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DEICORP PTY LTD

Dewatering Management Plan

2 Mandala Parade, Castle Hill NSW

E24724.E16_Rev0
18 November 2021

DOCUMENT CONTROL

Report Title:	Dewatering Management Plan; 2 Mandala Parade, Castle Hill NSW
Report No:	E24724.E16_Rev0

Copies	Recipient
1 Soft Copy (PDF – Secured, issued by email)	Deicorp Pty Ltd Level 4, 161 Redfern St, **REDFERN NSW 2016**
2 Original (Saved to Digital Archives)	EI Australia Suite 6.01, 55 Miller Street, **PYRMONT NSW 2009**

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Revision	Details	Date	Amended By
0	Original	18 November 2021	-

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1. INTRODUCTION

1.1 Overview

Mr Greg Colbran of Deicorp Pty Ltd (the client) engaged EI Australia (EI) to prepare a Dewatering Management Plan (DMP) for 2 Mandala Parade, Castle Hill NSW (the site).

The site is located within the Local Government Area (LGA) of The Hills Shire Council (**Figure 1, Appendix A**) and covers a total area of 7,969 m². The site is legally defined as Lot 55 in Deposited Plan (DP) 1253217 (see **Figure 2, Appendix A**).

It was understood that modification approval was issued for the development by The Hills Shire Council. As basement construction would intercept the local groundwater table, temporary dewatering was required. This DMP aims to comply with The Hills Shire Council and NSW Office of Water (WaterNSW) requirements in relation to the proposed dewatering activities.

This DMP will be used as the basis for approval to connect and discharge to council's stormwater system. In addition, it will be submitted to WaterNSW in order to gain approval for a temporary dewatering licence.

1.2 Proposed Development

Based on the supplied plans **(Appendix B)**, the proposed development would include construction of multi-storey, mixed use commercial and residential apartment buildings, overlying a common podium structure with six-levels of basement car park.

The basements were to be constructed to the site boundaries; with the lowest basement level (B06) will require a Finished Floor Level (FFL) of 70.20m Australian Height Datum (AHD). It is understood that a Bulk Excavation Level (BEL) of RL 69.10mAHD will be required for the lowest basement level, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths of 19 m Below Existing Ground Level (mBGL) at the Doran Drive end of the site to 26.6 mBGL at the Andalusian Way end of the site have been estimated. Locally deeper excavations may be required for footings, services trenches, crane pads and lift overrun pits. EI have assumed the basement design would be drained basement with permanent dewatering.

The proposed development is immediately north of the Sydney Metro Hill Showground Station and tunnel (see **Figure 2**).

1.3 DMP Objectives

The objectives of this DMP are to:

- Describe the dewatering methodology, groundwater treatment requirements, monitoring and reporting procedures to be employed during temporary dewatering activities; and
- Provide effective management and contingency procedures to ensure that the discharge of extracted groundwater does not pose unacceptable risks to the receiving environment.

1.4 Scope of Work

With reference to the DMP objectives, the following works were undertaken:

- Complete a detailed review to extract the relevant information from previous geotechnical and environmental reports and official correspondence letters prepared for the proposed development;

- A search of registered groundwater bores licensed by Water NSW (formerly the Department of Primary Industries and NSW Office of Water) located within a 500m radius of the site; and. In particular, the database was reviewed for existing information regarding groundwater quality, bore yield and the number of bores that may be subject to potential impact by the proposed dewatering operations, if any;
- Interpretation of previous groundwater quality results in relation to the ANZG 2018 95% Trigger Values for Freshwater or Marine Aquatic Ecosystems guidelines;
- Review Council DA consent conditions and WaterNSW requirements to determine the generic and site specific conditions placed on the development relevant to the dewatering process.
- Attend a meeting with the dewatering and shoring contractors and the relative design engineers to ensure the required documentation and plans can be supplied to support the licence application process (if required);
- Prepare a dewatering management plan (DMP) for the site; and
- Prepare a WaterNSW Water licence application for the proposed dewatering.

1.5 Regulatory Requirements

The information provided in this DMP addresses WaterNSW *Mandatory Assessment Requirements for Groundwater Approval (Dewatering) Under the Water Management Act 2000*.

2. SITE DESCRIPTION

2.1 Property Identification, Location and Physical Setting

The site identification details and associated information are summarised in **Table 2-1**. Site locality and layout plans are provided in **Appendix A**.

