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DEICORP PROJECTS (TALLAWONG STATION) PTY LTD

Geotechnical Investigation

Tallawong Station Precinct South, Rouse Hill, NSW

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Revision	Details	Date	Amended By
Rev1	Updated Architectural Drawings	15 April 2020	IW
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1. Introduction

1.1 Background

At the request of Mr Greg Colbran of Deicorp Projects (Tallawong Station) Pty Ltd (the Client), EI Australia (EI) has carried out a Geotechnical Investigation (GI) for the proposed development at Tallawong Station Precinct South, Rouse 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 P17631.1, dated 21 October 2019, and with the Client's signed authorisation to proceed, dated 1 November 2019.

This GI was prepared in conjunction with a Detailed Site Investigation (DSI), referenced E24445.E02, dated March 2020. This report should be read in conjunction with the DSI.

1.2 Proposed Development

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

- Request for Fee Proposal (RFP) for Geotechnical Service.
- Phase 1 Preliminary Site Investigation Report prepared by ADE Consulting Group, Report No. STC-1023-13390/PSI1/v3f, dated 7 March 2018.
- Tallawong Station Precinct South EIS, Concept State Significant Development Application (SSD 18_9063) prepared by MG Planning Pty Ltd, dated 29 June 2018.
- Stamped Urban Design Report, Application No. SSD 9063 prepared by Bennett and Trimble, Sheets 1 to 30, dated 30 October 2018.
- Architectural Drawings by TURNER, Project No.: 18095, Drawing Nos.: DA-110-06, DA-110-010, DA-110-008, DA-110-010 and DA-110-020, Revision V, dated 8 April 2020 and Drawing Nos DA-110-030, DA-110-040, DA-110-050, DA-110-060, DA-110-070, DA-110-080, DA-110-090 and DA-110-100, Revision J, dated 8 April 2020.
- Site Survey Plan, prepared by Daw & Walton Consulting Surveyors, Project No: 4900-20, Sheets 1-7, Revision 03, dated 3 April 2020. The datum in the survey plan is in Australian Height Datum (AHD), hence all Reduced Levels (RL) mentioned in this report are henceforth in AHD.

Based on the provided documents, EI understands that the proposed mixed use development involves the construction of up to 16 buildings of varying heights, to a maximum of eight storeys, with up to two to three basement levels and interconnected roadways and landscaped areas including a private park. Four separate basements are shared by the buildings.

The lowest basement levels are proposed to have finished floor levels (FFL) ranging between RL 44.500m and 49.500m. Bulk Excavation Levels (BEL) ranging between RL 44.20m and 49.20m have been assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths ranging from 5.10m Below Existing Ground Level (BEGL) to 13.3m (BEGL) have been estimated. Locally deeper excavations may be required for footings, lift overrun pits, crane pads, and service trenches.

1.3 Objectives

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

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

1.4 Scope of Works

The scope of works for the GI included:

- Preparation of a Work Health and Safety Plan;
- Review of relevant geological maps for the project area;
- Site walkover inspection by a Geotechnical Engineer to assess topographical features and site conditions;
- Scanning of proposed borehole locations for buried conductive services using a licensed service locator with reference to Dial Before You Dig (DBYD) plans;
- Auger drilling of thirteen boreholes (BH1M, BH2M, BH3M, BH4, BH5, BH6, BH7M, BH8M, BH9, BH10, BH11M, BH12, and BH13M) by a track-mounted drill rig using solid-stem, continuous flight augers equipped with 'Tungsten-Carbide' (T-C) bit. BH1M, BH2M, BH3M, BH4, BH5, BH6, BH7M, BH8M, BH9, BH10, BH11M, BH12, and BH13M were auger drilled to depths between 3.50m and 6.40m BEGL (or about RL46.20m to RL54.00m).
  - Standard Penetration Testing (SPT) was carried out (as per AS 1289.6.3.1-2004), where possible, during auger drilling of the boreholes to assess soil strength/relative densities.
  - Measurements of groundwater seepage/levels, where possible, in the augered sections of the boreholes during and shortly after completion of auger drilling;
  - The strength of the bedrock in the augered sections of the boreholes was assessed by observation of the auger penetration resistance using a T-C drill bit and examination of the recovered rock cuttings. It should be noted that rock strengths assessed from augered boreholes are approximate and strength variances can be expected.
  - The approximate surface levels shown on the borehole logs were interpolated from spot levels shown on the supplied survey plan. Approximate borehole locations are shown on **Figure 2**;

- Continuation of BH1M, BH2M, BH3M, BH4, BH5, BH6, BH7M, BH8M, BH9, BH10, BH11M, BH12, and BH13M using NMLC diamond coring techniques to termination depths of between 19.61m and 20.92m BEGL, (RL 37.99m to RL 30.89m). The rock core photographs are presented in **Appendix A**;
- Borehole BH1M, BH2M, BH3M, BH7M, BH8M, BH11M and BH13M were converted into groundwater monitoring wells with depths between 7.0m and 11.6m BEGL, (RL 51.40m to RL 42.50m) to allow for long-term groundwater monitoring;
- Boreholes BH4, BH5, BH6, BH9, BH10, and BH12 were backfilled with drilling spoil upon completion;
- Excavation of four test pits (TP14, TP15, TP16 and TP17) using a 3.5 tonne excavator with a 300mm wide toothed bucket. TP14, TP15, TP16 and TP17 were excavated to depths between 1.00m BEGL and 2.20m BEGL;
- Soil and rock samples were sent to Macquarie Geotechnical Pty Ltd (Macquarie) and SGS Australia (SGS), which are National Australian Testing Authority (NATA) accredited laboratories, for testing and storage.
- Preparation of this GI report.

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

1.5 Constraints

The GI was limited by the intent of the investigation. The discussions and advice presented in this report are preliminary and intended to assist in the preparation of initial designs for the proposed development. Further geotechnical inspections should be carried out during construction to confirm the geotechnical and groundwater models, and the preliminary design parameters provided in this report.

2. Site Description

2.1 Site Description and Identification

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

Table 2-1 Summary of Site Information

Information	Detail
Street Address	Site 1: 2 - 12 Conferta Ave, Rouse Hill Site 2: 1 - 15 Conferta Ave, Rouse Hill
Lot and Deposited Plan (DP) Identification	Lot 293 & Lot 294 in DP 1213279
Brief Site Description	At the time of our investigation, the site consisted of two vacant blocks. The block to the north was bounded by Themeda Avenue, Cudgegong Road and Conferta Avenue, and consisted of a grassed block with some unpaved roads. The southern block was bounded by Conferta Ave, Cudgegong Road and Schofields Road, and consisted of a grassed block, with some unpaved roads. In the central portion of the block was an earth embankment dam, which appeared in fair condition based on a cursory inspection.
Site Area	The site area is approximately 70,424m^2 (based on the stamped Urban Design Report referenced above).

Plate 1: Aerial photograph of the site (source: Google maps, accessed 17/2/20)

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 Themeda Avenue shall be adopted as the northern site boundary.

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description
North	Themeda Avenue, a two lane, asphalt paved road. Beyond this is Tallawong Metro Station, an asset of Transport for NSW (TfNSW), with tracks running in a WSW-ENE orientation. The levels of the tracks are approximately 7.0m below the site levels at the northern site boundary. The TfNSW easement is approximately 25m from the northern site boundary.
East	Cudgegong road, a three and four lane, asphalt paved road. Beyond this is an Endeavour Energy Sub Station in the central portion of the block, surrounded by grassed areas with some medium to large trees. This property is slightly lower in relation to the site, with no basement levels observed.
South	Schofields Road, a five lane, asphalt paved road with a median strip. Beyond this are one to two storey Brick rendered residential houses at a lower elevation in relation to the site with no basement levels observed.
West	Tallawong Station Car Park, an asphalt paved car parking area. The car park appeared to be in a good condition with no cracking observed.

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 the Schofields road within gently, south easterly dipping topography.
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 to be underlain by Bringelly Shale (Rwb), shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

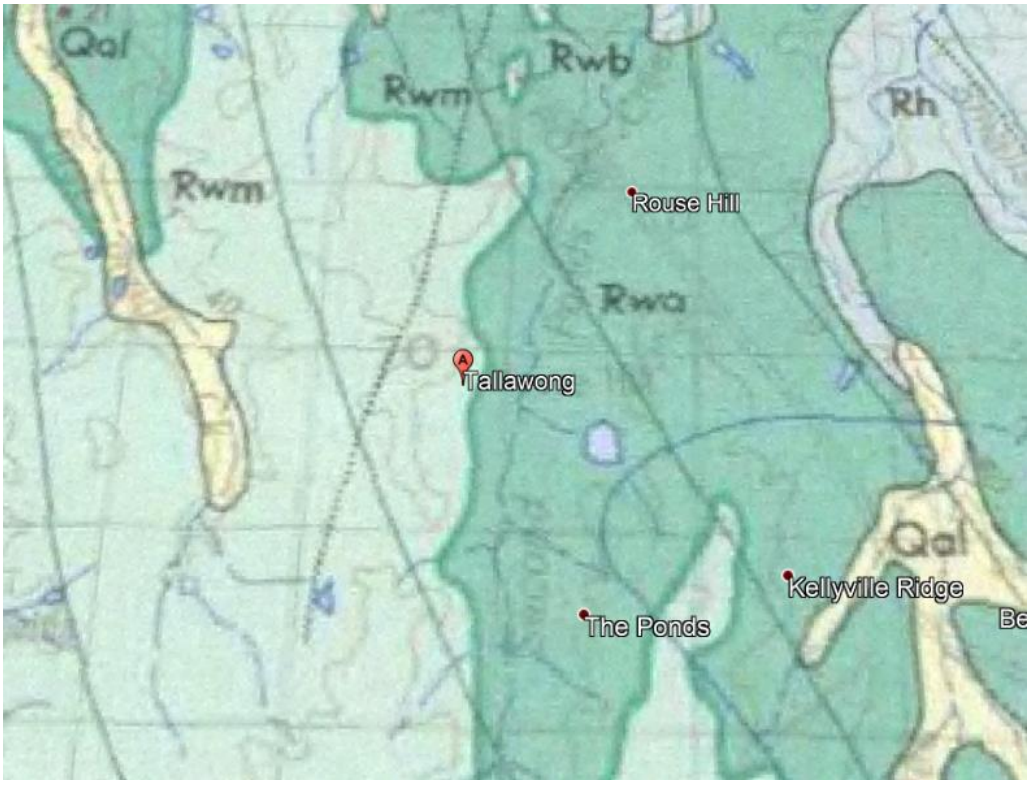


Plate 2: Excerpt of geological map showing location of site.

3. Investigation Results

3.1 Stratigraphy

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

Table 3-1 Summary of Subsurface Conditions

Unit	Material[2]	Depth to Top of Unit (m BEGL)[1]	RL of Top of Unit (m AHD)[1]	Observed Thickness (m)	Comments
1	**Fill**	Surface	50.50 to 59.50	0.80 to 4.50	Gravelly clay and silty clay fill, low to medium plasticity, brown with fine grained sand and some fine to medium ironstone, blue metal and shale gravel;
2	**Residual Soil**	0.80 to 4.50	48.00 to 56.70	0.90 to 3.20	Medium to high plasticity, firm to hard silty clay with some ironstone gravels, grading into weathered shale with depth. SPT values ranged from 5 to refusal indicated by hammer bounce;
3	**Class V/IV Shale**	2.60 to 5.90	47.10 to 57.30	1.20 to 4.48	Extremely weathered to distinctly weathered, very low to low strength shale grading into low to medium strength with depth. Defects were generally very closely spaced with frequent weathered seams.
4	**Class III/II Shale/ Laminite**	4.60 to 10.38	45.90 to 52.10	- [3]	Distinctly weathered to fresh, medium to high strength shale and laminite consisting of dark grey shale, interbedded with fine grained pale grey sandstone laminations. Defects were generally closely to moderately spaced, with some sub-vertical jointing.

Note 1 Approximate depth and level at the time of our investigation. 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.

Table 3-2 RL of Class V/IV and Class III/II Shale and Laminite

Borehole ID	RL of top of Unit	
	Unit 3 – Class V/IV Shale	Unit 4 – Class III/II Shale/Laminite
BH1M	55.50	52.10
BH2M	53.00	49.80
BH3M	51.10	46.62
BH4	50.50	49.10
BH5	52.00	49.80
BH6	49.30	47.50
BH7M	49.40	47.20
BH8M	50.00	47.20
BH9	53.40	49.00
BH10	53.50	49.60
BH11M	52.00	48.10
BH13M	53.90	50.10

3.2 Groundwater Observations

Groundwater seepage was observed during auger drilling of BH2M, BH3M, BH4, BH7M and BH8M between depths of 1.80m and 4.60m, (RL 48.70 to 53.30), and was not encountered in the other boreholes during drilling. Following their completion, groundwater monitoring wells were installed in BH1M, BH2M, BH3M, BH7M, BH8M, BH11M and BH13M and bailed dry. The groundwater levels were then measured within the monitoring wells as per **Table 3-2** below:

Table 3-3 Groundwater Levels

Borehole ID	Date Measured	Groundwater Level After Well Development	
		mBEGL	RL (m AHD)
BH1M	26 February 2020	6.80	51.70
BH2M	26 February 2020	6.58	50.92
BH3M	26 February 2020	8.60	48.40
BH7M	21 February 2020	1.44	49.06
BH8M	21 February 2020	2.88	49.62
BH11M	21 February 2020	4.51	52.99
BH13M	21 February 2020	1.80	54.70

3.3 Test Results

Eight soil and three bulk samples were selected for laboratory testing to assess the following:

- Atterberg Limits and Linear Shrinkage
- Soil aggressivity (pH, Chloride and Sulfate content and electrical conductivity).
- California Bearing Ratio (CBR); equipment
- Dry Density/Optimum Moisture Content.

A summary of the soil test results is provided in **Table 3-3, Table 3-4** and **Table 3-5** below. Laboratory test certificates are presented in **Appendix B**.

Table 3-2 Summary of Soil Aggressivity Laboratory Test Results

Test/ Sample ID		BH5_3.00-3.45	BH6_1.50-1.90	BH11M_1.50-1.95	BH12_3.00-3.45
Unit		2	2	1	2
Material Description [1]		Silty CLAY	Silty Clay	FILL	Silty Clay
Aggressivity	Chloride Cl (ppm)	380	310	140	530
	Sulfate SO_4 (ppm)	110	210	200	150
	pH	5.5	5.1	8.5	5.5
	Electrical Conductivity (µS/cm)	340	350	340	460
	Moisture Content (%)	15.3	16.0	11.4	11.5

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

Table 3-4 Summary of Soil Atterberg Limit Laboratory Test Results

Test/ Sample ID		BH3M_4.50-4.95	BH7M_3.00-3.45	BH10_1.50-1.95	BH13M_1.50-1.95
Unit		2	2	2	2
Material Description [1]		Silty CLAY	Silty Clay	Silty Clay	Silty Clay
	Moisture Content (%)	20.2	23.3	13.9	17.3
Attergerg Limits	Liquid Limit (%)	62	45	39	41
	Plastic Limit (%)	27	18	18	17
	Plasticity Index (%)	35	27	21	24
	Linear Shrinkage (%)	12.0	11.0	10.0	8.0

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

The Atterberg Limits result on the selected clay sample indicated clays to be of medium to high plasticity and of moderate shrink-swell potential.

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

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

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

Table 3-5 Summary of CBR Test Results

Test/ Sample ID	TP14_1.8-1.9	TP15_1.1-1.2	TP16_1.9-2.0
Depth (m BEGL)	1.80-1.90	1.10-1.20	1.90-2.00
Unit	1	1	2
Material Description [1]	Gravelly clay FILL	Gravelly clay FILL	Silty Clay
CBR (4-day Soaked) (%)	14.0%	17.0%	4.5%
Maximum Dry Density (t/m^3)	2.13	1.97	1.79
Optimum Moisture Content (%)	8.8	11.4	16.0

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

Bulk samples of the Unit 2 material from TP14, TP15 and TP16 were tested for compaction and four day soaked CBR, resulted in values of 4.5% to 17% when compaction to 100% of Standard Maximum Dry Density (SMDD) and surcharged with 9kg.

200 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 <1 MPa to 106 MPa.

4. Recommendations

4.1 Geotechnical Issues

Based on the results of the investigation, 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 infrastructure;
- Rock excavation;
- Groundwater within the depth of the excavation;
- 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.

Based on the provided drawings, the proposed development will include up to three level basements, requiring an excavation depth of between 5.10m BEGL and 13.30m BEGL. Locally deeper excavations for footings, service trenches, crane pads and lifts overrun pits may be required.

Based on the borehole logs, the proposed basement excavations may therefore extend through all units as outlined in **Table 3-1** above. Depending on the proposed footprints of the proposed developments within the site, if there is sufficient space available around the proposed excavation perimeters, temporary batters as outlined in **section 4.6.1** may be suitable for this site. If there is insufficient space for batters, then 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 shale and laminte, 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 (if required), 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 monitoring wells BH1M, BH2M, BH3M, BH7M, BH8M, BH11M and BH13M as detailed in **Table 3-3**, all of which are above the assumed BEL of 15.00m BEGL.

Due to the expected low permeability of the soil and 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 shale and laminite 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.

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.

Temporary Batters

Depending on the location of the proposed development within the site, temporary batters of no steeper than a safe angle of 1 (Vertical) to 1 (Horizontal) may be feasible where space allows for clayey fill, residual clays, and weathered bedrock. The above temporary batters should remain stable provided that all surcharge loads, including construction loads, are kept at a distance of at least 2h (where 'h' is the height of the batter in metres) from the crest of the batter. If steeper batters are to be used, then these must be supported by shotcrete and soil nail system designed by a suitable structural or geotechnical engineer. The stability of these batters can be assessed using computer slope stability analysis software such as Slope/W. we can complete such analysis, if commissioned to do so.

Where batters are used, the space between the batters and the permanent retaining walls will need to be carefully backfilled to reduce future settlement of the backfill. Only light compaction equipment should be used for compaction behind retaining walls so that excessive lateral pressures are not placed on the walls. This will require the backfill to be placed in thin layers, say 150mm loose thickness, appropriate to the compaction equipment being used. The compaction specification for the backfill will depend on whether paving or structures are to be supported on the fill. If the fill is to support paved areas it should be compacted to a density of at least 98% of Standard Maximum Dry Density (SMDD) for granular fill materials, but if it is only to support landscaped areas of lower compaction specification, say 95% of SMDD, may be appropriate, provided the risk of future settlement and maintenance can be accepted. An alternative for backfill would also be to use a uniform granular material, wrapped in a geofabric.

Retention Systems

Where space for temporary batters is not available, 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 strength shale or better (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 shale 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. Alternatively, the piles may extend to below BEL.

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 1.5m. 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 shale and laminite is expected to be about 10m, a lateral deflection at the crest of the excavation between 5mm to 20mm 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 shale bedrock. The proposed pile locations should take into account the presence of buried services. Further advice should be sought from prospective piling contractors who should be provided with a copy of this report.

4.5.2 Retaining Wall Design Parameters

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

- For progressively anchored or propped walls where minor movements can be tolerated (provided there are no buried movement sensitive services), we recommend the use of a trapezoidal earth pressure distribution of 5H kPa for soil, where H is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system, tapering to nil at top and bottom;
- For progressively anchored or propped walls which support areas which are highly sensitive to movement (such as areas where movement sensitive structures or infrastructures or buried services are located in close proximity), we recommend the use of a trapezoidal earth pressure distribution of 8H kPa for soil, where ‘H’ is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system, tapering to nil at top and bottom;
- All surcharge loading affecting the walls (including from construction equipment, construction loads, adjacent high level footings, etc.) should be adopted in the retaining wall design as an additional surcharge using an ‘at rest’ earth pressure coefficient, Ko, of 0.58;
- The retaining walls should be designed as drained and measures are to be taken to provide complete and permanent drainage behind the walls;
- For piles embedded into Unit 4 or better (below bulk excavation), 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 V/IV Shale	Unit 4 Class III/II Shale/ Laminite
RL of Top of Unit (m AHD) [2]		50.50 to 59.50	48.00 to 56.70	47.10 to 57.30	45.90 to 52.10
Bulk Unit Weight (kN/m^3)		18	20	24	24
Friction Angle, ϕ' (°)		25	25	30	-
Earth Pressure Coefficients	At rest, K_o [3]	0.58	0.58	0.50	-
	Active, K_a [3]	0.41	0.41	0.33	-
	Passive, K_p [3]	-	-	-	-
Allowable Bearing Pressure (kPa) [5]		-	-	700	3500
Allowable Shaft Adhesion (kPa) [4, 5]	in Compression	-	-	70	350
	in Uplift	-	-	35	175
Allowable Toe Resistance (kPa)		-	-	-	350
Allowable Bond Stress (kPa)		-	-	50	250
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 Design Parameters for Wallap Analysis

The following parameters as identified in **Table 4-2** below can be adopted in computational analysis such as Wallap.

Table 4-2 Geotechnical Design Parameters for Computational Analysis

Unit [1]	Unit Weight, γ (KN/m^3)	Cohesion, c' (kPa)	Friction angle, ϕ' (degrees)	Young's Modulus, E (MPa)	Poisson's Ratio, ν
1 - Fill	18	0	25	5	0.4
2 – Residual Soil	20	10	25	7	0.4
3 – Class V/IV Shale	24	50	30	50	0.3
4 – Class III/II Shale	24	150	38	300	0.25

Notes:
1 More detailed descriptions of subsurface conditions are available on the borehole logs presented in **Appendix A.**

4.7 Foundations

Generally, following bulk excavation to between RL 44.20m and RL 48.7m, we expect Unit 4 material to be exposed at BEL.

It is recommended that all footings for the building be founded within the shale bedrock of similar strength to provide uniform support and reduce the potential for differential settlements.

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

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

4.8 Basement Floor Slab

Following bulk excavations for the proposed basement, shale 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.

4.9 Existing Fill

Based on the investigation results, the site is covered by a layer of fill between 0.80m and 4.50m deep. Based on SPT tests within the fill, it appears that it has generally been variably compacted. However, the SPT tests do not give a precise determination of in-situ densities, since they are affected by friction during driving, the presence of gravel, and the changes in moisture content. Based on available information, the fill on site is not considered to be 'controlled fill'. AS2870 defines 'controlled' fill as material that has been placed and compacted in layers by compaction equipment within a defined moisture range, to a defined density requirement, and placed in accordance with AS3798.

4.10 Pavement Design

The design of new pavements will depend on subgrade preparation, subgrade drainage, the nature and composition of fill excavated or imported to the site, as well as vehicle loadings and use. Various alternative types of construction could be used for the pavements. Concrete construction would undoubtedly be the best in areas where heavy vehicles manoeuvre such as trucks turning and manoeuvring. Flexible pavements may have a lower initial cost, but maintenance will be higher. These factors should be considered when making the final choice.

Based on the laboratory test results, the sample of the residual soil collected from the proposed road alignments returned a CBR value 4.5%. We recommend that pavement design may be based on the CBR value of 4.5% for the residual clays.

