH1 45.71-45.81m	Sandstone							
			Axial	61.0	45.0	2.14	0.61	0.66	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62018-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62018	BH2 4.14 - 4.24m	Sandstone							
			Axial	61.1	41.0	5.70	1.79	1.89	1
S62019	BH2 5.14 - 5.24m	Sandstone							
			Axial	61.0	44.0	3.79	1.11	1.19	1
S62020	BH2 6.00 - 6.10m	Sandstone							
			Axial	61.3	52.0	3.39	0.84	0.93	1
S62021	BH2 6.59 - 6.68m	Sandstone							
			Axial	61.1	47.0	2.92	0.80	0.87	1
S62022	BH2 7.58 - 7.67m	Sandstone							
			Axial	61.1	45.0	3.50	1.00	1.08	1
S62023	BH2 8.90 - 8.99m	Sandstone							
			Axial	61.4	46.0	4.51	1.25	1.36	1
S62024	BH2 10.08 - 10.17m	Sandstone							
			Axial	61.2	45.0	4.91	1.40	1.51	1
S62025	BH2 11.08 - 11.18m	Sandstone							
			Axial	61.2	42.0	4.87	1.49	1.58	1
S62026	BH2 12.15 - 12.25m	Sandstone							
			Axial	61.1	45.0	7.31	2.09	2.25	1
S62027	BH2 13.25 - 13.35m	Sandstone							
			Axial	61.1	47.0	6.38	1.75	1.90	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62028-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62028	BH2 14.82 - 14.92m	Sandstone							
			Axial	61.0	50.0	4.38	1.13	1.25	1
S62029	BH2 16.32 - 16.42m	Sandstone							
			Axial	61.1	52.0	6.37	1.58	1.76	1
S62030	BH2 17.57 - 17.67m	Sandstone							
			Axial	61.2	49.0	7.13	1.87	2.05	1
S62031	BH2 18.86 - 18.96m	Sandstone							
			Axial	61.0	43.0	7.19	2.15	2.30	1
S62032	BH2 20.18 - 20.27m	Sandstone							
			Axial	61.4	40.0	5.22	1.67	1.76	1
S62033	BH2 21.56 - 21.65m	Sandstone							
			Axial	61.0	47.0	5.40	1.48	1.61	1
S62034	BH2 23.15 - 23.25m	Sandstone							
			Axial	61.1	52.0	8.58	2.12	2.36	1
S62035	BH2 24.79 - 24.87m	Sandstone							
			Axial	61.2	45.0	7.33	2.09	2.26	1
S62036	BH2 26.20 - 26.30m	Sandstone							
			Axial	61.2	43.0	5.31	1.58	1.69	1
S62037	BH2 27.33 - 27.43m	Sandstone							
			Axial	61.1	35.0	7.96	2.92	2.98	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62038-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62038	BH2 28.41 - 28.50m	Sandstone							
			Axial	61.1	40.0	4.12	1.32	1.39	1
S62039	BH2 29.30 - 29.40m	Sandstone							
			Axial	61.3	35.0	6.66	2.44	2.49	1
S62040	BH2 30.46 - 30.56m	Sandstone							
			Axial	61.2	41.0	5.60	1.75	1.85	1
S62041	BH2 31.43 - 31.53m	Sandstone							
			Axial	61.0	49.0	4.51	1.19	1.30	1
S62042	BH2 32.51 - 32.61m	Sandstone							
			Axial	61.3	55.0	4.62	1.08	1.22	1
S62043	BH2 33.77 - 33.86m	Sandstone							
			Axial	61.2	45.0	5.84	1.67	1.80	1
S62044	BH2 35.10 - 35.20m	Sandstone							
			Axial	61.1	45.0	5.83	1.66	1.80	1
S62045	BH2 36.30 - 36.40m	Sandstone							
			Axial	61.1	43.0	4.48	1.34	1.43	1
S62046	BH2 37.56 - 37.66m	Sandstone							
			Axial	61.2	45.0	4.87	1.39	1.50	1
S62047	BH2 38.90 - 38.99m	Sandstone							
			Axial	61.1	43.0	3.32	0.99	1.06	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62048-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62048	BH2 40.20 - 40.30m	Sandstone							
			Axial	61.2	46.0	4.77	1.33	1.44	1
S62049	BH2 41.80 - 41.90m	Sandstone							
			Axial	61.5	45.0	4.70	1.33	1.44	1
S62448	BH2 42.85-42.95m	Sandstone							