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	2 Mandala Parade, Castle Hill
Lot and DP	Lot 55 in DP 1253217
Site Area	7,969 m^2
Site Coordinates	Northeast corner of site: GDA2020-MGA56 ▪ Easting: 313544.048; ▪ Northing: 6266325.101. (Source: http://maps.six.nsw.gov.au)
State Survey Marks	Two State Survey (SS) marks are situated within close proximity to the site: ▪ SS62672N: at the roundabout of Carrington Road and Andalusian Way (approximately 63m southeast); and ▪ SS180257: on Carrington Road (approximately 83m southwest). (Source: http://maps.six.nsw.gov.au)
Local Government Authority	The Hills Shire Council
Current Zoning	B2: Local Centre (The Hills Local Environmental Plan 2019)
Surrounding Land Use	**North**: Castle Hill Showground **East**: Hills Showground Precinct East, which consists of the former The Hills Shire Council; **South**: Hills Showground Metro Station and associated station plaza and Metro tunnel; and **West**: Hills Showground Precinct West, which consists of a commuter carpark and plaza
Site Stratigraphy	Based on previous geotechnical and environmental (intrusive) investigations, the stratigraphy of the site is described as: **Fill**: Silty CLAY; low plasticity, with sandstone, gravels and sand, and gravelly and silty SAND, fine to medium grained, with gravels, clay, sandstone and foreign materials ; overlying **Residual Soil:** Silty and sandy CLAY; low to medium plasticity, with gravels and sand, grading to extremely weathered sandstone; overlaying **Sandstone Bedrock**: fine to medium grained, pale grey and orange-brown, low to medium strength, slightly to distinctly weathered.

2.2 Regional Setting

Regional topography, (hydro)geology and soil landscape information is summarised in **Table 2-2.**

Table 2-2 Regional Setting Information

Attribute	Description
Topography	The site displays a moderate downslope towards the southwest, with site levels varying from 98.13m AHD in the north-eastern site corner to 90.63m AHD in the south-western site corner (Appendix C). The batters along the site boundaries have an average 1-1.5m drop towards the surrounding roads. Regionally, the area slopes south-westerly towards Cattai Creek.
Site Drainage	Site drainage is likely to be consistent with the general slope of the site. Any run off would be expected to flow into the new constructed stormwater pits on the site, which flows into the municipal stormwater system and then into Cattai Creek approximately 130m southwest of the site.
Surface Water Receptor	Cattai Creek, located approximately 130m southwest of the site.
Regional Geology and Soil Landscape	The Department of Mineral Resources Penrith 1:100,000 Geological Series Sheet 9030 indicates the site is underlain by Hawkesbury Sandstone (Rh), consisting of medium to very coarse-grained quartz sandstone, minor laminated mudstone and siltstone lenses. However, the eastern end of the site is close to a boundary with Ashfield Shale (Rwa), consisting of dark-grey to black claystone-siltstone and fine sandstone-siltstone laminite. The thin Mittagong Formation may or may not be present between the Ashfield Shale and Hawkesbury Sandstone. The Soil Conservation Service of NSW Soil Landscapes of the Penrith 1:100,000 Sheet (Bannerman SM and Hazelton PA, 1990) indicates that the eastern portion of the site overlies an erosional Glenorie (gn) soil landscape, characterised by undulating to rolling low hills on Wianamatta Group shales, while the western portion of the site overlies a colluvial Hawkesbury (ha) soil landscape, characterised by rugged, rolling to very steep hills on Hawkesbury Sandstone.
Acid Sulfate Soils (ASS)	With reference to the Prospect/Parramatta River Acid Sulfate Soil Risk Map (1:25,000 scale; Murphy, 1997) and The Hills Local Environmental Plan 2019, the site is not situated in an ASS classed area. As such, ASS is unlikely to be encountered during development works at the site. The contamination report previously prepared for the site (JBS&G, 2019) also concluded that no further management for the potential presence of ASS is required during future ground disturbance works.
Hydrogeology and Groundwater Use	An online search of groundwater bores registered with WaterNSW was conducted by EI on 31 July 2020 (Ref. https://realtimedata.waternsw.com.au/water.stm). There was one registered bore within a 500 m radius of the site, and was registered for monitoring purpose. Contamination report prepared by JBS&G (2019) also identified one groundwater bore (GW100981) approximately 550m northeast from the site, which was authorized for domestic use. The water table (as indicated by standing water levels, SWL) was recorded at 8.0m BGL.