Tests completed on existing fill material in TP14 and TP15 returned CBR values of 14% and 17%, respectively. Should pavements on the existing fill be desirable, further advice should be sought from EI.

We recommend that in situ density tests be completed on the proof rolled and prepared subgrade to confirm that at least 98% Standard Maximum Dry Density (SMDD) has been achieved. If the existing fill is removed and replaced with imported fill, the CBR of the imported material may be taken into account. These design values should be confirmed by inspection and Dynamic Cone Penetration (DCP) testing of the subgrade following proof rolling.

All upper (base) course should be crushed rock to RMS QA specification 3051 (2013) unbound base and compacted to at least 100% of SMDD. All lower (sub-base) course should be crushed rock to RMS QA specification 3051 (2013) unbound base or ripped/crushed sandstone with CBR greater than 40%, maximum particle size of 60mm, well graded and Plastic Index less than 10. All lower course material should be compacted to an average of no less than 100% of SMDD, but with a minimum acceptance value of 98% of SMDD.

Concrete pavements should have a sub-base layer of at least 100mm thickness of crushed rock to RMS QA specification 3051 (2013) unbound base material (or equivalent good quality and durable fine crushed rock) which is compacted to at least 100% SMDD. Concrete pavements should be designed with an effective shear transmission of all joints by way of either doweled or keyed joints.

Careful attention to subsurface and surface drainage is required in view of the effect of moisture on the clay soils. Pavement levels will need to be graded to promote rapid removal of surface water so ponding does not occur on the surface of pavements. The drainage trenches should be excavated with a uniform longitudinal fall to appropriate discharge points so as to reduce the risk of water ponding. The capacity of the stormwater collection system from the pavement should be checked and upgraded if necessary. In order to protect the pavement edge, subsoil drains should be provided along the perimeter of all proposed new external pavement areas, particularly in those areas of cut, with invert levels of at least 200mm below subgrade level.

The long-term successful performance of the pavements is dependent on the satisfactory completion of the earthworks. In order to achieve this, the quality assurance programme should not be limited to routine compaction density testing only. Other important factors associated with the earthworks includes subgrade preparation, selection of fill materials, control of moisture content and drainage, etc.

4.11 Sydney Metro

At the closest point along Themeda Avenue, the TfNSW easement is approximately 25m from the northern site boundary. In this area, excavation depth for the basements beneath the closest buildings, buildings 1A.1, 1B.2 and 1B.3 are expected to be approximately 10.80m BEGL to 13.30m BEGL. We expect that with an appropriately designed retention system, the proposed excavation within the expected subsurface conditions should have negligible impact on the Sydney Metro rail corridor.

5. Further Geotechnical Inputs

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

- Long term groundwater monitoring and seepage modelling;
- Stability assessment of temporary batters using computer 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 unsupported vertical excavations in bedrock;
- 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 Mr Greg Colbran and Deicorp Projects (Tallawong Station) Pty Ltd who is the only intended beneficiary of EI's work. The scope of the investigation carried out for the purpose of this report is limited to those agreed with Mr Greg Colbran and Deicorp Projects (Tallawong Station) 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.

AS3600:2009, *Concrete Structures,* Standards Australia

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

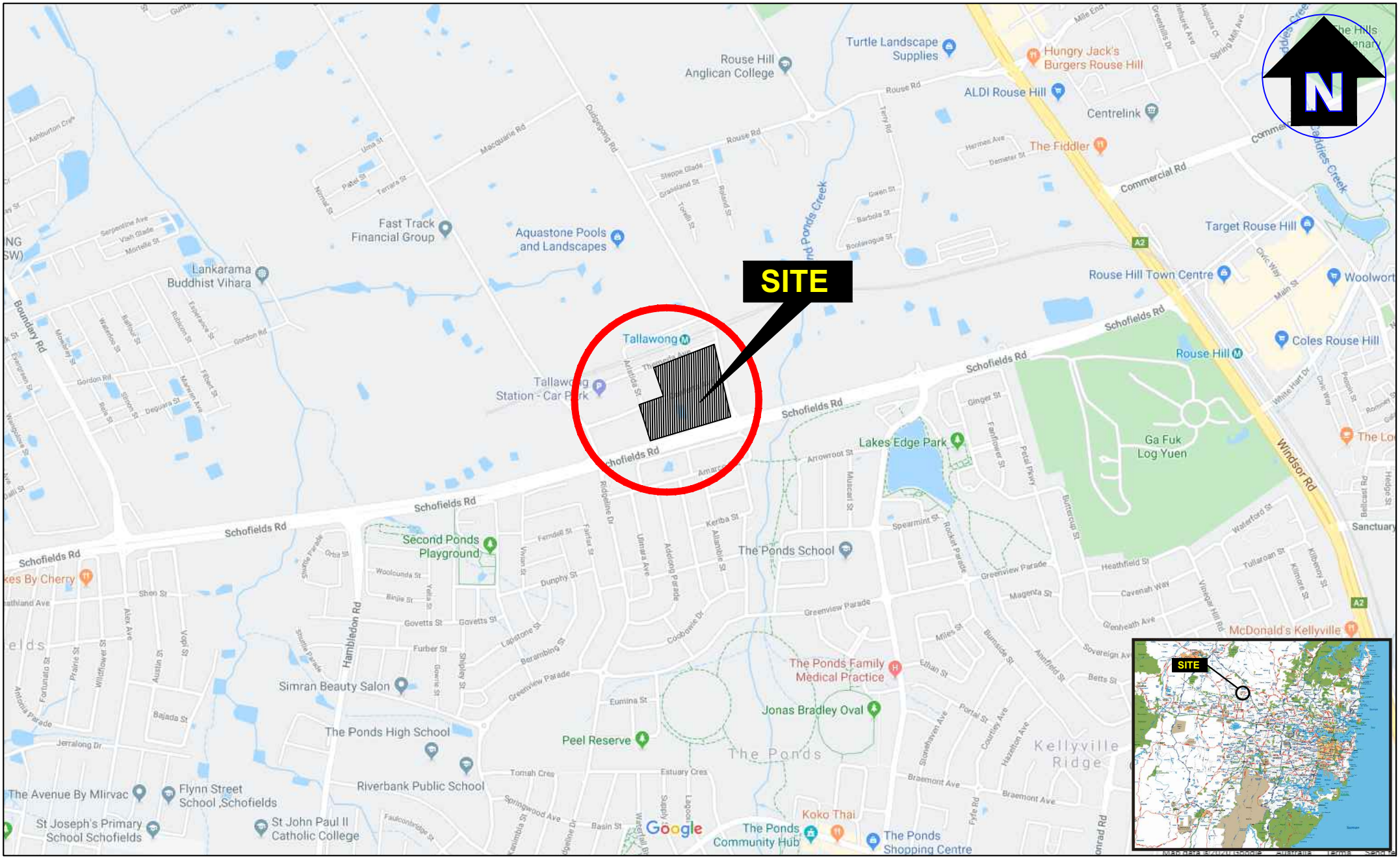
NSW Department of Finance and Service, Spatial Information Viewer, maps.six.nsw.gov.au.

NSW Department of Mineral Resources (1991) Penrith 1:100,000 Geological Series Sheet 9030. Geological Survey of New South Wales, Department of Mineral Resources.

Abbreviations

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

Figures



Drawn:	AM.H.
Approved:	S.K.
Date:	15-4-20
Scale:	Not To Scale

Deicorp Projects (Tallawong Station) Pty Ltd

Geotechnical Investigation

Tallawong Station Precinct South, Rouse Hill NSW

Site Locality Plan

Figure: 1

Project: E24445.G03_Rev1

eiaustralia
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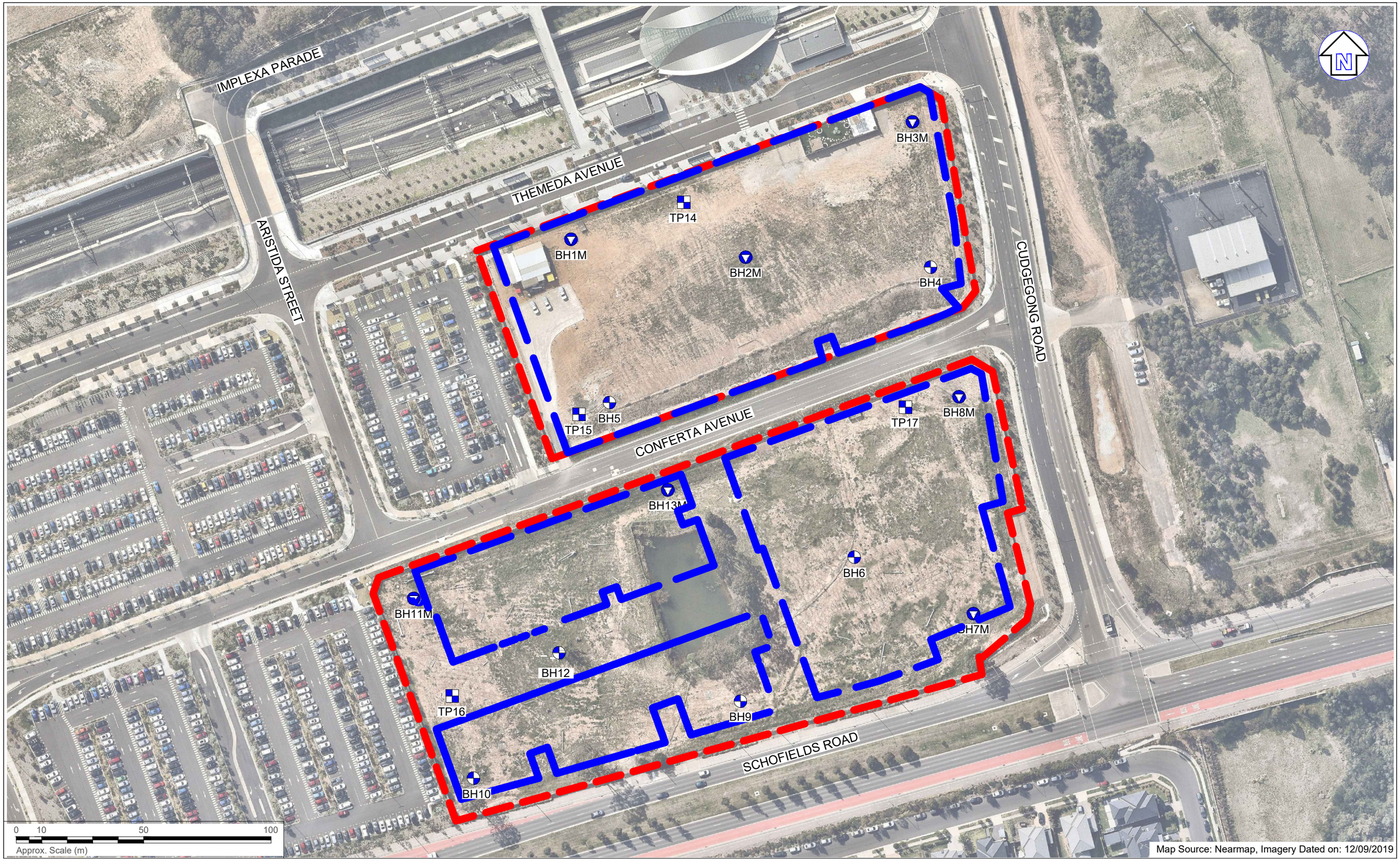

LEGEND

- Approximate site boundary
- Approximate basement boundary
- Approximate borehole location
- Approximate borehole / monitoring well location
- Approximate test pit location

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Approved:	S.K.
Date:	15-04-20

Deicorp Projects (Tallawang Station) Pty Ltd
Geotechnical Investigation
Tallawong Station Precinct South, Rouse Hill NSW

Borehole and Test Pit Location Plan

Figure: 2

Project: E24445.G03_Rev1

Appendix A – Borehole Logs And Explanatory Notes

BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	22/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈58.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	58.50	SPT 0.50-0.95 m 8,7,9 N=16			-	FILL: Gravelly CLAY; low plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.	D		FILL
			1	*1.00* 57.50					From 1.0 m, brown mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels.		-	
			2		SPT 1.50-1.95 m 12,11,13 N=24					M		
			3	***3.00*** 55.50	SPT 3.00-3.45 m 26,19/100mm N>50			-	SHALE; very low strength, pale brown-dark grey, extremely weathered.			WEATHERED ROCK
	M		4		BH1M_3.8-4.0 DS					-	-	
	H			*4.20* 54.30 ***4.50***					From 4.2 m, very low to low strength, pale brown-dark grey, distinctly weathered.			
			5						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. BH1M

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	22/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈58.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.50*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	26	5	54.00 *4.70* 53.80		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams. From 4.7 m, very thinly bedded.	DW		4.56-4.57: XWS, Clay 4.59-4.60: XWS, Clay 4.67-4.69: XWS, Clay 5.03: JT, 70°, SN, ST, SM, 10 mm 5.08: JT, 90°, SN, IR, SM, 100 mm 5.15: JT, 40°, SN, IR, SM, 10 mm 5.18: JT, 60°, SN, PR, SM, 30 mm 5.38-5.40: XWS, Clay	
				6	*6.07* 52.43 *6.38* 52.12		From 6.07 m, grading to grey, with interbedded pale grey sandstone. From 6.38 m, thinly bedded lamination.	SW		5.80-5.82: XWS, Clay 5.82: JT, 85°, IR, SM, 80 mm 5.90-5.92: XWS, Clay 6.28-6.29: XWS, Clay 6.36-6.38: CS	
		100	51	7	*7.00* 51.50		SHALE; dark grey shale, with some very thinly bedded, fine grained sandstone lamination, pale grey.				
				8				FR			
		100	90	9							
				10							

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

CORED BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	22/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈58.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	90	10				FR			
				11	*11.30* 47.20		From 11.3 m, thinly bedded.				
		100	85	12							
				13	*13.00* 45.50		From 13.0 m, medium bedded.				
		100	100	14							
				15							
				16							
				17	*17.37* 41.13		From 17.37 to 18.0 m, thinly bedded.				
		100	99	18							
				19							
				20							

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

CORED BOREHOLE LOG

BH NO. BH1M

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	22/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈58.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC		100	99	20				FR			
					20.51 37.99		Borehole Terminated at 20.51 m, Target Depth Reached.				
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

MONITORING WELL LOG

MW NO. BH1M

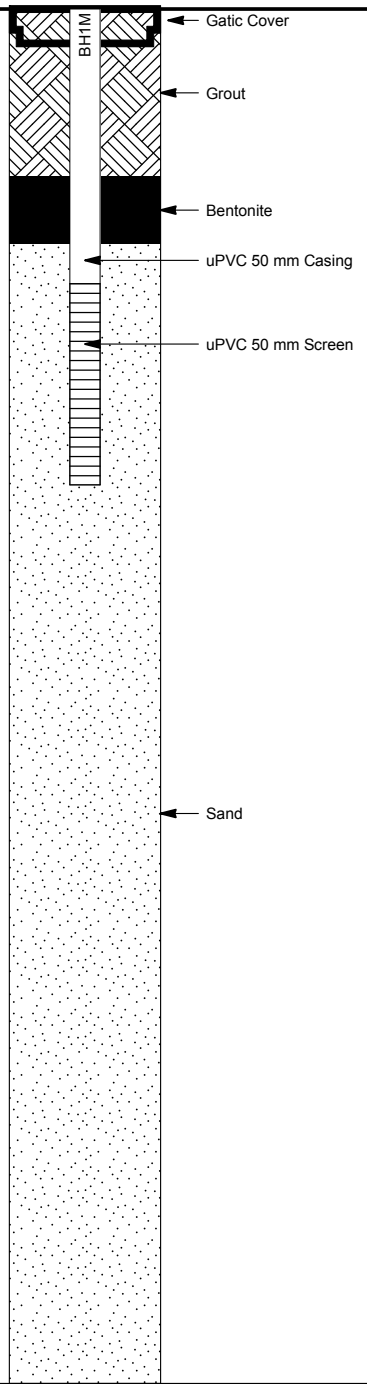
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	22/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈58.50 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	58		FILL: Gravelly CLAY; low plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.
					From 1.0 m, brown mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels.
		2	56		SHALE; very low strength, pale brown-dark grey, extremely weathered.
		4			
			54		From 4.2 m, very low to low strength, pale brown-dark grey, distinctly weathered.
NMLC	100% RETURN				LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
		6			From 4.7 m, very thinly bedded.
			52		From 6.07 m, grading to grey, with interbedded pale grey sandstone.
					From 6.38 m, thinly bedded lamination.
		8	50		SHALE; dark grey shale, with some very thinly bedded, fine grained sandstone lamination, pale grey.
		10	48		
		12			From 11.3 m, thinly bedded.
			46		
					From 13.0 m, medium bedded.
		14	44		
		16	42		
		18			From 17.37 to 18.0 m, thinly bedded.
		20	40		
			38		Borehole Terminated at 20.51 m, Target Depth Reached.
		22			
			36		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH1M	Standpipe	1.00 m 57.50 m	7.10 m 51.40 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH1M

Project	Proposed Development			**Depth Range**	4.5m to 14.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 58.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	22 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH1M

Project	Proposed Development			**Depth Range**	14.0m to 20.51m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 58.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	22 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH2M

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	23/01/20 ▽	0	57.50	BH2M_0.1-0.2 DS			-	FILL: Gravelly CLAY; low to medium plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.	D		FILL
			1		SPT 0.50-0.95 m 9,6,8 N=14 BH2M_0.8-1.0 DS							
				1.20 56.30					From 1.2 m, with ironstone gravels.			
			2		SPT 1.50-1.95 m 3,3,2 N=5							
					BH2M_2.3-2.5 DS					M (<PL)	-	
			3		SPT 3.00-3.45 m 9,8,9/50mm N>50							
			4	*4.50* 53.00						M (>PL)		
				5.00	SPT 4.50-4.95 m 16,15/70mm N>50			-	SHALE; very low strength, pale brown, distinctly weathered, with some ironstaining.	-	-	BEDROCK
			5						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. BH2M

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5	*5.00*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	3	6	52.50		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW		5.00-5.09: XWS, Clay 5.13: JT, 90°, CN, PR, RF, 10 mm 5.14-5.15: XWS, Clay 5.25-5.29: XWS, Clay 5.35-5.43: XWS, Clay 5.48: JT, 90°, CN, PR, RF, 30 mm 5.51: JT, 80°, CN, PR, SM, 20 mm 5.79-5.81: XWS, Clay 6.15-6.17: XWS, Clay 6.34-6.37: XWS, Clay 6.55: JT, 90°, CN, UN, SM, 20 mm 6.57-6.58: XWS, Clay 6.80-6.82: XWS, Clay 7.07-7.13: XWS, Clay 7.13: JT, 90°, CN, IR, SM, 80 mm 7.26: JT, 80°, CN, IR, SM, 90 mm 7.34: JT, 60°, CN, PR, SM, 40 mm 7.46-7.47: XWS, Clay 7.47: JT, 90°, CN, PR, SM, 20 mm 7.58: JT, 90°, CN, IR, SM, 70 mm 7.65-7.67: XWS, Clay 7.67-7.71: CS 7.71: JT, 90°, CN, IR, SM, 40 mm 7.95-7.97: XWS, Clay 8.53-8.57: CS 8.85: JT, 60°, CN, PR, SM, 20 mm	
				7	*7.71*						
					49.79		SHALE; dark grey, fresh, with some thinly bedded, fine grained sandstone lamination, thinly bedded.	SW			
				8	*8.00*		From 8.0 m, medium bedded.				
		100	94		49.50			FR			
				9							
				10							

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

CORED BOREHOLE LOG

BH NO. BH2M

Project	Proposed Development	**Sheet**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	94	10				FR			
				11						11.53: JT, 80°, CN, IR, SM, 10 mm	
		100	93	12							
				13						13.64: JT, 45°, CN, PR, RF, 40 mm 13.68: JT, 80°, IR, RF, 30 mm 13.74: JT, 90°, CN, PR, RF, 10 mm 13.75: JT, 90°, CN, IR, RF, 50 mm	
		100	89	14							
				15							
				16							
				17						16.88: JT, 90°, CN, PR, RF, 10 mm	
				18						17.68: JT, 75°, CN, IR, RF, 250 mm 17.93: JT, 90°, CN, IR, RF, 250 mm	
		100	81	19						18.31: JT, 75°, CN, IR, RF, 100 mm	
				20	19.98		Borehole Terminated at 19.98 m, Target Depth Reached.			19.19: JT, 90°, CN, PR, RF, 20 mm	

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

MONITORING WELL LOG

MW NO. BH2M

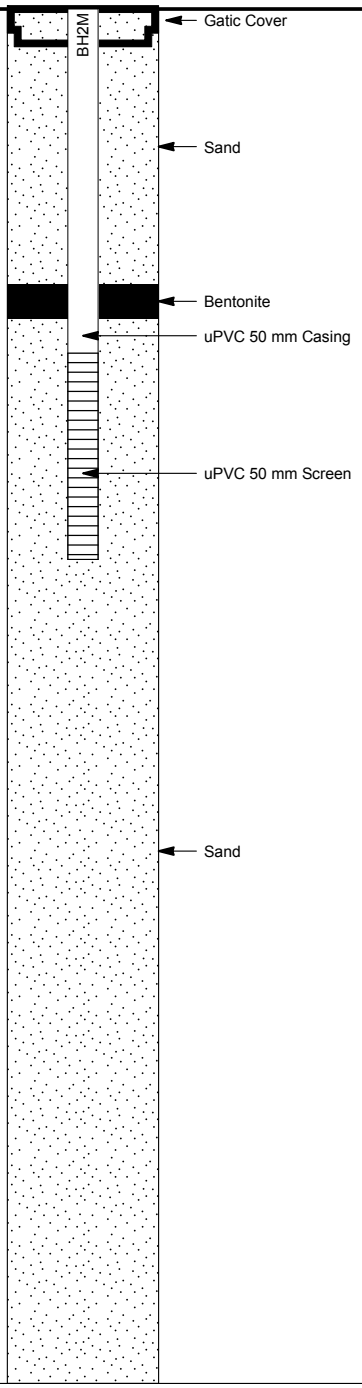
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	22/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 22/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	22/01/20	0			FILL: Gravelly CLAY; low to medium plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.
		2	56		From 1.2 m, with ironstone gravels.
		4	54		SHALE; very low strength, pale brown, distinctly weathered, with some ironstaining.
NMLC	100% RETURN	6	52		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
		8	50		SHALE; dark grey, fresh, with some thinly bedded, fine grained sandstone lamination, thinly bedded.
		10	48		From 8.0 m, medium bedded.
		12	46		
		14	44		
		16	42		
		18	40		
		20	38		Borehole Terminated at 19.98 m, Target Depth Reached.
			36		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH2M	Standpipe	0.92 m 56.58 m	8.00 m 49.50 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH2M

Project	Proposed Development			**Depth Range**	5.0m to 14.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 57.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	23 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH2M

Project	Proposed Development			**Depth Range**	14.0m to 19.98m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 57.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	23 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.00 m AHD
Drill Rig	Christie Rig	**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	-	23/01/20	0	57.00				-	FILL: Gravelly CLAY; low to medium plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.	D		FILL
				0.50								
				56.50	SPT 0.50-0.95 m 12,8,11 N=19				From 0.5 m, brown mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels.			
			1		BH3M_1.1-1.2 DS							
					SPT 1.50-1.95 m 5,9,8 N=17							
			2		BH3M_2.1-2.2 DS					M (<PL)	-	
					BH3M_2.8-3.0 DS							
			3		SPT 3.00-3.45 m 6,4,7 N=11							
					BH3M_3.5-3.7 DS							
			4		BH3M_4.3-4.5 DS							
		▽		*4.50*								
				52.50	SPT 4.50-4.95 m 11,10,19 N=29			CH	Silty CLAY; high plasticity, red-brown to grey, grading to weathered shale.	M (<PL)	-	RESIDUAL SOIL
			5									
				5.90								
			6	51.10	SPT 6.00-6.45 m 8,12,17/50mm N=32			-	SHALE; very low strength, pale grey-pale brown, distinctly weathered.	-	-	BEDROCK
				6.40								
									Continued as Cored Borehole			
			7									
			8									
			9									
			10									

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

CORED BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.00 m AHD
Drill Rig	Christie Rig	**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							
				6							
					6.40		Continuation from non-cored borehole				
NMLC	100% RETURN	100	0	7	50.60		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW XW		6.41: JT, 80°, SN, PR, RF, 10 mm 6.43-6.44: XWS, Clay 6.47-6.53: XWS, Clay 6.60-6.85: XWZ, Clay	
					7.00 50.00		From 7.0 m, very thinly bedded.	DW XW DW		6.89-7.00: XWZ, Clay 7.23-7.26: CS 7.36: JT, 80°, CN, IR, SM, 40 mm	
		100	19	8	*7.78* 49.22		SHALE; dark grey, with some thinly bedded, fine grained sandstone lamination, very thinly to thinly bedded.	FR		7.64-7.66: XWS, Clay 7.66: JT, 70°, CN, IR, SM, 20 mm 7.68-7.70: XWS, Clay	
				9				DW			
		100	44	10							

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

CORED BOREHOLE LOG

BH NO. BH3M

Project	Proposed Development	**Sheet**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.00 m AHD
Drill Rig	Christie Rig	**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	44	10				DW		9.98-10.00: CS 10.12-10.15: XWS, Clay	
								FR			
				11	*11.00* 46.00		From 11.0 m, very thinly to thinly bedded.				
		100	48	12						11.40-11.44: XWS, Clay	
										12.68: JT, 80°, CN, IR, SM, 190 mm	
				13						13.30: JT, 90°, CN, IR, SM, 20 mm	
		100	85	14							
				15							
				16							
		100	71	17						16.91: JT, 80°, CN, PR, SM, 120 mm	
				18	*18.05* 38.93		NO CORE; 20 mm thick.	-			
							SHALE; dark grey, with some thinly bedded, fine grained sandstone lamination, very thinly to thinly bedded.	FR			
		99	78	19							
				20	*20.00*		Borehole Terminated at 20.00 m, Target Depth Reached.				