			Axial	61.1	48.0	6.68	1.79	1.96	1
S62449	BH2 43.86-43.96m	Sandstone							
			Axial	61.1	46.0	4.09	1.14	1.24	1
S62050	BH3 2.90 - 2.99m	Sandstone							
			Axial	51.8	42.0	3.34	1.20	1.23	1
S62051	BH3 3.74 - 3.84m	Sandstone							
			Axial	51.8	40.0	2.86	1.08	1.10	1
S62052	BH3 4.63 - 4.73m	Sandstone							
			Axial	51.9	40.0	2.38	0.90	0.91	1
S62053	BH3 5.82 - 5.90m	Sandstone							
			Axial	52.0	44.0	3.23	1.11	1.15	1
S62054	BH3 6.85 - 6.95m	Sandstone							
			Axial	52.1	41.0	2.53	0.93	0.95	1
S62055	BH3 8.06 - 8.16m	Sandstone							
			Axial	52.3	41.0	2.29	0.84	0.86	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62056-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62056	BH3 9.28 - 9.38m	Sandstone							
			Axial	51.7	43.0	2.06	0.73	0.75	1
S62057	BH3 10.29 - 10.39m	Sandstone							
			Axial	51.9	40.0	4.16	1.57	1.59	1
S62058	BH3 11.37 - 11.47m	Sandstone							
			Axial	51.8	43.0	3.60	1.27	1.31	1
S62059	BH3 12.30 - 12.40m	Sandstone							
			Axial	52.0	45.0	5.34	1.79	1.87	1
S62060	BH3 13.40 - 13.49m	Sandstone							
			Axial	52.1	40.0	5.08	1.91	1.94	1
S62061	BH3 14.62 - 14.72m	Sandstone							
			Axial	52.1	36.0	5.69	2.38	2.36	1
S62062	BH3 16.21 - 16.31m	Sandstone							
			Axial	51.8	44.0	4.60	1.58	1.64	1
S62063	BH3 17.25 - 17.37m	Sandstone							
			Axial	51.9	41.0	5.73	2.11	2.15	1
S62064	BH3 18.33 - 18.40m	Sandstone							
			Axial	52.3	44.0	4.73	1.62	1.67	1
S62065	BH3 19.36 - 19.46m	Sandstone							
			Axial	52.2	35.0	4.57	1.96	1.93	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62066-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62066	BH3 20.65 - 20.73m	Sandstone							
			Axial	52.2	40.0	4.51	1.70	1.72	1
S62067	BH3 21.78 - 21.88m	Sandstone							
			Axial	51.9	35.0	1.49	0.64	0.63	1
S62068	BH3 22.76 - 22.86m	Sandstone							
			Axial	52.0	39.0	5.22	2.02	2.04	1
S62069	BH3 24.16 - 24.27m	Sandstone							
			Axial	51.9	41.0	6.52	2.41	2.45	1
S62070	BH3 25.31 - 25.42m	Shale							
			Axial	52.0	39.0	2.16	0.84	0.84	1
S62071	BH3 26.42 - 26.52m	Sandstone							
			Axial	51.9	34.0	3.01	1.34	1.31	1
S62072	BH3 27.54 - 27.64m	Sandstone							
			Axial	51.9	35.0	2.53	1.09	1.07	1
S62073	BH3 29.00 - 29.10m	Sandstone							
			Axial	52.1	40.0	3.64	1.37	1.39	1
S62074	BH3 30.59 - 30.68m	Sandstone							
			Axial	51.8	40.0	1.79	0.68	0.69	1
S62075	BH3 31.89 - 31.99m	Sandstone							
			Axial	52.1	35.0	2.95	1.27	1.25	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62076-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62076	BH3 33.44 - 33.54m	Sandstone							
			Axial	52.1	40.0	3.25	1.22	1.24	1
S62077	BH3 34.90 - 34.99m	Sandstone							
			Axial	52.2	37.0	3.57	1.45	1.45	1
S62078	BH3 36.04 - 36.14m	Sandstone							
			Axial	52.0	40.0	2.96	1.12	1.13	1
S62079	BH3 37.42 - 37.52m	Sandstone							
			Axial	52.1	41.0	3.41	1.25	1.28	1
S62080	BH3 39.06 - 39.16m	Sandstone							
			Axial	52.1	38.0	3.76	1.49	1.49	1
S62081	BH3 40.40 - 40.49m	Sandstone							
			Axial	52.2	40.0	3.34	1.26	1.27	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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Authorised Signatory:

Chris Lloyd

29/07/2020

Date

MACQUARIE GEOTECH

Macquarie Geotech
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62181-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62181	BH4M 5.86 - 5.97m	Sandstone							
			Axial	51.7	42.0	3.67	1.33	1.36	1
S62182	BH4M 6.83 - 6.93m	Sandstone							
			Axial	51.8	40.0	2.50	0.95	0.96	1
S62183	BH4M 7.34 - 7.46m	Sandstone							
			Axial	52.2	41.0	3.68	1.35	1.38	1
S62184	BH4M 8.70 - 8.80m	Sandstone							
			Axial	52.0	43.0	4.36	1.53	1.58	1
S62185	BH4M 9.51 - 9.61m	Sandstone							
			Axial	52.1	42.0	3.57	1.28	1.31	1
S62186	BH4M 10.89 - 10.99m	Sandstone							
			Axial	52.2	45.0	4.34	1.45	1.51	1
S62187	BH4M 12.07 - 12.17m	Sandstone							
			Axial	51.8	37.0	3.35	1.37	1.37	1
S62188	BH4M 13.61 - 13.71m	Sandstone							
			Axial	51.9	32.0	7.57	3.58	3.45	1
S62189	BH4M 14.40 - 14.50m	Sandstone							
			Axial	51.7	41.0	6.73	2.49	2.54	1
S62190	BH4M 15.03 - 15.13m	Sandstone							
			Axial	51.8	32.0	5.23	2.48	2.39	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62191-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62191	BH4M 16.40 - 16.50m	Sandstone							
			Axial	52.1	40.0	3.79	1.43	1.45	1
S62192	BH4M 17.82 - 17.92m	Sandstone							
			Axial	52.1	41.0	4.85	1.78	1.82	1
S62193	BH4M 19.04 - 19.14m	Sandstone							
			Axial	52.2	35.0	5.05	2.17	2.14	1
S62194	BH4M 20.50 - 20.60m	Sandstone							
			Axial	51.9	45.0	5.26	1.77	1.84	1
S62195	BH4M 21.88 - 21.98m	Sandstone							
			Axial	51.8	43.0	4.07	1.43	1.48	1
S62196	BH4M 23.05 - 23.15m	Sandstone							
			Axial	51.7	40.0	3.24	1.23	1.24	1
S62197	BH4M 24.87 - 24.97m	Sandstone							
			Axial	52.0	38.0	5.00	1.99	1.99	1
S62198	BH4M 26.15 - 26.25m	Sandstone							
			Axial	51.8	41.0	3.80	1.40	1.43	1
S62199	BH4M 27.61 - 27.71m	Sandstone							
			Axial	51.7	35.0	3.09	1.34	1.32	1
S62200	BH4M 28.72 - 28.82m	Sandstone							
			Axial	51.6	36.0	3.78	1.60	1.58	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62201-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62201	BH4M 29.90 - 29.99m	Shale							
			Axial	51.9	33.0	2.04	0.94	0.91	1
S62202	BH4M 31.02 - 31.12m	Sandstone							
			Axial	52.0	35.0	7.09	3.06	3.01	1
S62203	BH4M 32.34 - 32.43m	Sandstone							
			Axial	52.2	40.0	3.55	1.34	1.35	1
S62204	BH4M 33.56 - 33.66m	Sandstone							
			Axial	51.8	40.0	5.11	1.94	1.96	1
S62205	BH4M 34.83 - 34.93m	Sandstone							
			Axial	51.7	42.0	3.67	1.33	1.36	1
S62206	BH4M 36.11 - 36.21m	Sandstone							
			Axial	51.8	44.0	6.20	2.14	2.21	1
S62207	BH4M 37.52 - 37.62m	Sandstone							
			Axial	52.0	37.0	4.48	1.83	1.82	1
S62208	BH4M 38.80 - 38.90m	Sandstone							
			Axial	52.0	39.0	3.05	1.18	1.19	1
S62209	BH4M 40.02 - 40.12m	Sandstone							
			Axial	52.1	40.0	4.50	1.70	1.72	1
S62210	BH4M 41.80 - 41.90m	Sandstone							
			Axial	51.8	40.0	4.54	1.72	1.74	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62211-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62211	BH4M 43.73 - 43.83m	Sandstone							
			Axial	51.9	40.0	4.26	1.61	1.63	1
S62212	BH4M 44.20 - 44.30m	Sandstone							
			Axial	52.1	45.0	5.03	1.69	1.75	1
S62213	BH4M 45.29 - 45.39m	Sandstone							
			Axial	52.0	41.0	1.06	0.39	0.40	1
S62457	BH4M 46.13 - 46.23m	Sandstone							
			Axial	52.0	45.0	4.13	1.39	1.44	1
S62214	BH5M 2.62 - 2.73m	Sandstone							
			Axial	51.9	39.0	3.60	1.40	1.41	1
S62215	BH5M 4.12 - 4.22m	Sandstone							
			Axial	51.9	33.0	3.89	1.78	1.73	1
S62216	BH5M 5.56 - 5.68m	Sandstone							
			Axial	52.0	45.0	3.99	1.34	1.39	1
S62217	BH5M 6.86 - 6.94m	Sandstone							
			Axial	52.0	38.0	2.31	0.92	0.92	1
S62218	BH5M 8.18 - 8.28m	Sandstone							
			Axial	52.0	46.0	3.77	1.24	1.29	1
S62219	BH5M 9.50 - 9.61m	Sandstone							
			Axial	51.9	30.0	4.72	2.38	2.26	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62220-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62220	BH5M 10.89 - 10.99m	Sandstone							
			Axial	51.8	39.0	3.81	1.48	1.49	1
S62221	BH5M 11.76 - 11.86m	Sandstone							
			Axial	52.1	42.0	4.04	1.45	1.49	1
S62222	BH5M 13.62 - 13.72m	Sandstone							
			Axial	52.0	45.0	4.58	1.54	1.60	1
S62223	BH5M 14.87 - 14.97m	Sandstone							
			Axial	52.3	48.0	4.01	1.25	1.33	1
S62224	BH5M 16.20 - 16.30m	Sandstone							
			Axial	52.3	41.0	5.93	2.17	2.21	1
S62225	BH5M 17.49 - 17.59m	Sandstone							
			Axial	52.0	41.0	5.97	2.20	2.24	1
S62226	BH5M 18.87 - 18.97m	Sandstone							
			Axial	52.2	40.0	6.01	2.26	2.29	1
S62227	BH5M 20.08 - 20.18m	Sandstone							
			Axial	52.5	35.0	4.09	1.75	1.72	1
S62228	BH5M 21.63 - 21.73m	Sandstone							
			Axial	52.2	42.0	3.98	1.43	1.46	1
S62229	BH5M 22.83 - 22.92m	Sandstone							
			Axial	52.0	44.0	3.95	1.36	1.40	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62230-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62230	BH5M 24.28 - 24.37m	Sandstone							
			Axial	51.8	40.0	6.24	2.37	2.39	1
S62231	BH5M 25.63 - 25.73m	Sandstone							
			Axial	51.9	44.0	5.12	1.76	1.82	1
S62232	BH5M 26.50 - 26.61m	Sandstone							
			Axial	52.2	44.0	5.72	1.96	2.03	1
S62233	BH5M 27.84 - 27.92m	Sandstone							
			Axial	51.8	44.0	3.52	1.21	1.25	1
S62234	BH5M 29.60 - 29.69m	Sandstone							
			Axial	51.9	44.0	3.50	1.20	1.25	1
S62235	BH5M 31.52 - 31.62m	Sandstone							
			Axial	51.9	45.0	3.96	1.33	1.38	1
S62236	BH5M 32.74 - 32.83m	Sandstone							
			Axial	52.3	40.0	3.87	1.45	1.47	1
S62237	BH5M 34.11 - 34.20m	Sandstone							
			Axial	52.6	37.0	3.73	1.50	1.50	1
S62238	BH5M 35.40 - 35.50m	Sandstone							
			Axial	52.1	42.0	3.78	1.36	1.39	1
S62239	BH5M 36.73 - 36.84m	Sandstone							
			Axial	51.8	43.0	3.55	1.25	1.29	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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29/07/2020