3. GROUNDWATER CONDITIONS

Water quality data were available from the following environmental and geotechnical reports:

- JBS&G (2009) *Phase 1 and 2 Environmental Site Assessment*;
- JBS&G (2013) *Contamination Due Diligence Advice, Former Hills Shire Depot, Carrington Road, Castle Hill, NSW*, Report Ref. 42829/54994 (Rev1), dated 26 August 2013;
- Arup (2015) *Showground Precinct Desktop Contamination Review*, dated 1 September 2015;
- Douglas Partners (2016) *Report on UST Validation Sydney Metro Northwest, Showground Station, Carrington Road, Castle Hill NSW*, Ref. 73315.03.R.001.Rev0.UST Validation, dated 6 May 2016;
- JBS&G (2019) *Soil and Contamination Report*, Ref. 54813/125497 (Rev1), dated 29 October 2019;
- EI (2021a) *Detailed Site Investigation, Doran Drive Precinct, 2 Mandala Parade, Castle Hill NSW,* report ref. E24724.E02_Rev2, dated 9 July 2021;
- EI (2021b) *Geotechnical Investigation, 2 Mandala Parade, Castle Hill NSW,* report ref. E24724.G03_Rev2, dated 9 July 2021;
- EI (2021c) *Groundwater Take Assessment (GTA), 2 Mandala Parade, Castle Hill NSW,* report ref. E24724.G12, dated 5 November 2021; and
- EI (2021d) *Impact Assessment on Sydney Metro Tunnels, 2 Mandala Parade, Castle Hill NSW,* report ref. E24724.G06, dated 15 November 2021.

Pertinent details relevant to the dewatering of the site are presented below. Refer to the figures in **Appendix A** for previous sampling (monitoring well and borehole) locations, as well as **Appendix C** for more detailed groundwater quality data and borehole logs.

The requirements for dewatering, including volumes, management and shoring, are discussed under the EI 2021 GTA report (**Appendix D**), and should be read in conjunction with this DMP.

3.1 Groundwater Depth and Flow Direction

As part of the DSI scope, EI (2021) had installed 4 monitoring wells (BH3M-a, BH4M-a, BH5M and BH7M) for groundwater monitoring. EI undertook a Groundwater Monitoring Event on 14 July 2020 and 11 October 2021 at the mentioned wells.

Groundwater measurements are presented in **Table 3-1** below.

Table 3-1 Groundwater Depth Summary – based on previous reports

Monitoring Well / Borehole ID	Date of Observation	Depth to standing Groundwater (m BGL)	Groundwater RL (m AHD)	Assumed Bulk Excavation Level (m AHD)
BH3M	14/7/20	15.4	75.6	69.1
BH4M	14/7/20	20.5	77.5	
BH3M	11/10/21	15.2	75.8	
BH3Ma	11/10/21	2.9	88.2	

Monitoring Well / Borehole ID	Date of Observation	Depth to standing Groundwater (m BGL)	Groundwater RL (m AHD)	Assumed Bulk Excavation Level (m AHD)
BH4M	11/10/21	19.9	78.1	
BH4Ma	11/10/21	4.6	93.4	
BH5M	11/10/21	4.2	89.9	
BH7M	11/10/21	4.8	88.4	

Note 1 RL – reduced level (corrected) elevation in meters at ground level relative to Australian Height Datum (m AHD)
Note 2 BGL – metres below ground level (depth to groundwater relative to ground level)
Note 3 Surface RLs extrapolated from site survey plan

3.2 Groundwater Quality

A groundwater monitoring event (GME) was conducted by EI on 29 July 2020 for all the monitoring wells installed. In addition, another round of sampling for BH4M-a was conducted on 18 August to confirm the heavy metal results. Samples were then evaluated on the basis of odour and visual signs of contamination, with the following observations noted:

- Groundwater in monitoring well BH3M-a and BH5M was noted to be light brown, with low to medium turbidity, while in BH4M-a, groundwater was noted to be brown, with medium to high turbidity;
- No sufficient water was in monitoring well BH7M for sampling and field observation;
- No olfactory or visual evidence of contamination was noted in the monitoring wells;
- No sheens were noted within the groundwater of any monitoring well sampled; and
- Additional round of sampling of BH4M-a recorded the groundwater in this well was noted to be light brown, with low to medium turbidity on 18 August 2020.

Field measurements of pH, dissolved oxygen (DO) and electrical conductivity (EC) formed part of the GME. Field data was recorded during EI 2020 DSI investigation on 29 July 2020, as presented in **Table 3-2**. The local water conditions were classified as slightly acidic, anoxic and brackish.