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

MONITORING WELL LOG

MW NO. BH3M

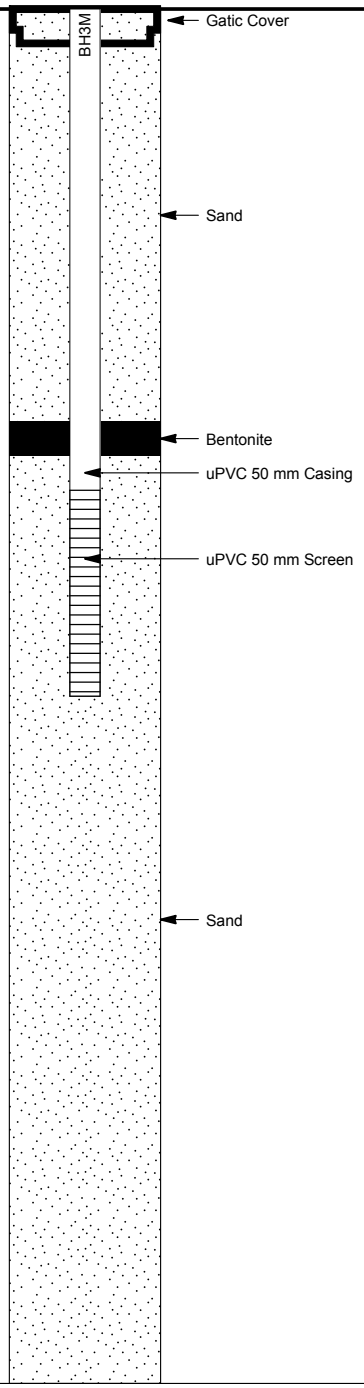
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.00 m AHD
Drill Rig	Christie Rig	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	23/01/20 ▽	0	56	FILL: Gravelly CLAY; low to medium plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.
		0.5		From 0.5 m, brown mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels.
		2	54	
		4	52	Silty CLAY; high plasticity, red-brown to grey, grading to weathered shale.
		6		SHALE; very low strength, pale grey-pale brown, distinctly weathered.
NMLC	100% RETURN		50	LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
		7.0		From 7.0 m, very thinly bedded.
		8	48	SHALE; dark grey, with some thinly bedded, fine grained sandstone lamination, very thinly to thinly bedded.
		10		
		11.0	46	From 11.0 m, very thinly to thinly bedded.
		12	44	
		14	42	
		16	40	
		18		NO CORE; 20 mm thick.
			38	SHALE; dark grey, with some thinly bedded, fine grained sandstone lamination, very thinly to thinly bedded.
		20		Borehole Terminated at 20.00 m, Target Depth Reached.
			36	
		22		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH3M	Standpipe	0.70 m 56.30 m	10.00 m 47.00 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**	6.4m to 20.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 57.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	23 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-3 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH4

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.00 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	-	23/01/20	0	55.00	BH4_0.1-0.2 DS			-	FILL: Gravelly CLAY; low to medium plasticity, brown, with fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.			FILL
					SPT 0.50-0.95 m 10,15,7 N=22							
			1	*1.00* 54.00	BH4_0.8-1.0 DS				From 1.0 m, brown mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels.	-	-	
					SPT 1.50-1.95 m 2,4,3 N=7							
			2		BH4_1.8-2.0 DS							
				2.50 52.50					From 2.5 m, becoming dark grey.			
					BH4_2.8-3.0 DS							
			3	*3.20* 51.80	SPT 3.00-3.45 m 4,6,8 N=14			CI	Silty CLAY; medium plasticity, red-brown mottled grey-orange, fine to medium, rounded to sub-rounded ironstone gravels.	M (<PL)	St	RESIDUAL SOIL
			4	*4.50* 50.50	SPT 4.50-4.95 m 26,8/30mm, N>50			-	SHALE; very low strength, pale brown-pale grey, distinctly weathered.	-	-	BEDROCK
			5	*5.50*					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. BH4

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.00 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							
					5.50		Continuation from non-cored borehole				
NMLC	100% RETURN				49.50		SHALE; pale brown, with very thinly bedded, fine grained sandstone lamination, laminated to very thinly bedded.	DW		5.67-5.77: XWS, Clay	
					6.00 49.00		From 6.0 m, dark grey, with some ironstaining and ironstone bands, very thinly to thinly bedded.	SW		5.84-5.85: XWS, Clay 5.91: JT, 70°, CN, PR, SM, 40 mm	
		100	35	6						6.55: JT, 90°, SN, PR, SM, 30 mm	
				7						6.79-6.81: XWS, Clay 7.03-7.06: XWS, Clay	
				8						8.04-8.07: XWS, Clay	
		100	72	9						9.58-9.61: XWS, Clay	
				10	*10.00*					9.91-9.95: CS, Clay	

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

CORED BOREHOLE LOG

BH NO. BH4

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	23/01/2020
Position	Refer to Figure 2	**Date Completed**	23/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.00 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	100% RETURN	100	72	10	45.00		From 10.0 m, thinly to medium bedded.	FR			
				11							
				12						11.94: JT, 60°, SN, PR, SM, 30 mm	
		100	83	13						12.76: JT, 80°, SN, IR, RF, 190 mm	
				14							
					14.70 40.30		From 14.7 m, medium bedded.			14.65: JT, 60°, CN, IR, SM, 50 mm	
				15						14.98: JT, 45°, CN, PR, SM, 40 mm	
		100	92	16							
				17							
				18							
		100	98	19						19.11: JT, 60°, CN, PR, SM, 30 mm	
				20	*20.00*		Borehole Terminated at 20.00 m, Target Depth Reached.			19.93: JT, 80°, CN, PR, SM, 70 mm	

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

CORE PHOTOGRAPH OF BOREHOLE: BH4

Project	Proposed Development			**Depth Range**	5.5m to 10.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 55.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	23 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH4

Project	Proposed Development			**Depth Range**	10.0m to 20.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 55.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	23 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	2-3 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH5

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	24/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	56.50	BH5_0.1-0.2 DS			-	FILL: Gravelly CLAY; low to medium plasticity, brown, with fine to medium grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale, and sandstone fragments.	D		FILL
				0.50								
				56.00	SPT 0.50-0.95 m 5,6,22 N=28 BH5_0.8-1.0 DS				From 0.5 m, fine to medium, angular to sub-angular ironstone gravels.	M (<PL)	-	
			1		SPT 1.50-1.95 m 7,8,10 N=18 BH5_1.8-2.0 DS							
			2	*2.80*								
				53.70				Cl	Silty CLAY; medium plasticity, red-brown to orange mottled grey, grading to weathered shale.			RESIDUAL SOIL
			3		SPT 3.00-3.45 m 2,4,11 N=15 BH5_3.1-3.2 DS					M (<PL)	VSt	
			4	*4.50*								
	H			52.00	SPT 4.50-4.95 m 4 N>50			-	SHALE; very low strength, dark grey, distinctly weathered, with ironstaining.	-	-	BEDROCK
			5	*5.50*								
									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. BH5

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	24/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.50		Continuation from non-cored borehole				
NMLC	100% RETURN	100	49	6	51.00		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	SW		5.54: JT, 80°, SN, ST, RF 5.62: JT, 60°, CN, IR, RF 5.85-5.93: XWS, Clay 6.27-6.32: XWS, Clay 6.31: JT, 60°, SN, IR, SM, 10 mm 6.67-6.70: XWS, Clay 7.10-7.13: XWS, Clay 7.27-7.29: XWS, Clay 7.55: JT, 70°, CN, IR, SM, 30 mm	
				7							
				8	*8.08*		From 8.08 m, thinly bedded.			8.02-8.08: XWS, Clay	
					48.32		SHALE; dark grey, with fine grained sandstone lamination.	FR			
		100	88	9							
				10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH5

Project	Proposed Development	**Sheet**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	24/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	88	10	46.50		From 10.0 m, thinly to medium bedded.	FR		10.82: JT, 60°, CN, IR, SM	
				11							
		100	96	12							
				13							
				14							
				15	*15.00* 41.50		From 15.0 m, medium bedded.				
		100	97	16						16.23: JT, 80°, CN, PR, SM, 30 mm	
				17							
				18							
		100	97	19							
				20	*20.00*		Borehole Terminated at 20.00 m, Target Depth Reached.				

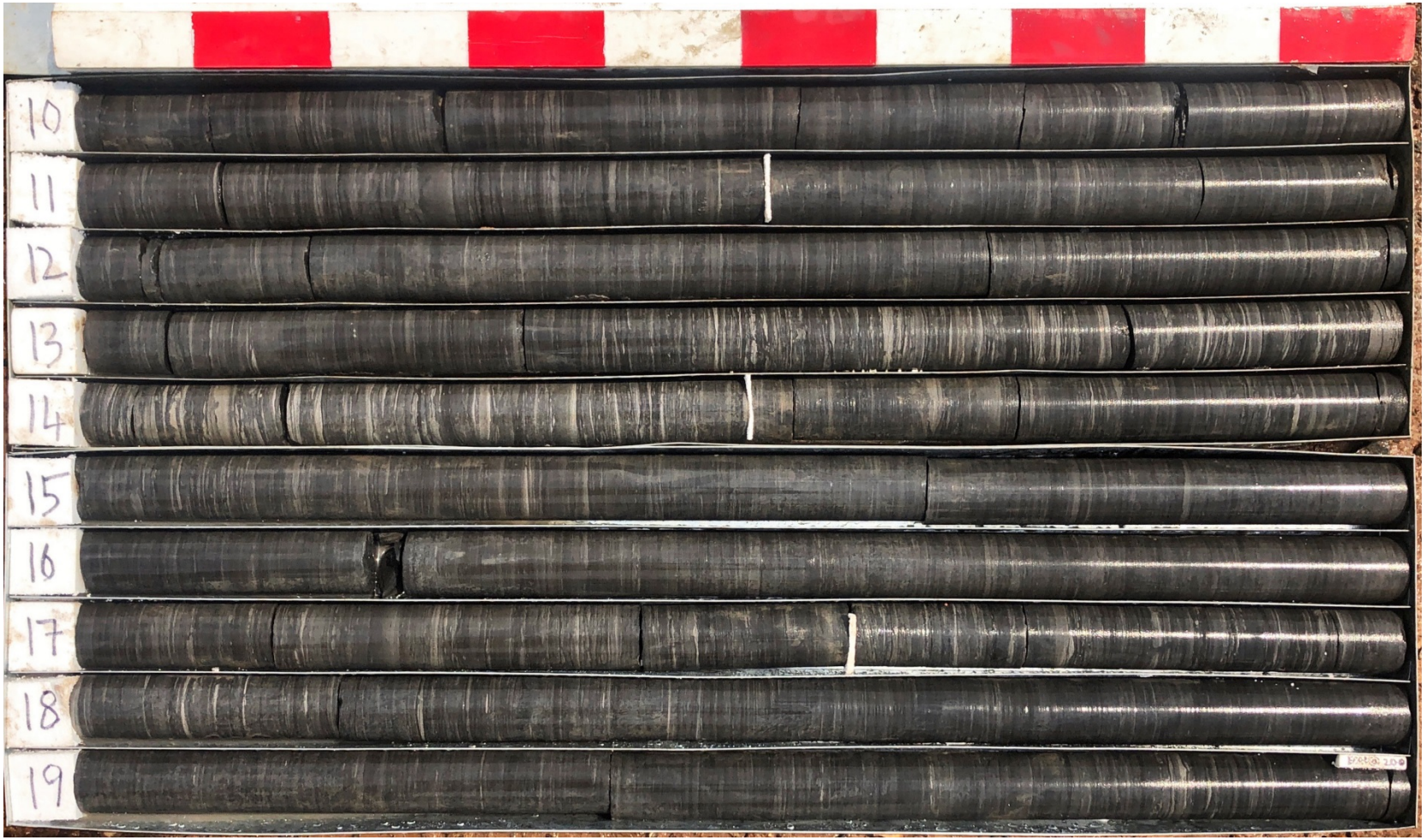
This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH5

Project	Proposed Development			**Depth Range**	5.5m to 10.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	24 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH5

Project	Proposed Development			**Depth Range**	10.0m to 20.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	24 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	2-3 of 3	**Checked**	SK	**Date**	06 / 03 / 2020



BOREHOLE LOG

BH NO. BH6

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	28/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	53.50	SPT 0.50-0.95 m 2,2,3 N=5			-	FILL: Silty CLAY; low to medium plasticity, dark brown mottled orange-red, with fine grained sand, fine to medium, angular to sub-angular ironstone gravels, blue metal and shale fragments.	M (<PL)	-	FILL
			1	*1.00* 52.50	SPT 1.50-1.95 m 1,2,3 N=5			CI	Silty CLAY; medium plasticity, red-brown to grey, with fine to medium, rounded to sub-rounded ironstone gravels.			RESIDUAL SOIL
			2	*2.00* 51.50					From 2.0 m, grading to weathered shale.	-	F	
			3		SPT 3.00-3.45 m 8,15,16 N=31						H	
			4	*4.20* 49.30				-	SHALE; very low to low strength, dark grey, distinctly weathered.	-	-	BEDROCK
	H		5	*5.40*								
									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. BH6

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	28/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.40		Continuation from non-cored borehole				
NMLC	100% RETURN				48.10		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	SW		5.57-5.58: XWS, Clay 5.59-5.60: XWS, Clay 5.74-5.77: XWS, Clay 5.84: JT, 60°, CN, IR, SM	
				6	*6.00* 47.50		SHALE; dark grey, with very thinly bedded,fine grained sandstone lamination.			6.29: JT, 60°, PR, SM, 80 mm, Healed 6.37: JT, 80°, PR, SM, 70 mm, Healed 6.47: JT, 70°, PR, SM, 30 mm, Healed	
		100	68	7	*7.03* 46.47		From 7.03 m, thinly bedded.	FR			
				8	*8.42* 45.08		From 8.42 m, medium bedded.				
		100	99	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**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	24/01/2020
Position	Refer to Figure 2	**Date Completed**	28/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	99	10				FR			
				11							
				12	*12.00* 41.50		From 12.0 m, thinly bedded.			11.66: JT, 75°, CN, PR, SM, 110 mm 11.77: JT, 80°, CN, PR, SM, 180 mm 11.95: JT, 80°, CN, PR, SM, 50 mm 12.02: JT, 80°, CN, PR, SM, 30 mm 12.40: JT, 80°, CN, PR, SM, 180 mm 12.66: JT, 80°, CN, PR, SM, 60 mm 12.72: JT, 80°, CN, PR, SM, 60 mm	
		100	68	13	*13.13* 40.37		From 13.13 m, medium bedded.				
				14						14.38: JT, 80°, CN, IR, SM, 90 mm 14.60: JT, 80°, CN, IR, SM, 110 mm	
		100	95	15							
				16							
				17	*16.91* 36.59		From 16.91 m, thinly bedded.			16.91: JT, 80°, CN, PR, SM, 20 mm 17.04-17.06: XWS, Clay 17.13: JT, 60°, CN, PR, SM, 20 mm 17.14: JT, 50°, CN, PR, SM, 30 mm 17.32: JT, 60°, CN, PR, SM, 20 mm, Healed 17.42: JT, 80°, CN, PR, SM, 40 mm 17.84: JT, 80°, CN, PR, SM, 110 mm	
		100	63	18							
				19						18.50: JT, 80°, CN, IR, SM, 50 mm 18.55: JT, 70°, CN, PR, SM, 40 mm 18.69: JT, 90°, CN, IR, SM, 70 mm 18.78: JT, 80°, CN, IR, SM, 100 mm 19.10: JT, 60°, CN, PR, SM, 30 mm 19.34: JT, 80°, CN, IR, SM	
				20	*20.00*		Borehole Terminated at 20.00 m, Target Depth Reached.				

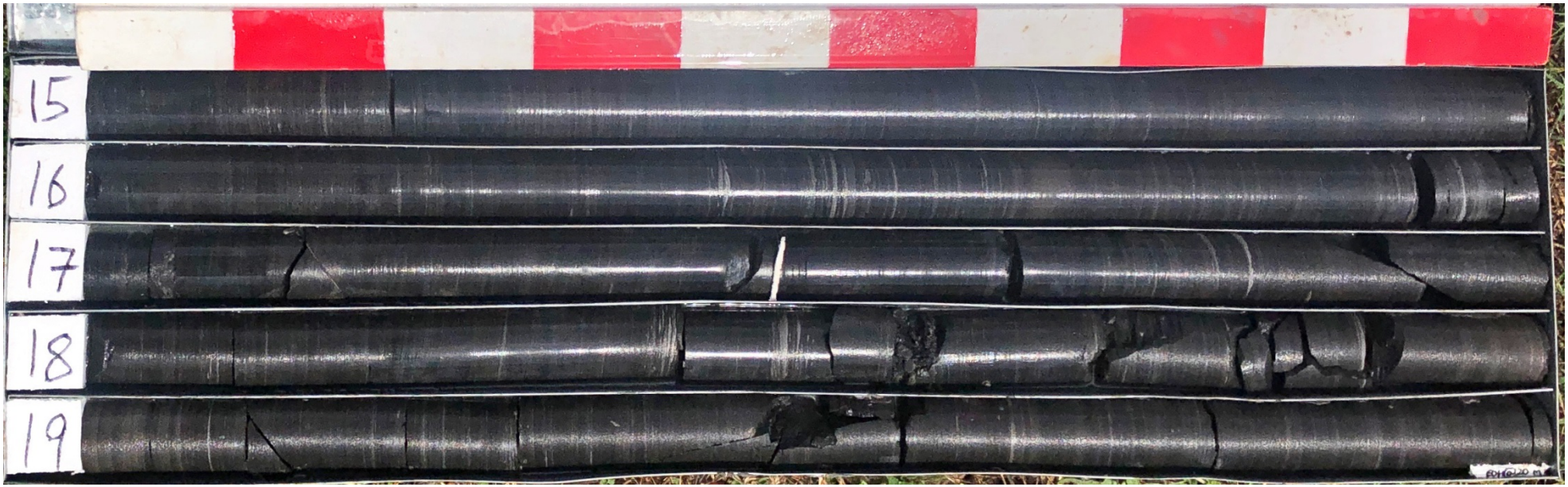
This borehole log should be read in conjunction with EI Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	5.4m to 15.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 53.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	24 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH6

Project	Proposed Development			**Depth Range**	15.0m to 20.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 53.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	24 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3 of 3	**Checked**	SK	**Date**	06 / 03 / 2020



BOREHOLE LOG

BH NO. BH7M

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Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈50.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	23/01/20 ▽ 28/01/20 ▼	0	50.50	BH7M_0.1-0.2 DS			-	FILL: Silty CLAY; medium plasticity, with fine grained sand, red-brown mottled orange, with fine to medium, angular to sub-angular gravels, blue metal.	M (<PL)	-	FILL
				0.60								
				49.90	SPT 0.50-0.95 m 7,6,7 N=13			-	FILL: Gravelly CLAY; low to medium plasticity, with fine grained sand, pale brown, with fine to medium, angular to sub-angular ironstone gravels, blue metal and shale fragments.	M (<PL)	-	
			1									
					SPT 1.50-1.95 m 3,2,1 N=3							
			2		BH7M_1.9-2.0 DS					M (>PL)		
				2.50								
				48.00				Cl	Silty CLAY; medium plasticity, pale grey mottled red-brown, with fine grained sand, fine to medium, rounded to sub-rounded ironstone gravels.		-	RESIDUAL SOIL
					BH7M_2.8-3.0 DS					M (>PL)		
			3		SPT 3.00-3.45 m 3,22, N>50						H	
				3.40								
				47.10				-	SHALE; very low to low strength, pale brown-dark grey, distinctly weathered.			BEDROCK
	H				BH7M_3.8-4.0 DS					-	-	
			4	*4.30*								
									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. BH7M

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈50.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.30*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	75	5	46.20 *4.61* 45.89 *5.05* 45.45		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams. SHALE; dark grey, with very thinly bedded, fine grained sandstone lamination. From 5.05 m, thinly to medium bedded.	SW FR SW FR		4.35: JT, 70°, SN, PR, SM, 70 mm 4.44: JT, 70°, SN, PR, SM, 60 mm 4.53-4.54: XWS, Clay	
		100	78	6						5.64: JT, 50°, CN, PR, SM, 30 mm	
		100	73	7							
				8							
				9	*9.00* 41.50		From 9.0 m, medium bedded.				
				10						9.87: JT, 80°, CN, PR, RF, 220 mm	