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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62240-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62240	BH5M 38.00 - 38.10m	Sandstone	Axial	51.8	40.0	3.17	1.20	1.22	1
S62241	BH5M 39.45 - 39.55m	Sandstone	Axial	52.3	37.0	4.81	1.95	1.95	1
S62242	BH5M 40.80 - 40.90m	Sandstone	Axial	52.0	39.0	4.85	1.88	1.89	1
S62243	BH5M 41.45 - 41.58m	Sandstone	Axial	52.1	40.0	4.65	1.75	1.78	1
S62244	BH5M 42.51 - 42.61m	Sandstone	Axial	51.9	44.0	3.36	1.16	1.20	1
S62245	BH5M 43.64 - 43.73m	Sandstone	Axial	52.1	38.0	5.40	2.14	2.15	1
S62246	BH5M 44.57 - 44.67m	Sandstone	Axial	51.9	41.0	3.92	1.45	1.47	1
S62247	BH6 1.50 - 1.62m	Sandstone	Axial	52.0	35.0	2.05	0.88	0.87	1
S62248	BH6 2.48 - 2.57m	Sandstone	Axial	52.0	42.0	3.14	1.13	1.16	1
S62249	BH6 3.63 - 3.71m	Sandstone	Axial	52.3	40.0	2.37	0.89	0.90	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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POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62250-PL
Job No:	S20323-1	**Date Tested:**	23/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62250	BH6 4.78 - 4.88m	Sandstone							
			Axial	52.3	43.0	2.31	0.81	0.83	1
S62251	BH6 6.00 - 6.10m	Sandstone							
			Axial	51.9	45.0	3.56	1.20	1.24	1
S62252	BH6 7.40 - 7.50m	Sandstone							
			Axial	51.9	42.0	3.34	1.20	1.23	1
S62253	BH6 8.84 - 8.94m	Sandstone							
			Axial	52.1	39.0	4.06	1.57	1.58	1
S62254	BH6 10.20 - 10.30m	Sandstone							
			Axial	52.0	38.0	5.53	2.20	2.20	1
S62255	BH6 11.38 - 11.47m	Sandstone							
			Axial	52.0	40.0	3.18	1.20	1.22	1
S62256	BH6 12.55 - 12.65m	Sandstone							
			Axial	52.2	40.0	5.01	1.89	1.91	1
S62257	BH6 13.80 - 13.90m	Sandstone							
			Axial	52.1	41.0	4.36	1.60	1.63	1
S62258	BH6 15.12 - 15.20m	Sandstone							
			Axial	52.0	35.0	2.81	1.21	1.19	1
S62259	BH6 16.53 - 16.62m	Sandstone							
			Axial	52.1	41.0	4.56	1.68	1.71	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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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62260-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62260	BH6 17.78 - 17.87m	Sandstone							
			Axial	51.8	44.0	5.93	2.04	2.11	1
S62261	BH6 19.08 - 19.15m	Sandstone							
			Axial	52.1	45.0	5.50	1.84	1.92	1
S62262	BH6 20.60 - 20.70m	Sandstone							
			Axial	52.0	46.0	5.14	1.69	1.76	1
S62263	BH6 21.86 - 21.95m	Sandstone							
			Axial	51.9	41.0	6.80	2.51	2.56	1
S62264	BH6 23.18 - 23.28m	Sandstone							
			Axial	51.9	44.0	4.28	1.47	1.52	1
S62265	BH6 24.48 - 24.60m	Sandstone							
			Axial	52.4	45.0	6.79	2.26	2.36	1
S62266	BH6 25.71 - 25.81m	Sandstone							
			Axial	52.6	42.0	5.67	2.02	2.07	1
S62267	BH6 27.10 - 27.22m	Shale							
			Axial	51.9	38.0	2.78	1.11	1.11	1
S62268	BH6 28.62 - 28.71m	Sandstone							
			Axial	52.0	36.0	4.96	2.08	2.06	1
S62269	BH6 29.84 - 29.93m	Sandstone							
			Axial	51.8	45.0	4.46	1.50	1.56	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