Table 3-2 Groundwater Field Data

Well ID	DO (mg/L)	Field pH	Field EC (µS/cm)	Temp (°C)	Redox (mV)
BH3M-a	0.59	5.15	2809	21.08	106.2
BH4M-a	0.91	5.24	3088	20.95	97.03
BH5M	0.80	5.29	2782	20.90	92.4
BH7M	-	-	-	-	-

Analytical results for the representative groundwater samples collected by EI (2021) were below the proposed discharge criteria, except for chromium, copper, lead, nickel and zinc. The reported concentrations of metals were representative of background (natural) concentrations due to the concentrations of the elevated metal concentrations were consistent and were presented among all wells onsite. Petroleum hydrocarbons (as TRH- F1 and F2) were reported by EI (2021) in wells BH4M-a and BH5M at low concentration and marginally above the

laboratory limit of reporting. EI considers that the reported concentration of metals and petroleum hydrocarbons were a low environmental risk to the site or its surrounds.

Table 3-3 Summary of Previous Groundwater Results

Number of samples	Analyte	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Sample(s) of EI 202 Exceeding Adopted Criterion
Total Dissolved Metals				
3	Arsenic	<1	2	None
3	Cadmium	<0.1	0.2	None
3	Chromium (Total)	1	3	BH5M (3µg/L) exceeded fresh water criteria for Cr VI (1 µg/L)
3	Copper	22	23	BH3M-a (22 µg/L), BH4M-a (22 µg/L) and BH5M (23 µg/L) exceeded fresh water criteria (1.4 µg/L)
3	Lead	<1	30	BH4M-a (30 µg/L) and BH5M (11µg/L) exceeded fresh water criteria (3.4µg/L)
3	Nickel	26	38	BH3M-a (26µg/L), BH4M-a (38 µg/L) and BH5M (27µg/L) exceeded fresh water criteria (11µg/L)
3	Zinc	74	240	BH3M-a (74 µg/L), BH4M-a (240 µg/L) and BH5M (180 µg/L) exceeded fresh water criteria (8µg/L)
3	Mercury	<0.1	<0.1	None
PAHs				
3	Benzo(α)pyrene	<0.1	<0.1	None
3	Naphthalene	<0.1	<0.1	None
3	Total PAHs	<1	<1	None
BTEX				
3	Benzene	<0.5	<0.5	None
3	Toluene	<0.5	<0.5	None
3	Ethylbenzene	<0.5	<0.5	None
3	o-xylene	<0.5	<0.5	None
3	m/p-xylene	<1	<1	None
TRHs				
3	TRH C_6-C_{10} minus BTEX (F1)	<50	52	None
3	TRH >C_{10}-C_{16} (F2) minus Naphthalene	<60	76	None

Number of samples	Analyte	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Sample(s) of EI 202 Exceeding Adopted Criterion
3	TRH >C_{16}-C_{34} (F3)	<500	<500	None
3	TRH >C_{34}-C_{40} (F4)	<500	<500	None
VOCs				
3	Chloroform (THM)	1.7	39	None
3	Bromodichloro methane (THM)	<0.5	6.6	None
3	Dibromochloro methane (THM)	<0.5	1.6	None
3	Total VOC	<10	48	None

Note 1 To obtain F1, subtract the sum of BTEX concentrations from the TRH C_6-C_{10} fraction.
Note 2 To obtain F2, subtract Naphthalene from the TRH >C_{10}-C_{16} fraction.
Note 3 F3 is the TRH >C_{16}-C_{34} fraction; and F4 is the TRH >C_{34}-C_{40} fraction.

4. DEWATERING METHODOLOGY

As stated in **Section 1.2**, the proposed development would include construction of multi-storey, mixed use commercial and residential apartment buildings, overlying a common podium structure with six-levels of basement car park. The basements were to be constructed to the site boundaries; with the lowest basement level (B06) will require a Finished Floor Level (FFL) of 70.20m Australian Height Datum (AHD).

EI has carried out a groundwater take assessment (GTA), which is attached in **Appendix D**. The findings of the GTA are integrated into the sections below. EI have assumed the basement design would be drained basement with permanent dewatering.