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

CORED BOREHOLE LOG

BH NO. BH7M

Project	Proposed Development	**Sheet**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈50.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	73	10				FR		10.43: JT, 90°, CN, IR, SM, 70 mm	
				11							
		100	83	12						12.18: JT, 90°, CN, IR, SM, 150 mm 12.30: JT, 80°, CN, IR, SM, 30 mm	
				13							
					13.88 36.62		From 13.88 m, thinly bedded.			13.88: JT, 70°, CN, IR, SM, 30 mm 13.92-13.93: XWS, Clay 13.93: JT, 90°, CN, IR, SM, 20 mm 14.00: JT, 60°, CN, IR, SM, 50 mm 14.18: JT, 90°, CN, IR, SM, 40 mm	
				14						14.61: JT, 80°, CN, IR, SM, 70 mm 14.79: JT, 75°, CN, IR, SM, 60 mm	
		100	40	15						15.23: JT, 90°, CN, IR, SM, 70 mm 15.40: JT, 70°, CN, IR, SM, 70 mm, Healed	
				16						15.82-15.83: XWS, Clay 16.06: JT, 50°, CN, IR, SM, 20 mm 16.19: JT, 90°, CN, IR, SM, 20 mm	
		100	33	17						16.46-16.47: XWS, Clay 16.54: JT, 70°, CN, PR, SM, 70 mm 16.61: JT, 60°, CN, IR, SM, 70 mm 16.66: JT, 80°, CN, PR, SM, 20 mm 16.82: JT, 50°, CN, PR, SM, 20 mm 16.90: JT, 90°, Clay, IR, SM, 100 mm	
		100	65	18						17.23: JT, 60°, CN, IR, SM, 70 mm, Healed 17.34: JT, 50°, CN, PR, SM, 10 mm 17.41-17.44: JT, 60°, Clay, PR, SM 17.67-17.69: XWS, Clay	
				19						18.36: JT, 50°, CN, ST, SM, 50 mm 18.61: JT, 60°, CN, IR, SM, 50 mm 18.79: JT, 80°, CN, UN, SM, 100 mm	
					19.61 30.89		Borehole Terminated at 19.61 m, Target Depth Reached.			19.42: JT, 80°, CN, IR, SM, 190 mm	
				20							

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

MONITORING WELL LOG

MW NO. BH7M

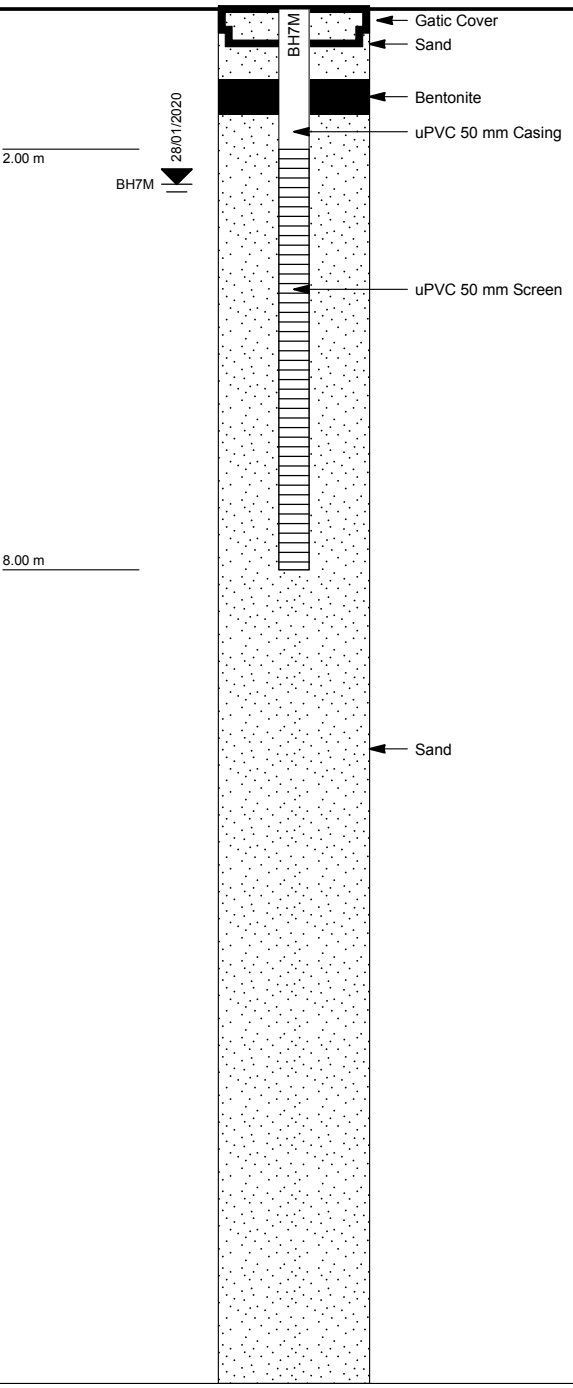
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈50.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	28/01/20	0	50		FILL: Silty CLAY; medium plasticity, with fine grained sand, red-brown mottled orange, with fine to medium, angular to sub-angular gravels, blue metal.
					FILL: Gravelly CLAY; low to medium plasticity, with fine grained sand, pale brown, with fine to medium, angular to sub-angular ironstone gravels, blue metal and shale fragments.
	28/01/20	2	48		Silty CLAY; medium plasticity, pale grey mottled red-brown, with fine grained sand, fine to medium, rounded to sub-rounded ironstone gravels.
					SHALE; very low to low strength, pale brown-dark grey, distinctly weathered.
NMLC	100% RETURN	4	46		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
					SHALE; dark grey, with very thinly bedded, fine grained sandstone lamination.
		6	44		From 5.05 m, thinly to medium bedded.
		8	42		From 9.0 m, medium bedded.
		10	40		
		12	38		
		14	36		From 13.88 m, thinly bedded.
		16	34		
		18	32		
		20	30		Borehole Terminated at 19.61 m, Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH7M	Standpipe	1.00 m 49.50 m	8.00 m 42.50 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH7M

Project	Proposed Development			**Depth Range**	4.3m to 14.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 50.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	28 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH7M

Project	Proposed Development			**Depth Range**	14.0m to 19.61m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 50.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	28 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH8M

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	29/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈52.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	03/02/2020 01/20	0	52.50	BH8M_0.1-0.2 DS			-	FILL: Gravelly CLAY; low to medium plasticity, brown mottled grey-orange, with fine grained sand, fine to coarse, angular to sub-angular ironstone gravels, blue metal, shale and sandstone fragments and wood pieces.			FILL
					SPT 0.50-0.95 m 6,5,8 N=13					M (<PL)	-	
			1	*1.10*	BH8M_0.8-1.0 DS				From 1.1 to 1.3 m, shale layer, dark grey.			
				51.40								
				1.70	SPT 1.50-1.95 m							
				50.80	2,1,2 N=3			CI-CH	Silty CLAY ; medium to high plasticity, pale grey mottled red-brown to orange, with fine to medium, rounded to sub-rounded ironstone gravels.			RESIDUAL SOIL
			2		BH8M_2.2-2.3 DS					M (<PL)	S	
				3.10							H	
	H			49.40	SPT 3.00-3.45 m 15,8, 150mm N>50			-	SHALE; very low to low strength, dark grey, distinctly weathered.	-	-	BEDROCK
				3.57	BH8M_3.2-3.5 DS							
									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. BH8M

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	29/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈52.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
					3.57		Continuation from non-cored borehole				
NMLC	70% RETURN	100	22	4	48.93		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW		3.66: JT, 80°, SN, IR, SM, 80 mm 3.80: JT, 70°, SN, PR, SM, 20 mm 3.83-3.86: XWS, Clay	
				5						4.58-4.59: XWS, Clay 4.71-4.74: XWS, Clay	
					5.35					5.21-5.22: XWS, Clay	
		100	22	6	47.15		SHALE; dark grey, with very thinly to thinly bedded, fine grained sandstone lamination.	FR		5.74-5.76: XWS, Clay 6.07-6.09: XWS, Clay	
				7							
					8.00						
		100	93	8	44.50		From 8.0 m, thinly to medium bedded.			8.82-8.84: CS 8.99: JT, 60°, CN, IR, SM, 20 mm	
				9							
				10							

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

CORED BOREHOLE LOG

BH NO. BH8M

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	29/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈52.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	70% RETURN	100	93	10				FR			
		100	78	11						10.44: JT, 70°, IR, SM, 20 mm	
		100	90	12							
				13							
				14						14.50: JT, 60°, CN, UN, SM	
		100	75	15							
				16						16.45: JT, 80°, PR, RF, 70 mm, Healed 16.62-16.69: XWS, Clay	
				17							
				18							
		100	96	19	18.72 33.78		From 18.72 m, medium bedded.			18.72: JT, 80°, CN, IR, SM, 30 mm	
				20							

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

CORED BOREHOLE LOG

BH NO. BH8M

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	29/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈52.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC		100	96	20				FR			
					20.47 32.03		Borehole Terminated at 20.47 m, Target Depth Reached.				
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

MONITORING WELL LOG

MW NO. BH8M

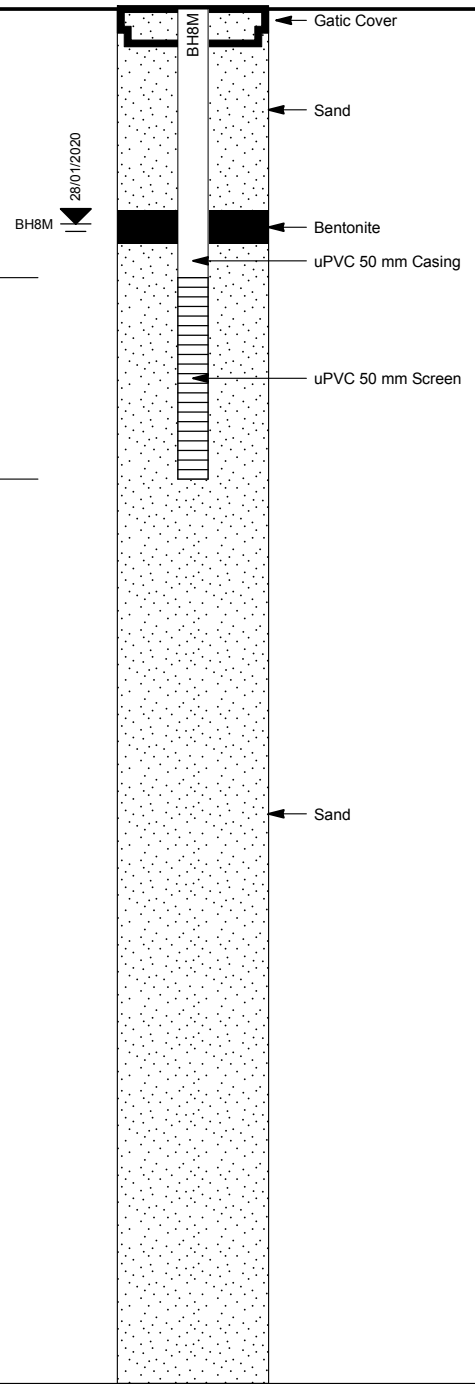
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	28/01/2020
Position	Refer to Figure 2	**Date Completed**	29/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 28/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈52.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	28/01/20	0	52		FILL: Gravelly CLAY; low to medium plasticity, brown mottled grey-orange, with fine grained sand, fine to coarse, angular to sub-angular ironstone gravels, blue metal, shale and sandstone fragments and wood pieces.
					From 1.1 to 1.3 m, shale layer, dark grey.
		2	50		Silty CLAY ; medium to high plasticity, pale grey mottled red-brown to orange, with fine to medium, rounded to sub-rounded ironstone gravels.
					SHALE; very low to low strength, dark grey, distinctly weathered.
NMLC	70% RETURN	4	48		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
		6	46		SHALE; dark grey, with very thinly to thinly bedded, fine grained sandstone lamination.
		8	44		From 8.0 m, thinly to medium bedded.
		10	42		
		12	40		
		14	38		
		16	36		
		18	34		From 18.72 m, medium bedded.
		20	32		Borehole Terminated at 20.47 m, Target Depth Reached.
		22	30		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH8M	Standpipe	0.60 m 51.90 m	7.00 m 45.50 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH8M

Project	Proposed Development			**Depth Range**	3.57m to 13.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 52.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	28 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH8M

Project	Proposed Development			**Depth Range**	13.0m to 20.47m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 52.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	28 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH9

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	53.00				-	FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red, with very thinly bedded, fine grained sand, fine to medium, angular to sub-angular gravels, blue metal, shale and sandstone fragments.	D	-	FILL
				0.50 52.50	SPT 0.50-0.95 m 5,8,9 N=17				From 0.5 m, fine to medium, rounded to sub-rounded ironstone gravels.			
			1	*1.00* 52.00				CI-CH	Silty CLAY; medium to high plasticity, pale grey mottled red-brown to orange, with fine to medium, rounded to sub-rounded ironstone gravels, grading to weathered shale.		-	RESIDUAL SOIL
					SPT 1.50-1.95 m 2,4,6 N=10					M (<PL)	St	
			2									
			3	*3.00* 50.00	SPT 3.00-3.45 m 10,15,16/70mm N>50 BH9_3.1-3.3 DS			-	SHALE; very low strength, pale brown mottled pale grey-orange, extremely weathered, with ironstone bands.			WEATHERED ROCK
	M			*3.50* 49.50					From 3.5 m, low strength, pale brown, distinctly weathered.	-	-	
	H		4	*5.20*								
			5						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. BH9

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.00 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	*5.20*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	71	6	47.80 *6.07* 46.93		SHALE; dark grey, with fine grained sandstone lamination, very thinly to thinly bedded. From 6.07 m, thinly to medium bedded.	SW XW SW FR		5.47-5.70: XWZ, Clay 5.70-5.80: CS	
				7						7.20-7.21: XWS, Clay	
				8	*8.25* 44.75		From 8.25 m, thinly bedded.			7.95-8.00: CS 8.42-8.46: XWS, Clay	
		100	66	9						8.80-8.81: XWS 8.82: JT, 80°, CN, IR, SM, 20 mm 9.39-9.46: 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. BH9

eiaustralia
Contamination | Remediation | Geotechnical

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.00 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	100% RETURN	100	66	10	43.00		From 10.0 m, thinly to medium bedded.	FR			
				11						11.18: JT, 80°, CN, IR, SM, 120 mm 11.35: JT, 80°, CN, IR, SM, 110 mm	
		100	83	12							
				13	13.00 40.00		From 13.0 m, thinly bedded.				
				14						13.88-14.00: CS 14.00: JT, 90°, CN, IR, SM, 50 mm 14.05: JT, 5°, CN, PR, SM, 20 mm 14.13-14.17: CS	
					14.45 38.55		From 14.45 m, very thinly bedded.			14.45: JT, 45°, CN, IR, RF, 50 mm 14.53-14.56: CS 14.62-14.67: XWS, Clay 14.68: JT, 50°, CN, IR, RF, 30 mm 14.71: JT, 60°, CN, PR, SM, 20 mm 14.85-14.86: XWS, Clay 14.90-14.91: XWS, Clay	
				15	15.23 37.77		From 15.23 m, thinly bedded.				
		100	66	16						16.48: JT, 90°, CN, IR, SM, 10 mm	
				17						17.29: JT, 60°, CN, PR, SM, 20 mm 17.33: JT, 90°, CN, IR, SM, 20 mm 17.46: JT, 70°, CN, PR, SM, 30 mm 17.49-17.53: XWS, Clay 17.53: JT, 70°, CN, PR, SM, 50 mm	
				18							
		100	70	19						18.78: JT, 80°, CN, PR, SM, 100 mm 19.02: JT, 70°, CN, PR, SM	
								XW		19.16-19.35: XWZ, Clay	
				20				-		19.43: JT, 80°, IR, RF, 160 mm, Healed 19.62-19.67: XWS, Clay 19.67: JT, 60°, CN, PR, SM, 10 mm	

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

CORED BOREHOLE LOG

BH NO. BH9

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	30/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

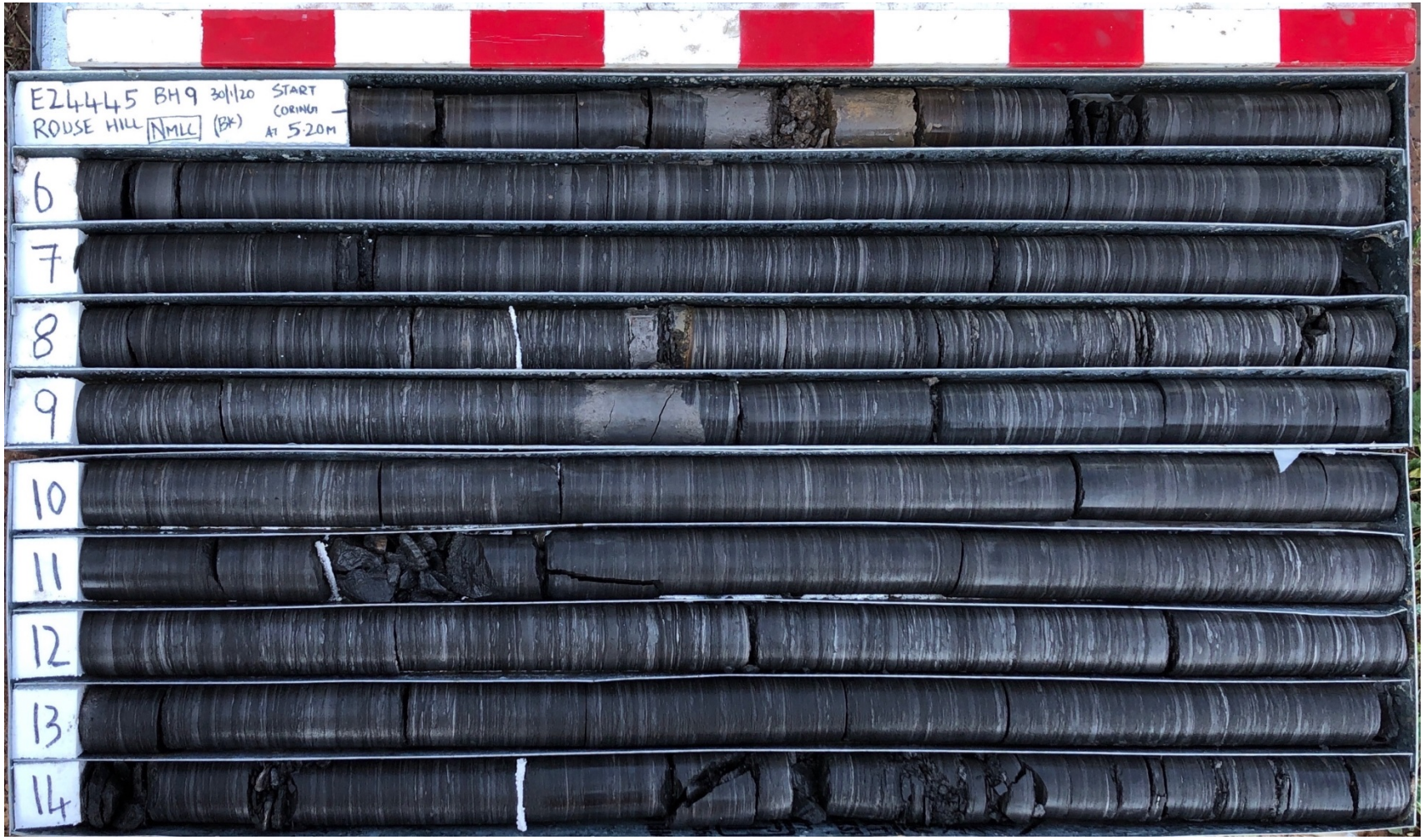
Drilling Contactor	Geosense Drilling	**Surface RL**	≈53.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

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		100	70	20	*20.47* 32.53		Borehole Terminated at 20.47 m, Target Depth Reached.	-			
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

CORE PHOTOGRAPH OF BOREHOLE: BH9

Project	Proposed Development			**Depth Range**	5.2m to 15.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 53.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	30 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020



CORE PHOTOGRAPH OF BOREHOLE: BH9

Project	Proposed Development			**Depth Range**	15.0m to 20.47m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 53.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	30 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH10

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	56.00	BH10_0.1-0.2 DS			-	FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red, with fine grained sand, fine to medium, angular to sub-angular ironstone gravels, blue metal.	D	-	FILL
				0.80	SPT 0.50-0.95 m 7,8,8 N=16							
			1	55.20				Cl	Silty CLAY; medium plasticity, pale grey to red-brown mottled orange, with fine to medium, rounded to sub-rounded ironstone gravels.			RESIDUAL SOIL
				1.50								
				54.50	SPT 1.50-1.95 m 8,10,10 N=20				From 1.5 m, becoming pale grey mottled red-brown, grading to weathered shale.	M (<PL)	VSt	
			2		BH10_1.8-2.0 DS							
				2.60								
				53.40	BH10_2.8-3.0 DS			-	SHALE; very low strength, pale grey-pale brown, very low strength, extremely weathered.			WEATHERED ROCK
			3	*3.10*						-	-	
	H			52.90	SPT 3.00-3.45 m 26,16/100mm N>50				From 3.1 m, low strength, pale brown, distinctly weathered.			
				3.50								
									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. BH10

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.00 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							
					3.50		Continuation from non-cored borehole				
NMLC	100% RETURN	100	34	4	52.50		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW		3.60-3.62: XWS, Clay 3.88-3.91: XWS, Clay 3.98-4.01: XWS, Clay 4.33-4.37: XWS, Clay 4.50: JT, 50°, CN, PR, RF, 10 mm 4.67-4.68: XWS, Clay 4.68: JT, 80°, CN, IR, RF, 20 mm 4.76-4.77: XWS, Clay 4.82-4.87: XWS, Clay 5.03-5.04: XWS, Clay 5.12-5.22: XWZ, Clay 5.31-5.34: XWS, Clay	
				5				XW DW			
					5.53						
		100	65	6	50.47		SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination and layer.	SW		5.50-5.51: XWS, Clay 5.61-5.63: XWS, Clay 5.89-5.91: XWS, Clay 5.94-5.96: XWS, Clay 6.50-6.52: XWS, Clay 6.54: JT, 50°, SN, ST, SM, 20 mm 6.68-6.69: XWS, Clay	
				7	*7.09* 48.91		From 7.09 m, thinly bedded.	FR		6.95-6.97: XWS, Clay	
		100	72	8							
				9						9.64-9.66: CS, Clay	
				10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH10

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.00 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	100% RETURN	100	72	10	46.00		From 10.0 to 10.4 m, very thinly to thinly bedded.	FR			
				11							
		100	100	12	*12.15* 43.85		From 12.15 m, medium bedded.			12.52: JT, 90°, CN, IR, SM, 50 mm	
				13						13.79: JT, 90°, CN, PR, SM, 20 mm	
				14							
		100	95	15						16.29: JT, 90°, CN, IR, SM, 80 mm	
				16							
				17	*17.00* 39.00		From 17.0 m, thinly to medium bedded.				
				18							
		100	89	19						19.03-19.09: XWS, Clay 19.08: JT, 50°, CN, PR, SM, 40 mm 19.32: JT, 60°, CN, IR, SM, 40 mm 19.38: JT, 60°, CN, ST, SM, 70 mm	
				20							