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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

29/07/2020

Date

MACQUARIE GEOTECH

Macquarie Geotech
U7/8 10 Bradford Street
Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	EI Australia	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	2 Mandala Parade Castle Hill (E24724)	**Report No:**	S62270-PL
Job No:	S20323-1	**Date Tested:**	27/07/2020

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

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 21/07/2020

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
S62270	BH6 30.40 - 30.51m	Sandstone							
			Axial	52.4	43.0	3.59	1.25	1.29	1
S62271	BH6 31.40 - 31.52m	Sandstone							
			Axial	52.0	45.0	5.05	1.69	1.76	1
S62272	BH6 32.40 - 32.51m	Sandstone							
			Axial	52.2	40.0	1.56	0.59	0.60	1
S62273	BH6 33.40 - 33.52m	Sandstone							
			Axial	52.2	44.0	3.62	1.24	1.28	1
S62274	BH6 34.40 - 34.52m	Sandstone							
			Axial	52.3	41.0	4.30	1.57	1.61	1
S62275	BH6 35.43 - 35.53m	Sandstone							
			Axial	52.3	40.0	3.48	1.31	1.33	1
S62276	BH6 36.42 - 36.52m	Sandstone							
			Axial	52.1	44.0	4.19	1.43	1.49	1
S62277	BH6 37.47 - 37.58m	Sandstone							
			Axial	52.5	34.0	2.81	1.24	1.21	1
S62278	BH6 38.44 - 38.54m	Sandstone							
			Axial	52.0	41.0	4.28	1.58	1.61	1
S62279	BH6 39.58 - 39.67m	Sandstone							
			Axial	52.1	35.0	3.80	1.64	1.61	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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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.