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

CORED BOREHOLE LOG

BH NO. BH10

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	30/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 30/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

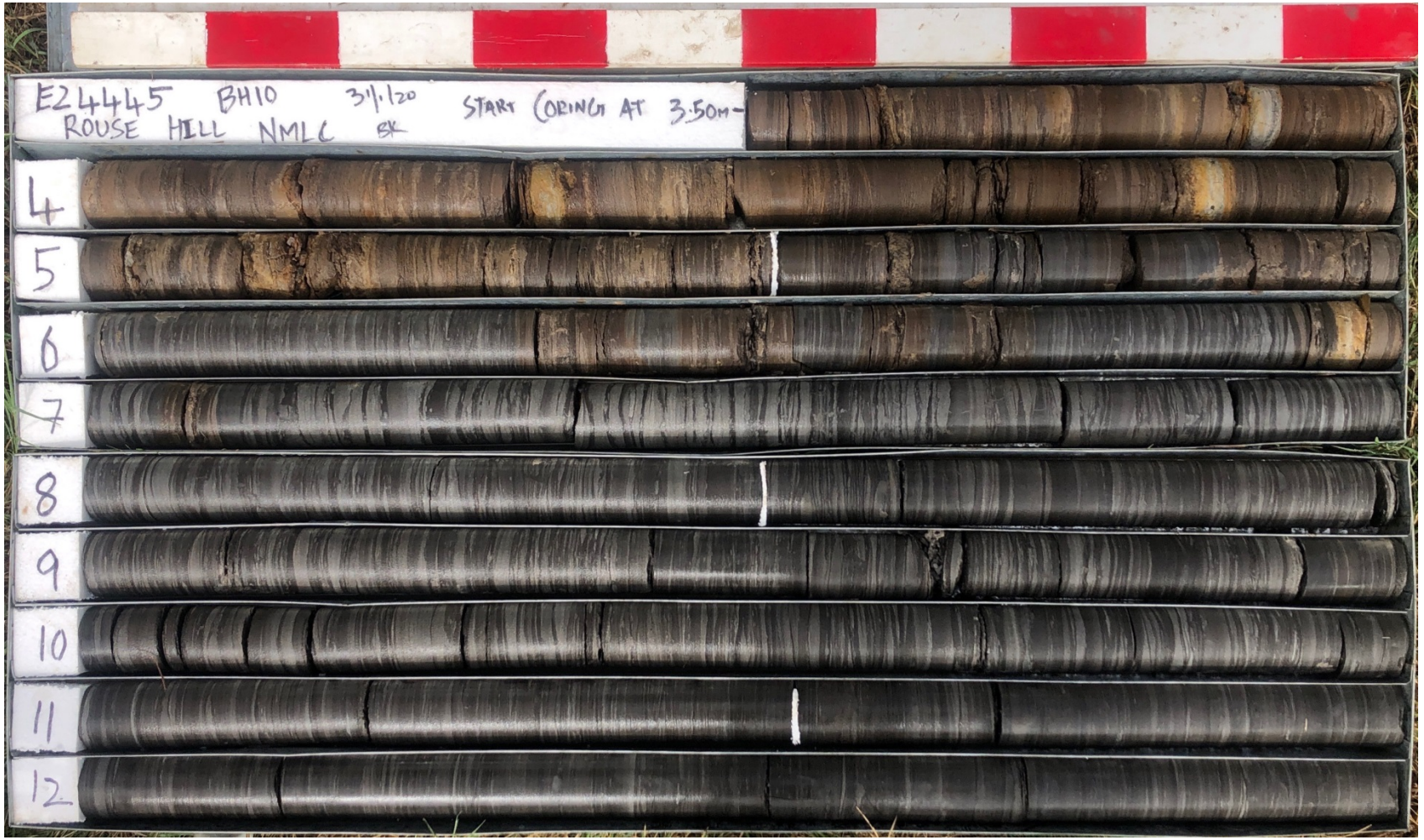
Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

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		100	89	20				FR			
					20.73 35.27		Borehole Terminated at 20.73 m, Target Depth Reached.				
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

CORE PHOTOGRAPH OF BOREHOLE: BH10

Project	Proposed Development			**Depth Range**	3.5m to 13.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	30 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020



CORE PHOTOGRAPH OF BOREHOLE: BH10

Project	Proposed Development			**Depth Range**	13.0m to 20.73m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.0m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	30 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH11M

Project	Proposed Development	**Sheet**	1 of 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	31/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 31/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	57.50				-	FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red to pale grey, with fine grained sand, fine to medium, angular to sub-angular ironstone gravels, blue metal.			FILL
				1.00	SPT 0.50-0.95 m 7,7,5 N=12							
			1	56.50					From 1.0 m, shale and sandstone fragments.	D	-	
					SPT 1.50-1.95 m 5,7,11 N=18							
			2	*2.20*								
				55.30				Cl-CH	Silty CLAY; medium to high plasticity, red-brown mottled pale grey, with fine to medium, rounded to sub-rounded ironstone gravels.			RESIDUAL SOIL
				3.00								
			3	54.50					From 3.0 m, becoming pale grey mottled red-brown to orange, grading to weathered shale.	M (<PL)	St	
					SPT 3.00-3.45 m 5,7,4 N=11							
				4.00								
	M		4	53.50				-	SHALE; very low strength, pale brown, distinctly weathered.			BEDROCK
				4.60								
	H			52.90	SPT 4.50-4.95 m 11/70mm N>50				From 4.6 m, low strength, pale brown, distinctly weathered.	-	-	
			5	*5.60*								
									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. BH11M

Project	Proposed Development	**Sheet**	2 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	31/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 31/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.60		Continuation from non-cored borehole				
NMLC	100% RETURN	100	100	6	51.90 *6.02* 51.48		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams. From 6.02 m, very thinly to thinly bedded.	DW XW DW XW DW		5.64-5.74: XWS, Clay 5.77-5.82: XWS, Clay 5.86-6.02: XWZ, Clay 6.09-6.13: XWS, Clay 6.21-6.22: XWS, Clay 6.31-6.33: XWS, Clay	
				7						6.80-6.82: XWS, Clay 7.07-7.08: XWS, Clay	
					7.85					7.75-7.80: XWS, Clay	
				8	49.65		SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination and layer.	SW		8.11: JT, 90°, IR, RF, 50 mm, Healed 8.51: JT, 50°, SN, IR, RF, 50 mm	
		100	67	9	*9.07* 48.43		From 9.07 m, medium bedded.	FR		8.73-8.75: XWS, Clay 8.78: JT, 80°, CN, IR, SM, 30 mm 9.03: JT, 50°, SN, IR, RF, 40 mm	
				10	*10.00*						

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

CORED BOREHOLE LOG

BH NO. BH11M

Project	Proposed Development	**Sheet**	3 OF 3
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	31/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 31/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	67	10	47.50		From 10.0 m, thinly bedded.	FR		10.05: JT, 50°, Clay SN, IR, RF, 90 mm	
				11						10.72-10.75: XWS, Clay	
										11.12: JT, 90°, CN, PR, RF, 10 mm	
		100	88	12							
				13							
				14							
				15	15.02						
					42.48		From 15.02 m, medium bedded.				
		100	93	16							
					16.76						
				17	40.74		From 16.76 m, thinly bedded.				
				18							
		100	100	19							
				20	20.00		Borehole Terminated at 20.00 m, Target Depth Reched.				

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

MONITORING WELL LOG

MW NO. BH11M

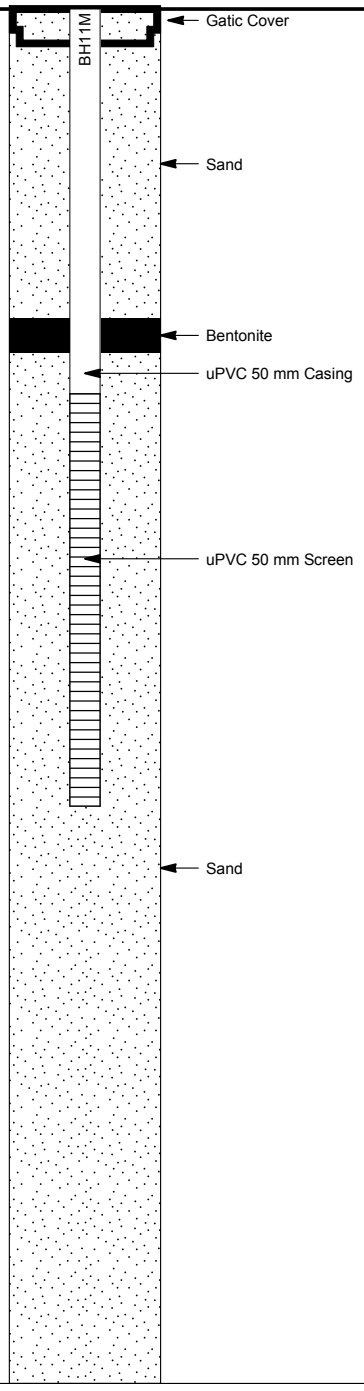
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	31/01/2020
Position	Refer to Figure 2	**Date Completed**	31/01/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 31/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈57.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	GWNE	0	57	FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red to pale grey, with fine grained sand, fine to medium, angular to sub-angular ironstone gravels, blue metal.
				From 1.0 m, shale and sandstone fragments.
		2	56	Silty CLAY; medium to high plasticity, red-brown mottled pale grey, with fine to medium, rounded to sub-rounded ironstone gravels.
				From 3.0 m, becoming pale grey mottled red-brown to orange, grading to weathered shale.
		4	54	SHALE; very low strength, pale brown, distinctly weathered.
				From 4.6 m, low strength, pale brown, distinctly weathered.
NMLC	100% RETURN	6	52	LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
				From 6.02 m, very thinly to thinly bedded.
		8	50	SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination and layer.
				From 9.07 m, medium bedded.
		10	48	From 10.0 m, thinly bedded.
		12	46	
		14	44	
				From 15.02 m, medium bedded.
		16	42	
				From 16.76 m, thinly bedded.
		18	40	
		20	38	Borehole Terminated at 20.00 m, Target Depth Reached.
		22	36	

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH11M	Standpipe	0.40 m 57.10 m	11.60 m 45.90 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH11M

Project	Proposed Development			**Depth Range**	5.6m to 10.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 57.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	31 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH11M

Project	Proposed Development			**Depth Range**	10.0m to 20.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 57.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	31 / 01 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	2-3 of 3	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH12

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	03/02/2020
Position	Refer to Figure 2	**Date Completed**	03/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 03/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	55.50				-	FILL: Silty CLAY; low to medium plasticity, brown to red-brown mottled orange, with fine grained sand, fine to medium, angular to sub-angular ironstone gravels, blue metal, shale and sandstone fragments.	M (<PL)		FILL
				0.70 54.80	SPT 0.50-0.95 m 3,4,4 N=8				From 0.7 m, becoming brown mottled dark grey-orange.		-	
			1	*1.00* 54.50					From 1.0 m, becoming dark grey, with some odour.	M (>PL)		
				1.80 53.70	SPT 1.50-1.95 m 2,1,3 N=4			CI	Silty CLAY; medium plasticity, pale grey mottled red-brown, with fine to medium, rounded to sub-rounded ironstone gravels, grading to weathered shale.			RESIDUAL SOIL
			2							M (<PL)	-	
			3		SPT 3.00-3.45 m 8,15,18/130mm N>50							
				3.50 52.00				-	SHALE; very low strength, pale brown, distinctly weathered.	-	-	BEDROCK
			4	*4.00*					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. BH12

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	03/02/2020
Position	Refer to Figure 2	**Date Completed**	03/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 03/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.00*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	43	5	51.50		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW		4.41-4.48: XWS, Clay 4.51-4.52: XWS, Clay 4.53-4.54: XWS, Clay 4.57-4.59: XWS, Clay 4.61: JT, 90°, SN, IR, RF 4.68-4.70: XWS, Clay 4.91-4.92: XWS, Clay 5.11-5.12: XWS, Clay 5.19-5.25: XWS, Clay	
					5.44			SW			
		100	42	6	50.06		SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination.			5.83-5.89: XWS, Clay 6.35-6.37: XWS, Clay 6.43-6.44: XWS, Clay	
				7	*7.58*					6.84: JT, 60°, CN, IR, RF, 60 mm 6.90: JT, 70°, CN, IR, RF, 20 mm, Healed 6.92: JT, 70°, Clay, IR, RF, 30 mm 6.95: JT, 50°, Clay, IR, RF, 50 mm 7.10: JT, 90°, CN, IR, RF, 30 mm 7.13-7.14: XWS, Clay 7.30: JT, 90°, SN, IR, RF, 40 mm, Healed 7.34-7.35: XWS, Clay 7.56-7.58: XWS, Clay 7.74: JT, 80°, CN, IR, RF, 30 mm	
					47.92		From 7.58 m, thinly bedded.	FR			
		100	79	8							
				9						9.65: JT, 90°, CN, IR, RF, 100 mm	
				10							

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

CORED BOREHOLE LOG

BH NO. BH12

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	03/02/2020
Position	Refer to Figure 2	**Date Completed**	03/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 03/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	79	10				FR		10.18: JT, 90°, CN, IR, SM	
				11							
				12	*12.00* 43.50		From 12.0 m, thinly to medium bedded.			11.87: JT, 70°, CN, IR, SM, 30 mm	
		100	49	13							
				14							
				15							
		100	86	16						15.86: JT, 50°, CN, PR, SM, 20 mm	
				17						17.04: JT, 90°, CN, IR, SM, 160 mm	
				18						17.92: JT, 50°, CN, IR, SM, 140 mm	
		100	38	19						18.57: JT, 60°, CN, IR, SM, 50 mm 19.06: JT, 80°, CN, IR, SM, 300 mm 19.36: JT, 70°, CN, UN, SM, 60 mm 19.44: JT, 70°, CN, IR, SM, 160 mm 19.60: JT, 70°, CN, IR, SM, 210 mm 19.68: JT, 80°, CN, PR, SM, 170 mm, Healed	
				20							

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

CORED BOREHOLE LOG

BH NO. BH12

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	03/02/2020
Position	Refer to Figure 2	**Date Completed**	03/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 03/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

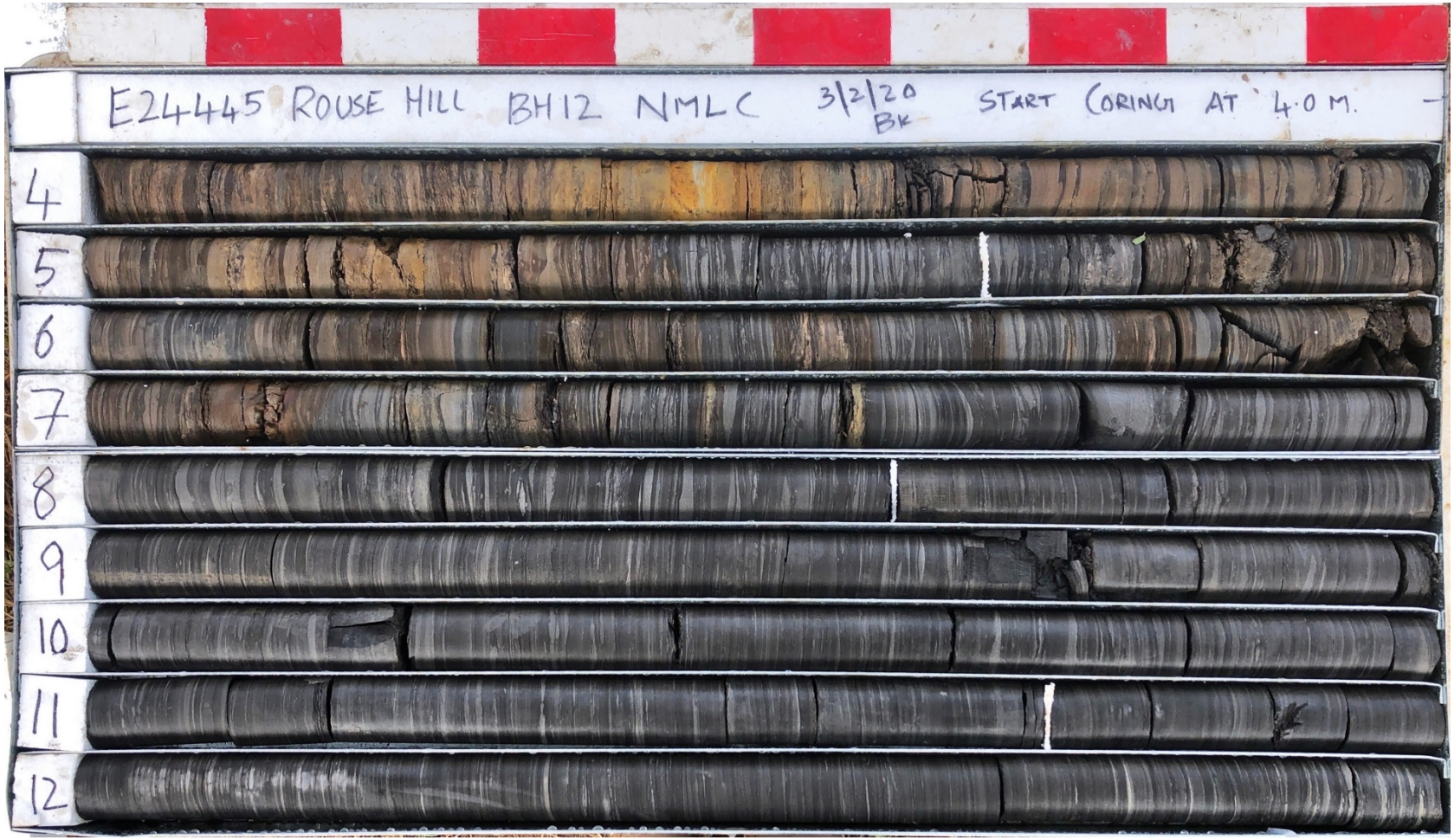
Drilling Contactor	Geosense Drilling	**Surface RL**	≈55.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	38	20				FR			
										20.30: JT, 50°, CN, PR, SM, 30 mm 20.44: JT, 60°, CN, PR, SM, 20 mm 20.56: JT, 60°, CN, IR, SM, 10 mm 20.73: JT, 60°, CN, ST, SM, 60 mm 20.81: JT, 80°, CN, PR, SM, 110 mm	
					20.92 34.58		Borehole Terminated at 20.92 m, Target Depth Reached.				
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

CORE PHOTOGRAPH OF BOREHOLE: BH12

Project	Proposed Development			**Depth Range**	4.0m to 13.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 55.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	03 / 02 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020



CORE PHOTOGRAPH OF BOREHOLE: BH12

Project	Proposed Development			**Depth Range**	13.0m to 20.92m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 55.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	03 / 02 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

BOREHOLE LOG

BH NO. BH13M

Project	Proposed Development	**Sheet**	1 of 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	04/02/2020
Position	Refer to Figure 2	**Date Completed**	04/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 04/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	56.50	BH13M_0.1-0.2 DS			-	FILL: Gravelly CLAY; low plasticity, brown, with fine to medium grained sand, fine to medium, angular to sub-angular gravels, shale and sandstone fragments.	D	-	FILL
					SPT 0.50-0.95 m 12,10,11 N=21							
				0.90 55.60 *1.10*				-	FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red, with fine grained sand, fine to medium, angular to sub-angular gravels, shale and sandstone fragments.	D	-	
			1	55.40				CI	Silty CLAY; medium plasticity, pale grey mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels, grading to weathered shale.			RESIDUAL SOIL
					BH13M_1.3-1.5 DS							
					SPT 1.50-1.95 m 3,4,5 N=9					M (<PL)	St	
			2	*2.60* 53.90				-	SHALE; very low strength, pale brown, extremely weathered, with ironstaining.			WEATHERED ROCK
					BH13M_2.8-3.0 DS							
				3.20 53.30	SPT 3.00-3.45 m 11,21,18/110mm N>50				From 3.2 m, low strength, pale brown, distinctly weathered.	-	-	
	H		3	*4.00*								
			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. BH13M

Project	Proposed Development	**Sheet**	2 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	04/02/2020
Position	Refer to Figure 2	**Date Completed**	04/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 04/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.00*		Continuation from non-cored borehole				
NMLC	100% RETURN	100	27	5	52.50		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.	DW		4.16: JT, 90°, CN, PR, RF, 10 mm 4.24-4.26: XWS, Clay 4.49-4.52: XWS, Clay	
					5.51						
		100	69	6	50.99		SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination.	SW		5.48: JT, 60°, SN, IR, RF, 40 mm 5.66: JT, 70°, CN, PR, RF, 50 mm 6.30: JT, 50°, CN, PR, RF, 30 mm 6.35-6.37: XWS, Clay 6.66: JT, 60°, SN, PR, RF, 20 mm 6.79-6.80: CS	
				7	*6.80* 49.70		From 6.8 m, medium bedded.	FR		7.87-7.90: XWS, Clay	
		100	96	8						8.56-8.59: XWS, Clay	
				9							
				10							

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

CORED BOREHOLE LOG

BH NO. BH13M

Project	Proposed Development	**Sheet**	3 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	04/02/2020
Position	Refer to Figure 2	**Date Completed**	04/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 04/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	96	10				FR			
				11							
				12	*12.00* 44.50		From 12.0 m, thickly bedded.				
		100	98	13						12.96: JT, 50°, CN, PR, SM, 70 mm	
				14							
				15						15.19: JT, 70°, CN, PR, SM, 70 mm	
		100	93	16							
				17						16.74-16.76: XWS, Clay	
				18							
		100	72	19	*18.55* 37.95		From 18.55 m, thinly bedded.			19.04: JT, 70°, CN, PR, SM, 140 mm 19.18: JT, 80°, CN, IR, SM, 110 mm 19.28: JT, 80°, CN, IR, SM, 90 mm 19.43-19.46: XWS, Clay 19.46-19.49: CS 19.55: JT, 50°, CN, IR, SM, 20 mm 19.57: JT, 80°, CN, IR, SM	
				20							

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

CORED BOREHOLE LOG

BH NO. BH13M

Project	Proposed Development	**Sheet**	4 OF 4
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	04/02/2020
Position	Refer to Figure 2	**Date Completed**	04/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 04/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
		100	72	20	*20.28*			FR			
					36.22		Borehole Terminated at 20.28 m, Target Depth Reached.				
				21							
				22							
				23							
				24							
				25							
				26							
				27							
				28							
				29							
				30							

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

MONITORING WELL LOG

MW NO. BH13M

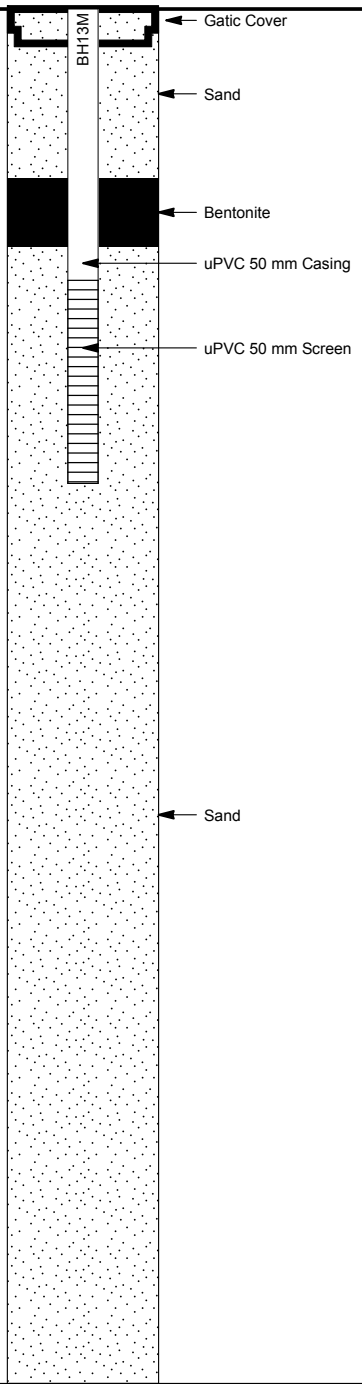
Project	Proposed Development	**Sheet**	1 of 2
Location	Tallawong Station Precinct South, Rouse Hill NSW	**Date Started**	04/02/2020
Position	Refer to Figure 2	**Date Completed**	04/02/2020
Job No.	E24445.G03	**Logged By** BK	**Date** 04/02/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Reviewed By** SK	**Date** 06/03/2020

Drilling Contactor	Geosense Drilling	**Surface RL**	≈56.50 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	56		FILL: Gravelly CLAY; low plasticity, brown, with fine to medium grained sand, fine to medium, angular to sub-angular gravels, shale and sandstone fragments.
					FILL: Silty CLAY; low to medium plasticity, brown mottled orange-red, with fine grained sand, fine to medium, angular to sub-angular gravels, shale and sandstone fragments.
		2	54		Silty CLAY; medium plasticity, pale grey mottled orange-red, with fine to medium, rounded to sub-rounded ironstone gravels, grading to weathered shale.
					SHALE; very low strength, pale brown, extremely weathered, with ironstaining.
					From 3.2 m, low strength, pale brown, distinctly weathered.
NMLC	100% RETURN	4	52		LAMINITE: SHALE; pale brown, interbedded with SANDSTONE; fine grained, pale brown, very thinly bedded with some extremely weathered clay seams.
		6	50		SHALE; dark grey, with laminated to very thinly bedded, fine grained sandstone lamination.
					From 6.8 m, medium bedded.
		8	48		
		10	46		
		12	44		From 12.0 m, thickly bedded.
		14	42		
		16	40		
		18	38		From 18.55 m, thinly bedded.
		20			
		22	36		Borehole Terminated at 20.28 m, Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH13M	Standpipe	1.00 m 55.50 m	7.00 m 49.50 m		



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

CORE PHOTOGRAPH OF BOREHOLE: BH13M

Project	Proposed Development			**Depth Range**	4.0m to 13.0m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	04 / 02 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	1-2 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

CORE PHOTOGRAPH OF BOREHOLE: BH13M

Project	Proposed Development			**Depth Range**	13.0m to 20.28m BEGL		
Location	Tallawong Station Precinct South, Rouse Hill NSW			**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 56.5m	**Drill Rig**	Hanjin D&B 8D		
Job No.	E24445.G03	**Inclination**	-90°	**Logged**	BK	**Date**	04 / 02 / 2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	**Box**	3-4 of 4	**Checked**	SK	**Date**	06 / 03 / 2020

TEST PIT: TP14

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Contamination | Remediation | Geotechnical

Project	Proposed Development			Sheet	1 OF 1
Location	Tallawong Station Precinct South, Rouse Hill NSW				
Position	Refer to Figure 2	Surface RL	59.50 m AHD		
Job No.	E24445.G03	Contractor	-	Date	24/01/2020
Client	Deicorp Projects (TallawongStation) Pty Ltd	Machine	Excavator	Logged	LW/NG

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E	-	GWNE	0	59.50	TP14_0.2-0.3 ES			-	FILL: Gravelly CLAY; low plasticity light brown to grey, with medium to coarse and sub-angular to angular gravel, with brick and concrete fragments.	M	-	FILL
				0.80								
			1	58.70				-	FILL: Gravelly CLAY; medium plasticity, dark grey and red, with sub-angular to angular gravels.	M	-	
					TP14_1.8-1.9 ES							
			2	*2.20*								
									Test Pit Refusal on SHALE at 2.20 m.			
			3									

Sketch & Other Observations

Comments
Refusal on SHALE

Checked
Date

TEST PIT: TP15

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Contamination | Remediation | Geotechnical

Project	Proposed Development			Sheet	1 OF 1
Location	Tallawong Station Precinct South, Rouse Hill NSW				
Position	Refer to Figure 2	Surface RL	56.50 m AHD		
Job No.	E24445.G03	Contractor	-	Date	24/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	Machine	Excavator	Logged	LW/NG

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E	-	GWNE	0	56.50	TP15_0.2-0.3 ES			-	FILL: Gravelly CLAY; low plasticity light brown to grey, with medium to coarse and sub-angular to angular gravel, with brick and concrete fragments.	M	-	FILL
			1	*1.20*	TP15_1.1-1.2 ES				Test Pit Refusal on SHALE at 1.20 m.			
			2									
			3									

Sketch & Other Observations

Comments
Refusal on SHALE

Checked
Date

TEST PIT: TP16

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Contamination | Remediation | Geotechnical

Project	Proposed Development			Sheet	1 OF 1
Location	Tallawong Station Precinct South, Rouse Hill NSW				
Position	Refer to Figure 2	Surface RL	58.50 m AHD		
Job No.	E24445.G03	Contractor	-	Date	23/01/2020
Client	Deicorp Projects (Tallawong Station) Pty Ltd	Machine	Excavator	Logged	LW/NG

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E	-	GWNE	0	58.50	TP16_0.2-0.3 ES			-	FILL: Gravelly CLAY; low plasticity light brown to grey, with medium to coarse and sub-angular to angular gravel, with brick and concrete fragments.	M	-	FILL
				0.50								
				58.00	TP16_0.7-0.8 ES			-	FILL: Silty CLAY; medium to high plasticity, dark grey and brown, with trace gravel, charcoal and ash.	M	-	
			1	*1.80*								
				56.70	TP16_1.9-2.0 ES			CI-CH	Silty CLAY; medium to high plasticity, red mottled brown.	M	-	RESIDUAL SOIL
			2	*2.10*								
				2.20				-	Weathered SHALE.	M	-	BEDROCK
									Test Pit Terminated at 2.20 m.			
			3									

Sketch & Other Observations

Comments
Target depth reached

Checked
Date

TEST PIT: TP17

eiaustralia
Contamination | Remediation | Geotechnical

Project	Proposed Development			Sheet	1 OF 1
Location	Tallawong Station Precinct South, Rouse Hill NSW				
Position	Refer to Figure 2	Surface RL	53.00 m AHD		
Job No.	E24445.G03	Contractor	-	Date	23/01/2020
Client	Deicorp Projects	Machine	Excavator	Logged	LW/NG
	(Tallawong Station) Pty Ltd	Bucket Size			

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E	-	GWNE	0	53.00				-	FILL: Gravelly CLAY; low plasticity light brown to grey, with medium to coarse and sub-angular to angular gravel, with brick and concrete fragments.	M	-	FILL
				0.30	TP17_0.2-0.3 ES							
				52.70				-	FILL: Gravelly CLAY; low plasticity, light grey, with medium to coarse and sub-angular to angular gravels.	M	-	
				0.80	TP17_0.4-0.5 ES							
				52.20				-	SHALE.	M	-	BEDROCK
			1	1.00	TP17_0.9-1.0 ES							
									Test Pit Refusal on SHALE at 1.00 m.			
			2									
			3									

Sketch & Other Observations

Comments
Refusal on SHALE

Checked
Date

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			

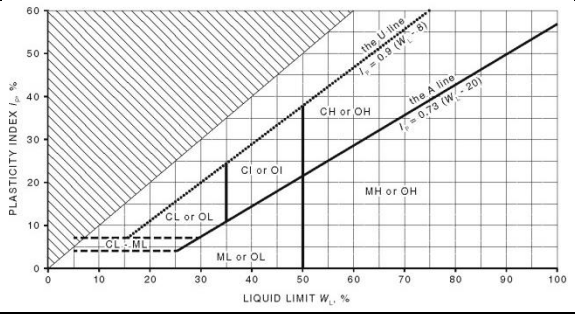
CLASSIFICATION AND INFERRED STRATIGRAPHY

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.

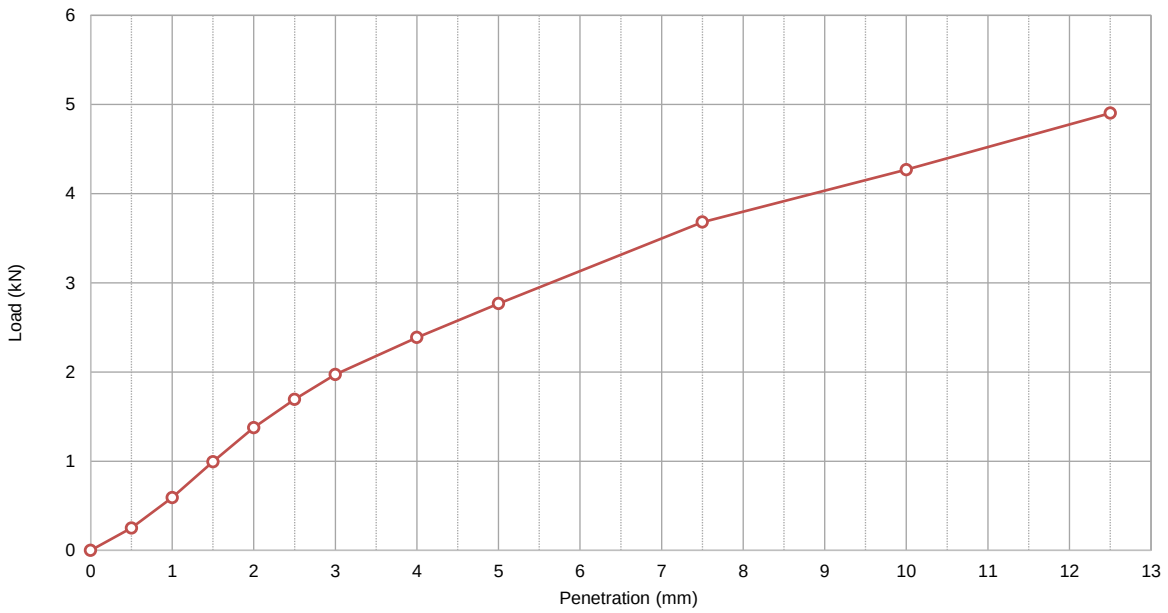
Appendix B - Laboratory Certificates

CALIFORNIA BEARING RATIO REPORT

Client	EI Australia	**Source**	TP14_1.8-1.9
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Gravely CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No.**	S57544-CBR
Job No.	S20040	**Sample No.**	S57544

Test Procedure:				
☑	AS 1289.6.1.1	☐	RMS T117	California Bearing Ratio
☑	AS 1289.5.1.1	☐	RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
☐	AS 1289.5.2.1	☐	RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
☑	AS 1289.2.1.1	☐	RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Preparation & Specification		Density & Moisture	Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)	91.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	100.5	100.0
Sample Curing Time (hrs)	48 hrs	Dry Density - At Compaction (t/m³)	2.14	2.13
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	2.13	
Surcharge Mass Applied (kg)	9.0	Specimen Swell (%)	0.3	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	8.0	
Maximum Dry Density - MDD (t/m³)	2.13	Moisture Content - Top 30mm (%)	11.6	
Optimum Moisture Content - OMC (%)	8.8	Moisture Content - Remainder (%)	8.7	

Material CBR Value (%): **14** **at a penetration of** **2.5** **mm**

Notes:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

18/02/2020

Chris Lloyd Date:

MACQUARIE GEOTECH

Macquarie Geotechnical
U7/8 10 Bradford Street
Alexandria NSW 2015

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

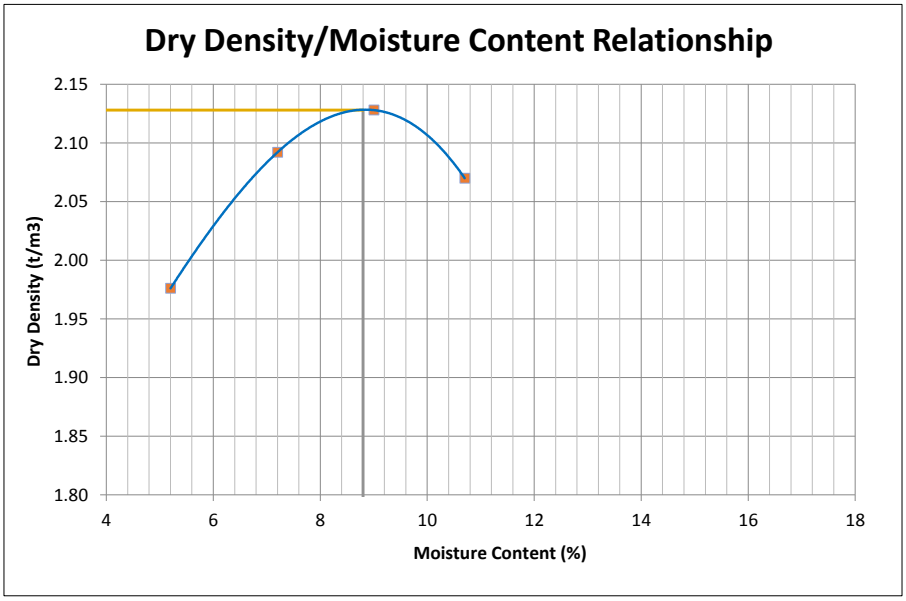
Client	EI Australia	**Source**	TP14_1.8-1.9
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Gravelly CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No**	S57544-MDD
Job No	S20040-1	**Sample No**	S57544

Test Procedure:

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Maximum Dry Density (t/m^3)	2.128
Optimum Moisture Content (%)	8.8
Oversize Retained on 19mm sieve (%)	24.8
Oversize Retained on 37.5mm sieve (%)	6.6
Curing Time	169 hrs
Liquid Limit Determination	Technician Assessment

NATA

Accredited for compliance with ISO/IEC 17025 - Testing.

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Chris Lloyd

18/02/2020

Date:

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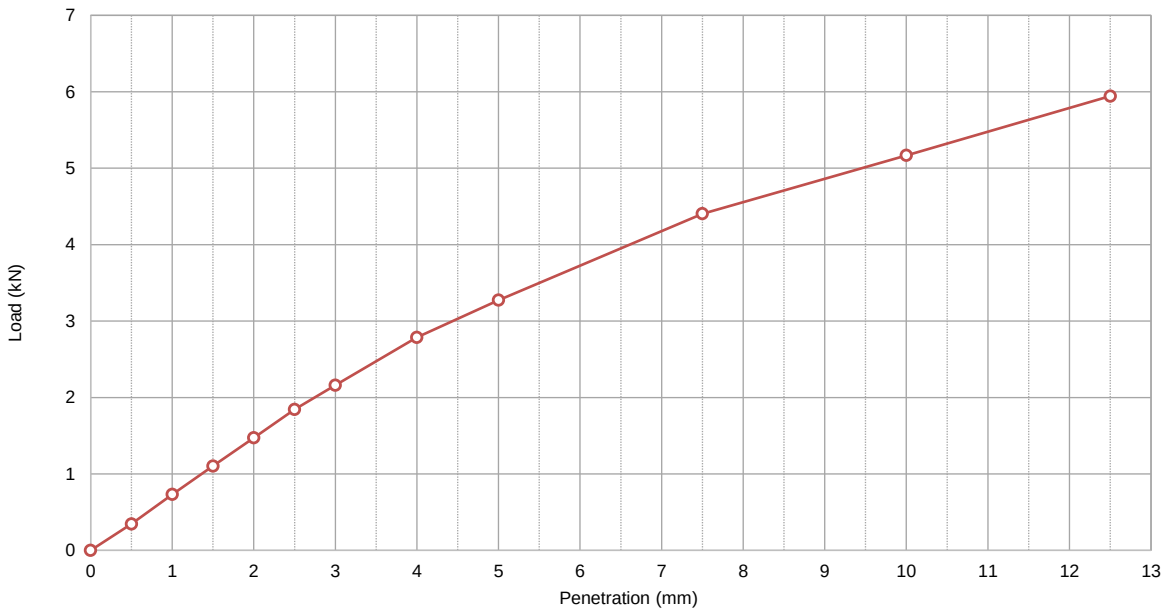
CALIFORNIA BEARING RATIO REPORT

Client	EI Australia	**Source**	TP15_1.1-1.2
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Gravelly CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No.**	S57545-CBR
Job No.	S20040	**Sample No.**	S57545

Test Procedure:				
☑	AS 1289.6.1.1	☐	RMS T117	California Bearing Ratio
☑	AS 1289.5.1.1	☐	RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
☐	AS 1289.5.2.1	☐	RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
☑	AS 1289.2.1.1	☐	RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Preparation & Specification		**Density & Moisture**	**Achieved**	**Target**
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)	102.5	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	99.5	100.0
Sample Curing Time (hrs)	48 hrs	Dry Density - At Compaction (t/m³)	1.97	1.97
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.97	
Surcharge Mass Applied (kg)	9.0	Specimen Swell (%)	0.0	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	11.7	
Maximum Dry Density - MDD (t/m³)	1.97	Moisture Content - Top 30mm (%)	12.6	
Optimum Moisture Content - OMC (%)	11.4	Moisture Content - Remainder (%)	11.8	

Material CBR Value (%): **17** **at a penetration of** **5.0** **mm**

Notes:

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DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

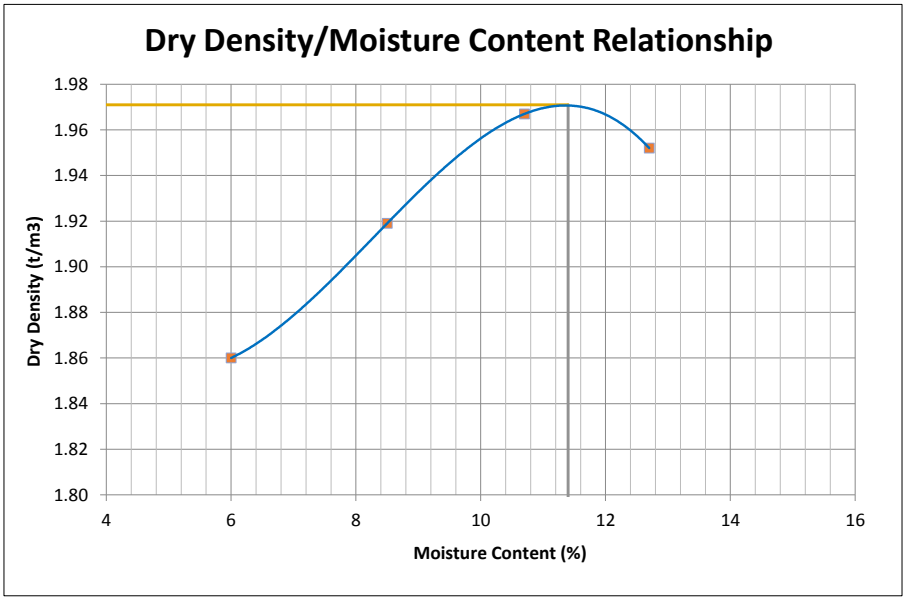
Client	EI Australia	**Source**	TP15_1.1-1.2
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Gravelly CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No**	S57545-MDD
Job No	S20040-1	**Sample No**	S57545

Test Procedure:

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Maximum Dry Density (t/m^3)	1.971
Optimum Moisture Content (%)	11.4
Oversize Retained on 19mm sieve (%)	15.3
Oversize Retained on 37.5mm sieve (%)	3.3
Curing Time	101 hrs
Liquid Limit Determination	Technician Assessment

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Authorised Signatory:

Chris Lloyd

18/02/2020

Date:

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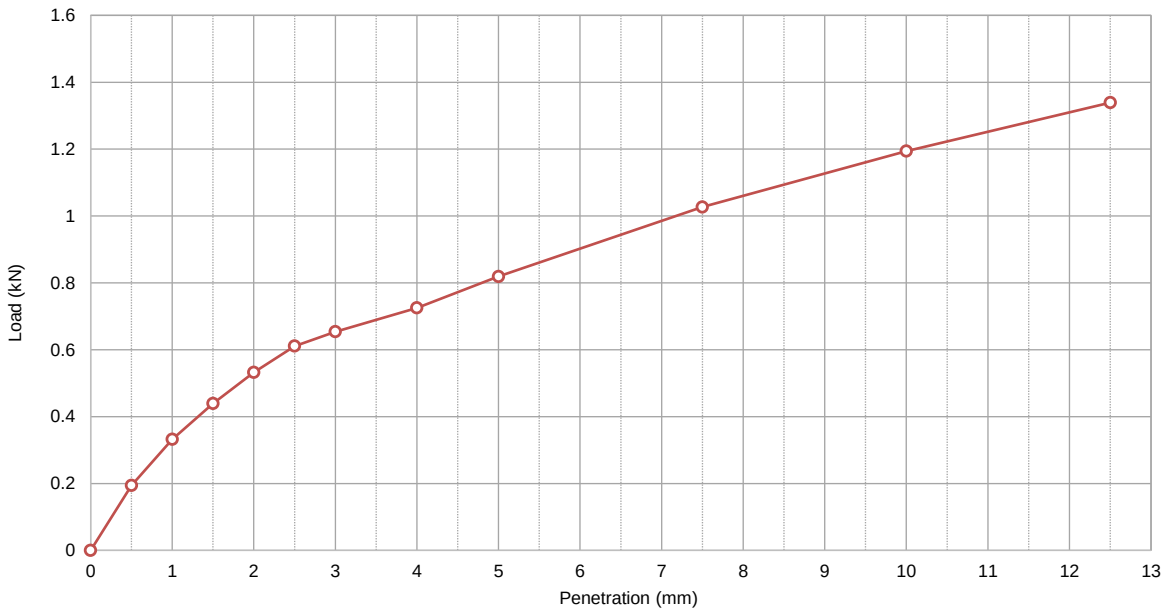
CALIFORNIA BEARING RATIO REPORT

Client	EI Australia	**Source**	TP16_1.9-2.0
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No.**	S57546-CBR
Job No.	S20040	**Sample No.**	S57546

Test Procedure:	☑	AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
	☑	AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
	☐	AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
	☑	AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Preparation & Specification		Density & Moisture	Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)	101.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	100.0	100.0
Sample Curing Time (hrs)	48 hrs	Dry Density - At Compaction (t/m³)	1.79	1.79
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.74	
Surcharge Mass Applied (kg)	9.0	Specimen Swell (%)	2.8	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	16.2	
Maximum Dry Density - MDD (t/m³)	1.79	Moisture Content - Top 30mm (%)	21.7	
Optimum Moisture Content - OMC (%)	16.0	Moisture Content - Remainder (%)	17.8	

Material CBR Value (%): **4.5** **at a penetration of** **2.5** **mm**

Notes:

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18/02/2020

Chris Lloyd Date:

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Alexandria NSW 2015

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

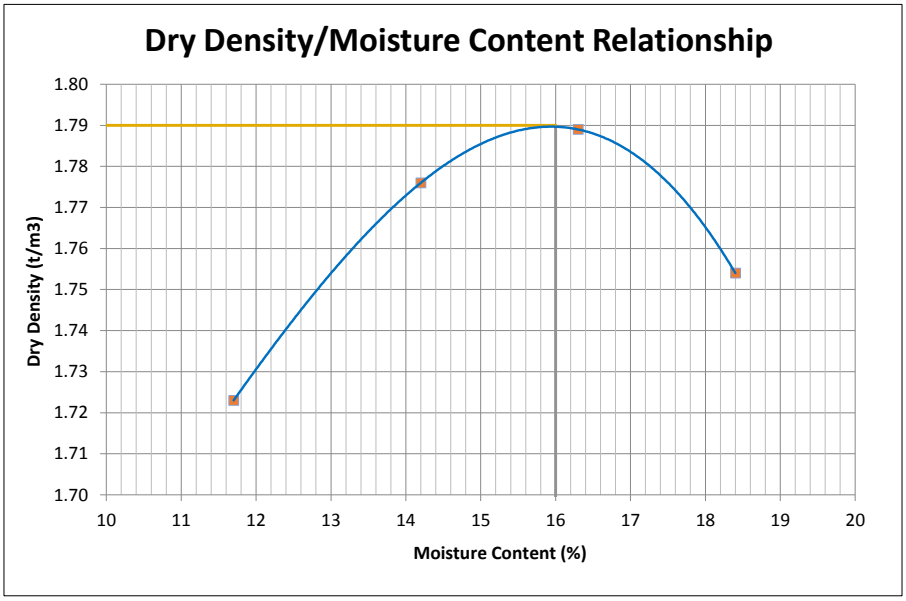
Client	EI Australia	**Source**	TP16_1.9-2.0
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No**	S57546-MDD
Job No	S20040-1	**Sample No**	S57546

Test Procedure:

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client	**Date Sampled:**	22-24/1/20
Preparation:	Prepared in accordance with the test method		



Maximum Dry Density (t/m^3)	1.790
Optimum Moisture Content (%)	16.0
Oversize Retained on 19mm sieve (%)	10.7
Oversize Retained on 37.5mm sieve (%)	5.5
Curing Time	169 hrs
Liquid Limit Determination	Technician Assessment

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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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57547-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57547	BH1M 4.79 - 4.87m	Shale							
			Axial	52.1	38.0	2.38	0.94	0.95	1
S57548	BH1M 5.63 - 5.73m	Shale							
			Axial	52.3	41.0	0.14	0.05	0.05	3
S57549	BH1M 6.37 - 6.45m	Shale							
			Axial	52.2	42.0	2.45	0.88	0.90	1
S57550	BH1M 7.53 - 7.62m	Shale							
			Axial	52.2	39.0	2.90	1.12	1.13	1
S57551	BH1M 8.54 - 8.74m	Shale							
			Axial	51.8	32.0	3.29	1.56	1.50	1
S57552	BH1M 9.61 - 9.70m	Shale							
			Axial	51.8	38.0	4.23	1.69	1.69	1
S57553	BH1M 10.92 - 10.99m	Shale							
			Axial	52.0	34.0	3.37	1.50	1.46	1
S57554	BH1M 11.56 - 11.66m	Shale							
			Axial	52.2	36.0	1.96	0.82	0.81	1
S57555	BH1M 13.15 - 13.24m	Shale							
			Axial	52.4	38.0	2.93	1.16	1.16	1
S57556	BH1M 14.47 - 14.57m	Shale							
			Axial	51.8	37.0	3.75	1.54	1.53	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57557-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57557	BH1M 15.51 - 15.61m	Shale							
			Axial	52.2	48.0	3.77	1.18	1.25	1
S57558	BH1M 16.69 - 16.79m	Shale							
			Axial	52.1	38.0	2.72	1.08	1.08	1
S57559	BH1M 17.78 - 17.87m	Shale							
			Axial	52.3	34.0	2.43	1.07	1.05	1
S57560	BH1M 19.09 - 19.19m	Shale							
			Axial	52.0	4.0	3.44	12.99	7.84	1
S57561	BH1M 20.16 - 20.26m	Shale							
			Axial	52.1	46.0	3.53	1.16	1.21	1
S57562	BH2 5.55 - 5.62m	Shale							
			Axial	52.1	32.0	0.22	0.10	0.10	1
S57563	BH2 6.65 - 6.73m	Shale							
			Axial	52.1	35.0	0.51	0.22	0.22	1
S57564	BH2 7.38 - 7.44m	Shale							
			Axial	52.0	30.0	1.73	0.87	0.83	1
S57565	BH2 8.06 - 8.14m	Shale							
			Axial	51.9	45.0	0.87	0.29	0.30	1
S57566	BH2 9.29 - 9.38m	Shale							
			Axial	51.9	40.0	3.87	1.46	1.48	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57567-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57567	BH2 10.49 - 10.57m	Shale							
			Axial	52.0	40.0	3.67	1.38	1.40	1
S57568	BH2 11.64 - 11.73m	Shale							
			Axial	52.4	36.0	3.95	1.64	1.63	1
S57569	BH2 12.85 - 12.94m	Shale							
			Axial	52.1	38.0	2.51	1.00	1.00	1
S57570	BH2 14.14 - 14.22m	Shale							
			Axial	52.0	32.0	2.60	1.23	1.18	1
S57571	BH2 15.12 - 15.25m	Shale							
			Axial	51.9	36.0	4.51	1.89	1.87	1
S57572	BH2 16.22 - 16.30m	Shale							
			Axial	51.9	34.0	2.74	1.22	1.19	1
S57573	BH2 17.41 - 17.51m	Shale							
			Axial	52.1	36.0	2.66	1.11	1.10	1
S57574	BH2 18.60 - 18.70m	Shale							
			Axial	52.0	33.0	2.51	1.15	1.11	1
S57575	BH2 19.69 - 19.77m	Shale							
			Axial	52.1	33.0	1.88	0.86	0.83	1
S57576	BH4 6.00 - 6.10m	Shale							
			Axial	52.0	35.0	1.81	0.78	0.77	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57577-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57577	BH4 6.68 - 6.78m	Shale							
			Axial	51.5	34.0	0.81	0.36	0.35	1
S57578	BH4 7.19 - 7.27m	Shale							
			Axial	51.9	31.0	2.63	1.28	1.23	1
S57579	BH4 8.35 - 8.44m	Shale							
			Axial	52.0	32.0	1.92	0.91	0.87	1
S57580	BH4 9.43 - 9.52m	Shale							
			Axial	52.1	36.0	2.40	1.00	0.99	1
S57581	BH4 10.65 - 10.76m	Shale							
			Axial	52.0	40.0	2.95	1.11	1.13	1
S57582	BH4 11.76 - 11.86m	Shale							
			Axial	51.9	36.0	3.81	1.60	1.58	1
S57583	BH4 13.00 - 13.09m	Shale							
			Axial	51.9	33.0	2.14	0.98	0.95	1
S57584	BH4 14.10 - 14.19m	Shale							
			Axial	52.2	30.0	4.76	2.39	2.27	1
S57585	BH4 15.29 - 15.39m	Shale							
			Axial	52.4	36.0	1.65	0.69	0.68	1
S57586	BH4 16.38 - 16.46m	Shale							
			Axial	52.1	38.0	1.09	0.43	0.43	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57587-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57587	BH4 17.70 - 17.79m	Shale							
			Axial	51.8	35.0	1.03	0.45	0.44	1
S57588	BH4 18.77 - 18.87m	Shale							
			Axial	51.9	45.0	1.32	0.44	0.46	1
S57589	BH4 19.78 - 19.88m	Shale							
			Axial	51.9	42.0	1.83	0.66	0.68	1
S57590	BH5 5.67 - 5.75m	Shale							
			Axial	51.5	36.0	0.36	0.15	0.15	1
S57591	BH5 6.53 - 6.63m	Shale							
			Axial	51.6	33.0	0.96	0.44	0.43	1
S57592	BH5 7.60 - 7.69m	Shale							
			Axial	51.4	39.0	2.77	1.09	1.09	1
S57593	BH5 8.26 - 8.37m	Shale							
			Axial	51.5	35.0	3.65	1.59	1.56	1
S57594	BH5 9.52 - 9.59m	Shale							
			Axial	51.6	40.0	3.11	1.18	1.20	1
S57595	BH5 10.71 - 10.81m	Shale							
			Axial	51.9	34.0	2.24	1.00	0.97	1
S57596	BH5 12.32 - 12.42m	Shale							
			Axial	51.5	40.0	3.23	1.23	1.24	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57597-PL
Job No:	S20040	**Date Tested:**	30/01/2020

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

Sampling: Sampled by Client **Date Sampled:** 22-24/1/20

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
S57597	BH5 13.48 - 13.57m	Shale							
			Axial	51.5	43.0	4.72	1.67	1.72	1
S57598	BH5 14.16 - 14.26m	Shale							
			Axial	51.4	35.0	4.62	2.02	1.98	1
S57599	BH5 15.34 - 15.42m	Shale							
			Axial	51.6	35.0	3.82	1.66	1.63	1
S57600	BH5 16.37 - 16.47m	Shale							
			Axial	51.8	42.0	3.23	1.17	1.19	1
S57601	BH5 17.60 - 17.70m	Shale							
			Axial	51.5	30.0	3.43	1.74	1.65	1
S57602	BH5 18.74 - 18.84m	Shale							
			Axial	51.2	39.0	3.33	1.31	1.31	1
S57603	BH5 19.80 - 19.90m	Shale							
			Axial	51.5	37.0	3.20	1.32	1.31	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57667-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57667	BH6 5.59 - 5.67m	Shale							
			Axial	51.5	39.0	0.24	0.09	0.09	1
S57668	BH6 6.51 - 6.61m	Shale							
			Axial	51.9	34.0	3.45	1.53	1.50	1
S57669	BH6 7.52 - 7.62m	Shale							
			Axial	51.7	35.0	3.48	1.51	1.48	1
S57670	BH6 8.43 - 8.53m	Shale							
			Axial	51.2	37.0	2.83	1.17	1.16	1
S57671	BH6 9.48 - 9.56m	Shale							
			Axial	51.4	44.0	3.59	1.25	1.29	1
S57672	BH6 10.43 - 10.52m	Shale							
			Axial	51.6	41.0	5.13	1.90	1.94	1
S57673	BH6 11.45 - 11.55m	Shale							
			Axial	51.4	33.0	2.43	1.13	1.09	1
S57674	BH6 12.20 - 12.30m	Shale							
			Axial	51.7	42.0	2.54	0.92	0.94	1
S57675	BH6 13.40 - 13.49m	Shale							
			Axial	51.6	35.0	3.30	1.43	1.41	1
S57676	BH6 14.47 - 14.57m	Shale							
			Axial	51.4	34.0	2.27	1.02	0.99	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57677-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57677	BH6 15.53 - 15.64m	Shale							
			Axial	51.6	45.0	2.27	0.77	0.80	1
S57678	BH6 16.51 - 16.60m	Shale							
			Axial	51.2	38.0	3.93	1.59	1.58	1
S57679	BH6 17.34 - 17.43m	Shale							
			Axial	51.5	30.0	1.69	0.86	0.81	1
S57680	BH6 18.29 - 18.39m	Shale							
			Axial	51.6	40.0	1.75	0.67	0.67	1
S57681	BH6 19.55 - 19.65m	Shale							
			Axial	52.0	34.0	2.12	0.94	0.92	1
S57682	BH7M 4.34 - 4.40m	Shale							
			Axial	51.5	36.0	1.12	0.47	0.47	1
S57683	BH7M 4.64 - 4.74m	Shale							
			Axial	51.4	36.0	3.69	1.56	1.54	1
S57684	BH7M 4.91 - 4.98m	Shale							
			Axial	51.3	33.0	2.14	0.99	0.96	1
S57685	BH7M 5.28 - 5.38m	Shale							
			Axial	51.5	35.0	2.47	1.08	1.06	1
S57686	BH7M 6.35 - 6.44m	Shale							
			Axial	51.5	31.0	1.92	0.94	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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Authorised Signatory:

Chris Lloyd

4/02/2020

Date

MACQUARIE GEOTECH

Macquarie Geotechn
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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57687-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57687	BH7M 7.68 - 779m	Shale							
			Axial	51.6	33.0	4.80	2.21	2.14	1
S57688	BH7M 9.0 - 9.09m	Shale							
			Axial	52.3	45.0	6.23	2.08	2.17	1
S57689	BH7M 10.26 - 10.33m	Shale							
			Axial	51.4	35.0	1.38	0.60	0.59	1
S57690	BH7M 11.75 - 11.84m	Shale							
			Axial	51.4	31.0	1.83	0.90	0.86	1
S57691	BH7M 13.07 - 13.15m	Shale							
			Axial	51.6	28.0	1.31	0.71	0.66	1
S57692	BH7M 14.25 - 14.34m	Shale							
			Axial	51.5	33.0	2.42	1.12	1.08	1
S57693	BH7M 15.50 - 15.59m	Shale							
			Axial	52.0	31.0	1.87	0.91	0.87	1
S57694	BH7M 17.13 - 17.21m	Shale							
			Axial	49.5	32.0	0.70	0.35	0.33	1
S57695	BH7M 18.48 - 18.58m	Shale							
			Axial	51.5	45.0	1.62	0.55	0.57	1
S57696	BH7M 19.17 - 19.25m	Shale							
			Axial	51.4	36.0	0.78	0.33	0.33	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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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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57697-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57697	BH8M 4.07 - 4.15m	Shale							
			Axial	51.3	35.0	0.55	0.24	0.24	1
S57698	BH8M 4.88 - 4.96m	Shale							
			Axial	51.4	35.0	1.54	0.67	0.66	1
S57699	BH8M 5.30 - 5.38m	Shale							
			Axial	52.3	37.0	2.79	1.13	1.13	1
S57700	BH8M 6.55 - 6.65m	Shale							
			Axial	51.5	36.0	2.12	0.90	0.89	1
S57701	BH8M 8.43 - 8.53m	Shale							
			Axial	51.2	36.0	2.18	0.93	0.92	1
S57702	BH8M 9.15 - 9.24m	Shale							
			Axial	51.3	44.0	1.75	0.61	0.63	1
S57703	BH8M 10.51 - 10.59m	Shale							
			Axial	51.4	36.0	1.60	0.68	0.67	1
S57704	BH8M 11.65 - 11.75m	Shale							
			Axial	51.6	46.0	1.37	0.45	0.47	1
S57705	BH8M 13.10 - 13.20m	Shale							
			Axial	51.4	36.0	1.59	0.67	0.67	1
S57706	BH8M 14.32 - 14.42m	Shale							
			Axial	51.3	44.0	1.12	0.39	0.40	3

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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57707-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57707	BH8M 15.67 - 15.77m	Shale							
			Axial	51.3	36.0	2.65	1.13	1.11	1
S57708	BH8M 17.05 - 17.15m	Shale							
			Axial	51.5	34.0	2.39	1.07	1.04	1
S57709	BH8M 18.20 - 18.30m	Shale							
			Axial	51.6	44.0	1.67	0.58	0.60	1
S57710	BH8M 19.47 - 19.57m	Shale							
			Axial	51.4	45.0	1.89	0.64	0.67	1
S57711	BH8M 20.31 - 20.41m	Shale							
			Axial	51.8	30.0	1.86	0.94	0.89	1
S57712	BH9 5.28 - 5.38m	Shale							
			Axial	51.4	42.0	0.67	0.24	0.25	3
S57713	BH9 5.65 - 5.75m	Shale							
			Axial	51.9	35.0	2.14	0.93	0.91	1
S57714	BH9 6.10 - 6.17m	Shale							
			Axial	51.7	32.0	1.67	0.79	0.76	1
S57715	BH9 7.23 - 7.34m	Shale							
			Axial	51.6	34.0	2.11	0.94	0.92	1
S57716	BH9 8.16 - 8.25m	Shale							
			Axial	51.5	45.0	4.01	1.36	1.41	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:	Tallawong Station Precinct South Rouse Hill (E24445 G03)	**Report No:**	S57717-PL
Job No:	S20040	**Date Tested:**	3/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 29-30/01/2020

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
S57717	BH9 9.75 - 9.85m	Shale							
			Axial	51.5	34.0	1.56	0.70	0.68	1
S57718	BH9 10.36 - 10.46m	Shale							
			Axial	51.6	35.0	1.56	0.68	0.67	1
S57719	BH9 11.54 - 11.65m	Shale							
			Axial	51.6	42.0	1.66	0.60	0.62	1
S57720	BH9 12.70 - 12.80m	Shale							
			Axial	51.6	32.0	1.93	0.92	0.88	1
S57721	BH9 13.58 - 13.68m	Shale							
			Axial	51.4	36.0	1.94	0.82	0.81	1
S57722	BH9 15.28 - 15.38m	Shale							
			Axial	51.8	36.0	2.10	0.88	0.87	4
S57723	BH9 16.60 - 16.70m	Shale							
			Axial	51.2	41.0	2.23	0.83	0.85	1
S57724	BH9 18.20 - 18.30m	Shale							
			Axial	51.6	44.0	2.33	0.81	0.83	1
S57725	BH9 19.33 - 19.42m	Shale							
			Axial	51.8	29.0	10.73	5.61	5.28	1
S57726	BH9 20.17 - 20.27m	Shale							
			Axial	51.7	42.0	2.24	0.81	0.83	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57774-PL
Job No:	S20054-1	**Date Tested:**	6/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57774	BH3M 7.41 - 7.47m	Shale							
			Axial	51.2	31.0	0.71	0.35	0.33	1
S57775	BH3M 7.84 - 7.92m	Shale							
			Axial	51.0	38.0	0.31	0.13	0.13	1
S57776	BH3M 8.84 -- 8.91m	Shale							
			Axial	50.7	37.0	2.36	0.99	0.98	1
S57777	BH3M 9.53 - 9.63m	Shale							
			Axial	50.2	31.0	0.31	0.16	0.15	1
S57778	BH3M 10.38 - 10.44m	Shale							
			Axial	50.7	29.0	0.63	0.34	0.32	1
S57779	BH3M 11.65 - 11.74m	Shale							
			Axial	51.0	32.0	0.91	0.44	0.42	1
S57780	BH3M 12.53 - 12.60m	Shale							
			Axial	50.4	38.0	1.13	0.46	0.46	1
S57781	BH3M 13.80 - 13.87m	Shale							
			Axial	51.2	34.0	0.82	0.37	0.36	1
S57782	BH3M 14.56 - 14.64m	Shale							
			Axial	51.6	32.0	1.06	0.50	0.48	1
S57783	BH3M 15.24 - 15.32m	Shale							
			Axial	51.6	31.0	0.25	0.12	0.12	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57784-PL
Job No:	S20054-1	**Date Tested:**	6/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57784	BH3M 16.43 - 16.52m	Shale							
			Axial	51.4	35.0	2.14	0.93	0.92	1
S57785	BH3M 17.61 - 17.70m	Shale							
			Axial	51.7	28.0	0.31	0.17	0.16	1
S57786	BH3M 18.48 - 18.58m	Shale							
			Axial	52.0	36.0	2.12	0.89	0.88	1
S57787	BH3M 19.84 - 19.91m	Shale							
			Axial	51.9	31.0	2.21	1.08	1.03	1
S57788	BH10 3.77 - 3.84m	Shale							
			Axial	51.5	35.0	0.46	0.20	0.20	1
S57789	BH10 4.23 - 4.34m	Shale							
			Axial	51.5	32.0	0.33	0.16	0.15	1
S57790	BH10 5.04 - 5.12m	Shale							
			Axial	51.7	34.0	0.10	0.04	0.04	1
S57791	BH10 5.54 - 5.60m	Shale							
			Axial	51.2	32.0	2.31	1.11	1.06	1
S57792	BH10 6.75 - 6.83m	Shale							
			Axial	51.8	45.0	3.66	1.23	1.28	1
S57793	BH10 7.50 - 7.58m	Shale							
			Axial	51.6	33.0	10.54	4.86	4.71	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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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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57794-PL
Job No:	S20054-1	**Date Tested:**	6/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57794	BH10 8.70 - 8.80m	Shale							
			Axial	51.5	42.0	3.89	1.41	1.44	1
S57795	BH10 9.44 - 9.54m	Shale							
			Axial	51.8	34.0	3.76	1.68	1.64	1
S57796	BH10 10.85 - 10.95m	Shale							
			Axial	51.5	35.0	3.40	1.48	1.45	1
S57797	BH10 11.70 - 11.79m	Shale							
			Axial	51.7	41.0	4.62	1.71	1.74	1
S57798	BH10 12.60 - 12.70m	Shale							
			Axial	51.5	40.0	4.63	1.76	1.78	1
S57799	BH10 13.45 - 13.54m	Shale							
			Axial	51.7	34.0	4.06	1.81	1.77	1
S57800	BH10 14.55 - 14.63m	Shale							
			Axial	51.7	35.0	4.02	1.75	1.71	1
S57801	BH10 15.40 - 15.49m	Shale							
			Axial	51.6	32.0	3.68	1.75	1.68	1
S57802	BH10 16.15 - 16.25m	Shale							
			Axial	51.7	36.0	4.17	1.76	1.74	1
S57803	BH10 17.22 - 17.29m	Shale							
			Axial	51.5	34.0	3.13	1.40	1.37	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57804-PL
Job No:	S20054-1	**Date Tested:**	6/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57804	BH10 18.52 - 18.59m	Shale							
			Axial	51.7	30.0	3.63	1.84	1.74	1
S57805	BH10 19.51 - 19.60m	Shale							
			Axial	51.4	38.0	3.28	1.32	1.32	1
S57806	BH10 20.60 - 20.70m	Shale							
			Axial	51.6	31.0	3.63	1.78	1.70	1
S57807	BH11M 6.19 - 6.24m	Shale							
			Axial	51.8	32.0	0.06	0.03	0.03	1
S57808	BH11M 6.75 - 6.79m	Shale							
			Axial	51.7	31.0	0.26	0.13	0.12	1
S57809	BH11M 7.90 - 7.96m	Shale							
			Axial	51.7	36.0	3.68	1.55	1.53	1
S57810	BH11M 8.62 - 8.69m	Shale							
			Axial	51.7	30.0	3.03	1.53	1.46	1
S57811	BH11M 9.40 - 9.49m	Shale							
			Axial	51.4	31.0	3.10	1.53	1.46	1
S57812	BH11M 10.30 - 10.39m	Shale							
			Axial	51.6	38.0	3.84	1.54	1.54	1
S57813	BH11M 11.41 - 11.48m	Shale							
			Axial	51.7	35.0	3.36	1.46	1.43	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57814-PL
Job No:	S20054-1	**Date Tested:**	6/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57814	BH11M 12.49 - 12.56m	Shale							
			Axial	51.8	36.0	2.97	1.25	1.24	1
S57815	BH11M 13.72 - 13.79m	Shale							
			Axial	51.6	35.0	3.33	1.45	1.42	1
S57816	BH11M 14.57 - 14.65m	Shale							
			Axial	51.7	32.0	3.99	1.89	1.82	1
S57817	BH11M 15.74 - 15.84m	Shale							
			Axial	51.6	38.0	3.00	1.20	1.20	1
S57818	BH11M 16.68 - 16.75m	Shale							
			Axial	51.6	35.0	4.39	1.91	1.87	1
S57819	BH11M 17.74 - 17.82m	Shale							
			Axial	51.7	34.0	4.58	2.05	2.00	1
S57820	BH11M 18.59 - 18.69m	Shale							
			Axial	51.8	29.0	2.92	1.53	1.44	1
S57821	BH11M 19.78 - 19.88m	Shale							
			Axial	51.6	35.0	3.73	1.62	1.59	1
S57822	BH12 4.0 - 4.09m	Shale							
			Axial	51.9	33.0	0.23	0.11	0.10	1
S57823	BH12 4.77 - 4.84m	Shale							
			Axial	51.6	38.0	2.61	1.05	1.04	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

11/02/2020

Date

MACQUARIE GEOTECH

Macquarie Geotechn
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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57824-PL
Job No:	S20054-1	**Date Tested:**	7/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57824	BH12 5.58 - 5.67m	Shale							
			Axial	51.7	40.0	2.42	0.92	0.93	1
S57825	BH12 6.22 - 6.30m	Shale							
			Axial	51.5	28.0	3.60	1.96	1.83	1
S57826	BH12 7.38 - 7.45m	Shale							
			Axial	51.3	33.0	2.57	1.19	1.15	1
S57827	BH12 8.56 - 8.75m	Shale							
			Axial	51.6	41.0	3.24	1.20	1.22	1
S57828	BH12 9.41 - 9.51m	Shale							
			Axial	51.6	42.0	3.69	1.34	1.37	1
S57829	BH12 10.65 - 10.75m	Shale							
			Axial	51.7	33.0	3.99	1.84	1.78	1
S57830	BH12 11.53 - 11.60m	Shale							
			Axial	51.7	44.0	4.33	1.49	1.54	1
S57831	BH12 12.53 - 12.62m	Shale							
			Axial	51.5	35.0	3.10	1.35	1.33	1
S57832	BH12 13.41 - 13.49m	Shale							
			Axial	51.5	40.0	5.94	2.26	2.29	1
S57833	BH12 14.58 - 14.68m	Shale							
			Axial	52.0	45.0	5.18	1.74	1.81	1

Failure Modes

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

2 - Fracture along bedding.

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

4 - Chip or partial fracture.

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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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57834-PL
Job No:	S20054-1	**Date Tested:**	7/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57834	BH12 15.37 - 15.47m	Shale							
			Axial	51.8	35.0	2.64	1.14	1.12	1
S57835	BH12 16.38 - 16.48m	Shale							
			Axial	51.5	42.0	3.14	1.14	1.16	1
S57836	BH12 17.50 - 17.59m	Shale							
			Axial	51.6	34.0	3.93	1.76	1.71	1
S57837	BH12 18.69 - 18.77m	Shale							
			Axial	51.5	45.0	3.78	1.28	1.33	1
S57838	BH12 19.85 - 19.91m	Shale							
			Axial	51.3	42.0	3.28	1.19	1.22	1
S57839	BH12 20.68 - 20.78m	Shale							
			Axial	51.4	35.0	2.25	0.98	0.96	1
S57840	BH13M 4.05 - 4.13m	Shale							
			Axial	51.2	31.0	1.09	0.54	0.51	1
S57841	BH13M 4.82 - 4.88m	Shale							
			Axial	51.7	38.0	0.65	0.26	0.26	1
S57842	BH13M 5.52 - 5.62m	Shale							
			Axial	51.6	34.0	2.69	1.20	1.17	1
S57843	BH13M 6.40 - 6.50m	Shale							
			Axial	51.7	37.0	3.76	1.54	1.53	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57844-PL
Job No:	S20054-1	**Date Tested:**	7/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57844	BH13M 7.61 - 7.70m	Shale							
			Axial	51.9	35.0	3.89	1.68	1.65	1
S57845	BH13M 8.72 - 8.81m	Shale							
			Axial	51.4	35.0	3.11	1.36	1.33	1
S57846	BH13M 9.47 - 9.56m	Shale							
			Axial	51.5	31.0	2.60	1.28	1.22	1
S57847	BH13M 10.64 - 10.71m	Shale							
			Axial	51.9	34.0	4.21	1.87	1.83	1
S57848	BH13M 11.42 - 11.52m	Shale							
			Axial	51.7	40.0	4.45	1.69	1.71	1
S57849	BH13M 12.77 - 12.86m	Shale							
			Axial	51.8	31.0	2.52	1.23	1.18	1
S57850	BH13M 13.49 - 13.57m	Shale							
			Axial	51.6	34.0	3.78	1.69	1.65	1
S57851	BH13M 14.00 - 14.09m	Shale							
			Axial	51.8	35.0	3.52	1.52	1.50	1
S57852	BH13M 15.30 - 15.37m	Shale							
			Axial	51.6	32.0	2.27	1.08	1.04	1
S57853	BH13M 16.64 - 16.73m	Shale							
			Axial	51.5	31.0	2.29	1.13	1.08	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:	Tallawong Station Rouse Hill (E24445 G03)	**Report No:**	S57854-PL
Job No:	S20054-1	**Date Tested:**	7/02/2020

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

Sampling: Sampled by Client **Date Sampled:** 31/1-4/2/20

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
S57854	BH13M 17.50 - 17.60m	Shale							
			Axial	51.6	36.0	2.67	1.13	1.11	1
S57855	BH13M 18.62 - 18.72m	Shale							
			Axial	51.7	30.0	2.25	1.14	1.08	1
S57856	BH13M 20.00 - 20.10m	Shale							
			Axial	51.8	36.0	2.52	1.06	1.05	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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MOISTURE CONTENT TEST REPORT

Client:	EI Australia	**Job No:**	S20054-1
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Report No:**	S57857-MC
Project:	Tallawong Station Rouse Hill (E24445 G03)		

Test Procedure:

- ☑ AS 1289 2.1.1 Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (Standard method).
- ☐ AS4133 1.1.1 Rock moisture content tests - Determination of the moisture content of rock - Oven drying method (standard method)
- ☐ RMS T120 Moisture content of road construction materials (Standard method)
- ☐ RMS T262 Determination of moisture content of aggregates (Standard method)

Sampling:	Sampled by Client	**Date Sampled:**	Unknown
Preparation:	Prepared in accordance with the test method		

Sample No.	Source	Sample Description	Moisture Content %
S57857	BH3M_4.5-4.95	Silty CLAY	**20.2**
S57858	BH7M_3.0-3.45	Silty CLAY	**23.3**
S57859	BH10_1.5-1.95	Silty CLAY	**13.9**
S57860	BH13M_1.5-1.95	Silty CLAY	**17.3**

Notes:

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Authorised Signatory:

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13/02/2020

Date:

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Alexandria NSW 2015

SOIL CLASSIFICATION REPORT

Client	EI Australia	**Source**	BH3M_4.5-4.95
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Rouse Hill (E24445 G03)	**Report No**	S57857-PI
Job No	S20054-1	**Lab No**	S57857

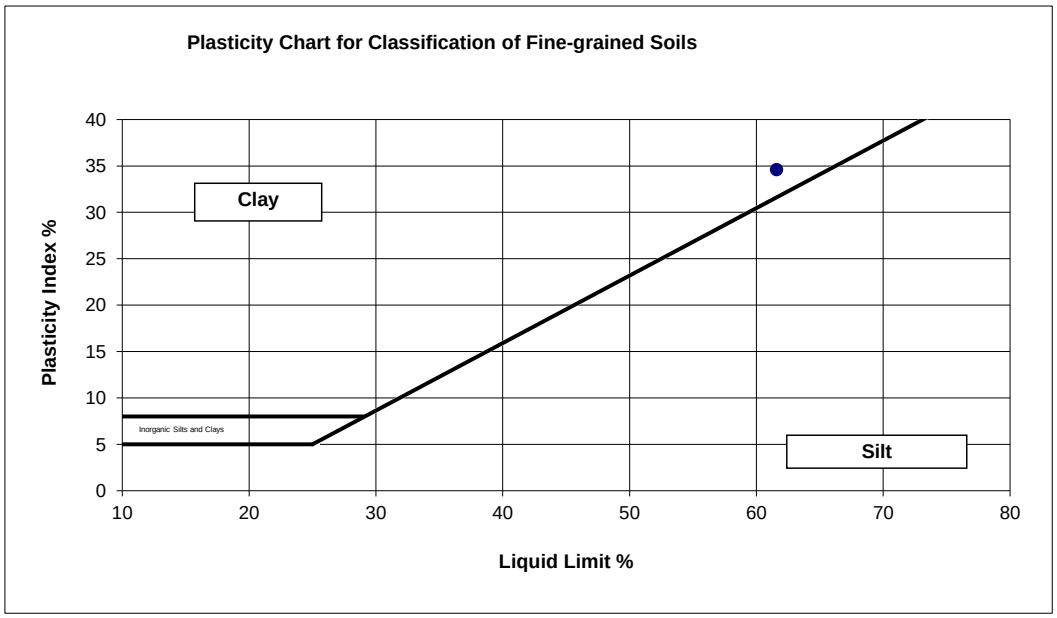
Test Procedure:

- ☐ AS1289 2.1.1 Soil moisture content tests (Oven drying method)
- ☑ AS1289 3.1.1 Soil classification tests - Determination of the liquid limit of a soil - Four point casagrande method
- ☐ AS1289 3.1.2 Soil classification tests - Determination of the liquid limit if a soil - One point Casagrande method (subsidiary method)
- ☑ AS1289 3.2.1 Soil classification tests - Determination of the plastic limit of a soil - Standard method
- ☑ AS1289 3.3.1 Soil classification tests - Calculation of the plasticity Index of a soil
- ☑ AS1289 3.4.1 Soil classification tests - Determination of the linear shrinkage of a soil - Standard method

Sampling: Sampled by Client **Date Sampled:** Unknown

Preparation: Prepared in accordance with the test method

Liquid Limit (%)	62	**Linear Shrinkage (%)**	12.0
Plastic Limit (%)	27	**Plasticity Index**	35



Soil Preparation Method: Dry Sieved
Soil History: Oven Dried
Soil Condition: Linear

Notes

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Date:

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SOIL CLASSIFICATION REPORT

Client	EI Australia	**Source**	BH7M_3.0-3.45
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Rouse Hill (E24445 G03)	**Report No**	S57858-PI
Job No	S20054-1	**Lab No**	S57858

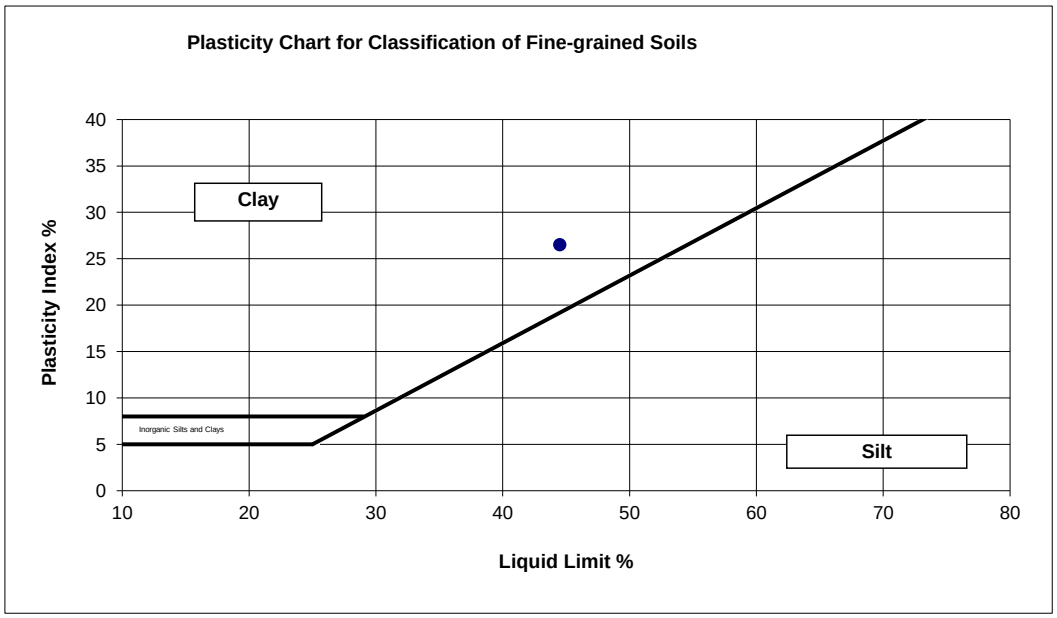
Test Procedure:

- ☐ AS1289 2.1.1 Soil moisture content tests (Oven drying method)
- ☑ AS1289 3.1.1 Soil classification tests - Determination of the liquid limit of a soil - Four point casagrande method
- ☐ AS1289 3.1.2 Soil classification tests - Determination of the liquid limit if a soil - One point Casagrande method (subsidiary method)
- ☑ AS1289 3.2.1 Soil classification tests - Determination of the plastic limit of a soil - Standard method
- ☑ AS1289 3.3.1 Soil classification tests - Calculation of the plasticity Index of a soil
- ☑ AS1289 3.4.1 Soil classification tests - Determination of the linear shrinkage of a soil - Standard method

Sampling: Sampled by Client **Date Sampled:** Unknown

Preparation: Prepared in accordance with the test method

Liquid Limit (%)	45	**Linear Shrinkage (%)**	11.0
Plastic Limit (%)	18	**Plasticity Index**	27



Soil Preparation Method: Dry Sieved
Soil History: Oven Dried
Soil Condition: Linear

Notes

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SOIL CLASSIFICATION REPORT

Client	EI Australia	**Source**	BH10_1.5-1.95
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Rouse Hill (E24445 G03)	**Report No**	S57859-PI
Job No	S20054-1	**Lab No**	S57859

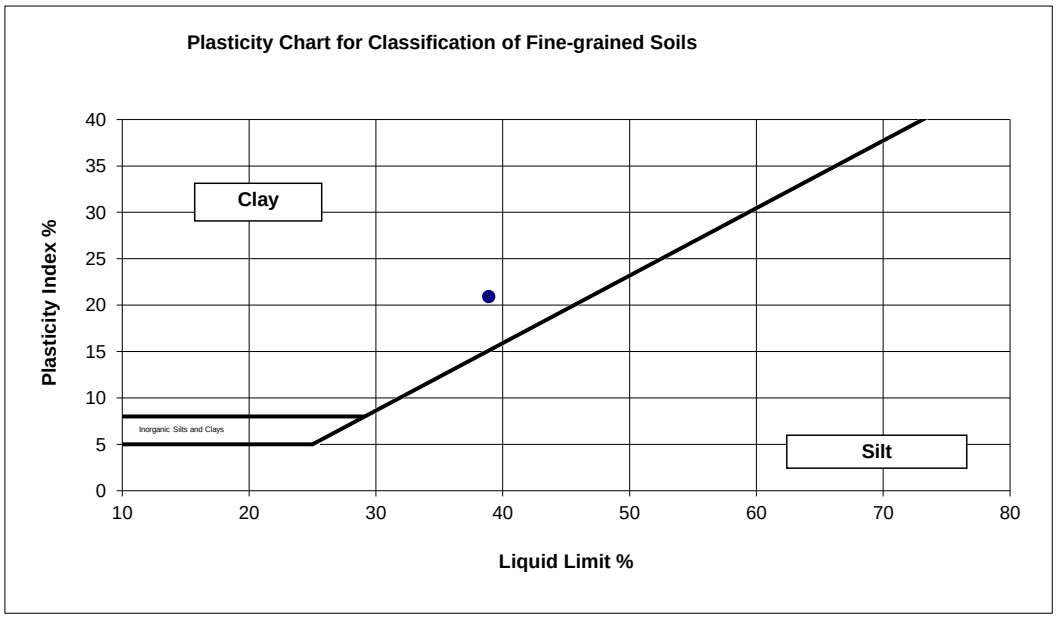
Test Procedure:

- ☐ AS1289 2.1.1 Soil moisture content tests (Oven drying method)
- ☑ AS1289 3.1.1 Soil classification tests - Determination of the liquid limit of a soil - Four point casagrande method
- ☐ AS1289 3.1.2 Soil classification tests - Determination of the liquid limit if a soil - One point Casagrande method (subsidiary method)
- ☑ AS1289 3.2.1 Soil classification tests - Determination of the plastic limit of a soil - Standard method
- ☑ AS1289 3.3.1 Soil classification tests - Calculation of the plasticity Index of a soil
- ☑ AS1289 3.4.1 Soil classification tests - Determination of the linear shrinkage of a soil - Standard method

Sampling: Sampled by Client **Date Sampled:** Unknown

Preparation: Prepared in accordance with the test method

Liquid Limit (%)	39	**Linear Shrinkage (%)**	10.0
Plastic Limit (%)	18	**Plasticity Index**	21



Soil Preparation Method: Dry Sieved
Soil History: Oven Dried
Soil Condition: Linear

Notes

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SOIL CLASSIFICATION REPORT

Client	EI Australia	**Source**	BH13M_1.5-1.95
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description**	Silty CLAY
Project	Tallawong Station Rouse Hill (E24445 G03)	**Report No**	S57860-PI
Job No	S20054-1	**Lab No**	S57860

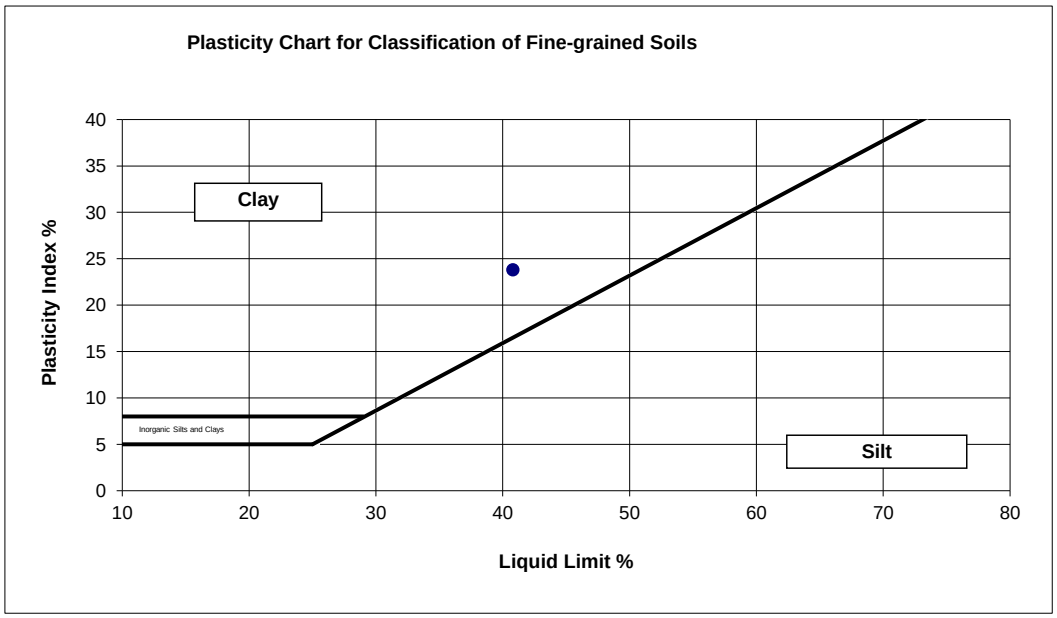
Test Procedure:

- ☐ AS1289 2.1.1 Soil moisture content tests (Oven drying method)
- ☑ AS1289 3.1.1 Soil classification tests - Determination of the liquid limit of a soil - Four point casagrande method
- ☐ AS1289 3.1.2 Soil classification tests - Determination of the liquid limit if a soil - One point Casagrande method (subsidiary method)
- ☑ AS1289 3.2.1 Soil classification tests - Determination of the plastic limit of a soil - Standard method
- ☑ AS1289 3.3.1 Soil classification tests - Calculation of the plasticity Index of a soil
- ☑ AS1289 3.4.1 Soil classification tests - Determination of the linear shrinkage of a soil - Standard method

Sampling: Sampled by Client **Date Sampled:** Unknown

Preparation: Prepared in accordance with the test method

Liquid Limit (%)	41	**Linear Shrinkage (%)**	8.0
Plastic Limit (%)	17	**Plasticity Index**	24



Soil Preparation Method: Dry Sieved
Soil History: Oven Dried
Soil Condition: Linear

Notes

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Alexandria NSW 2015

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Barath Kumar
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	barath.kumar@eiaustralia.com.au
Project	**E24445.G03 Tallawong Station Rouse Hill**
Order Number	**E24445.G03**
Samples	4

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	**SE202494 R0**
Date Received	5/2/2020
Date Reported	11/2/2020

COMMENTS

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SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 6/2/2020

PARAMETER	UOM	LOR	BH5_3.0-3.45 SOIL - 23/1/2020 SE202494.001	BH6_1.5-1.9 SOIL - 24/1/2020 SE202494.002	BH11M_1.5-1.95(Fill SOIL - 31/1/2020 SE202494.003	BH12_3.0-3.45 SOIL - 3/2/2020 SE202494.004
Chloride	mg/kg	0.25	380	310	140	530
Sulfate	mg/kg	5	110	210	200	150

pH in soil (1:5) [AN101] Tested: 7/2/2020

PARAMETER	UOM	LOR	BH5_3.0-3.45 SOIL - 23/1/2020 SE202494.001	BH6_1.5-1.9 SOIL - 24/1/2020 SE202494.002	BH11M_1.5-1.95(Fill SOIL - 31/1/2020 SE202494.003	BH12_3.0-3.45 SOIL - 3/2/2020 SE202494.004
pH	pH Units	0.1	**5.5**	**5.1**	**8.5**	**5.5**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 7/2/2020

PARAMETER	UOM	LOR	BH5_3.0-3.45 SOIL - 23/1/2020 SE202494.001	BH6_1.5-1.9 SOIL - 24/1/2020 SE202494.002	BH11M_1.5-1.95(Fill SOIL - 31/1/2020 SE202494.003	BH12_3.0-3.45 SOIL - 3/2/2020 SE202494.004
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**340**	**350**	**340**	**460**

Moisture Content [AN002] Tested: 6/2/2020

PARAMETER	UOM	LOR	BH5_3.0-3.45 SOIL - 23/1/2020 SE202494.001	BH6_1.5-1.9 SOIL - 24/1/2020 SE202494.002	BH11M_1.5-1.95(Fill SOIL - 31/1/2020 SE202494.003	BH12_3.0-3.45 SOIL - 3/2/2020 SE202494.004
% Moisture	%w/w	1	**15.3**	**16.0**	**11.4**	**11.5**

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 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.

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.