4.1 Excavation and Shoring

The client has provided EI with preliminary shoring wall designs:

- Shoring Plans prepared by ABC Consultants – Job No. 20025, Dated 12 April 2021;
  - Rev P1, Drawing No. S01.106,
  - Rev P3, Drawing No. S01.101 and S01.125
  - Rev P4, Drawing No. S01.105, S01.111 to S01.114 and S01.122

A copy of this design is provided within the GTA in **Appendix D**. Based on the provided structural plans by ABC Consultants, the shoring system for the proposed excavation consists of anchored / propped soldier pile walls for the retention of the fill, residual soil and Class V/IV sandstone above the Unit 4, Class II/I sandstone, which is to be cut vertically. The soldier pile wall is to consist of 600mm diameter piles with 2.4m c/c spacing and socketed into the Unit 4 sandstone with pile toe at RL 85.4m.

4.2 Proposed Groundwater Level Reductions

As outlined in the cross-section plan in **Appendix B**, the expected levels for basement construction were:

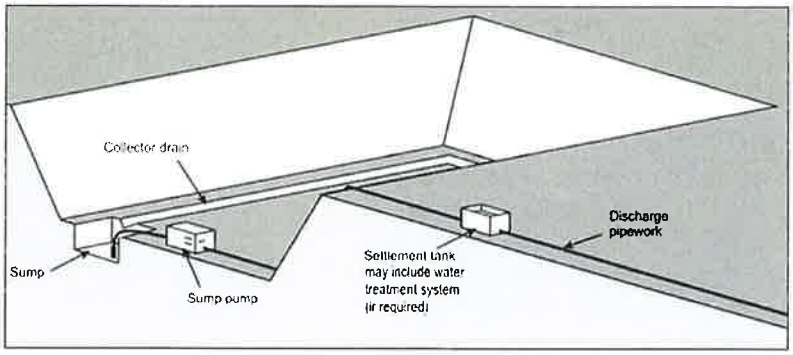
- The ground surface of the site lies at an average elevation of RL 98m AHD. The design BEL was 69.1m AHD.

As described in **Section 3.1** (**Table 3-1**), a design groundwater level of 93.4m AHD was adopted, being the highest standing water level (SWL) recorded for the site. Assuming groundwater levels are lowered by dewatering to BEL (69.1m AHD), dewatering will aim to achieve a lowering of the water table to allow basement construction in dry conditions.

4.3 Groundwater Extraction

At the time of preparing this plan, EI had not received details of the proposed dewatering system design. EI assume it will comprise of a sump and pump system. This will be used to control seepage, as illustrated in **Figure 4-1**.

Figure 4-1 Hypothetical layout of a *Sump and Pump* seepage collection System



It is recommended that during construction, any pumped-out groundwater will be discharged into a vessel (basin, or equivalent). The preferred vessel type will require adequate capacity to accommodate the rate of groundwater seepage, estimated by the EI (2021) GTA (**Appendix D**) as approximately 4.32 ML / 365 days (assumed) for the construction phase.

Groundwater treatment to meet the discharge performance criteria in relation to turbidity will be undertaken in the vessel prior to discharge, if necessary. Should water treatment for other water quality parameters become necessary during the course of dewatering, this may require additional water treatment systems to be installed prior to the discharge point. Additional information regarding water treatment is provided in **Section 5**. EI has assumed treated water will be discharged into a stormwater drain or channel located in close vicinity of the site.

Continuous dewatering and operation of the pumping system will be required on a full-time basis for approximately 365 days for the duration of basement constructions, to maintain groundwater levels at BEL. A drained basement was assumed for the long-term management of groundwater with permanent dewatering.

The Department of Planning, Industry & Environment (DPIE) support fully tanked basement structures. While it is acknowledged that long-term dewatering is not preferred for ecological sustainability reasons, it is understood that subject to development consent for discharge to storm water, DPIE may consider an application for a permanent water access license (WAL) for operational phase dewatering, where minimal harm to the groundwater source is demonstrated. To assist DPIE in its assessment relevant information is summarised in **Section 6.**

4.4 Dewatering Strategy

The Project Manager, Dewatering Contractor and Water Treatment Specialist must agree on a dewatering strategy to confirm that dewatering treatment systems and retention tanks can be positioned appropriately within approved areas prior to the start of works.

The temporary discharge during construction is proposed to an existing stormwater pit located to the south of the site along Mandala Parade.

4.5 Drawdown and Excavation Impacts

Lowering of groundwater table due to the temporary dewatering during construction has the potential to cause settlements of the sands, hence resulting in damage to the adjacent structures and infrastructures.

Based on our seepage analysis, the groundwater drawdown levels within the vicinity of the site as a result of the temporary dewatering works should be minimal due to the shallow sandstone bedrock identified onsite.

An impact Assessment on Sydney Metro Tunnels report has been prepared by EI in November 2021 (EI, 2021d) to assess the potential impact pf the proposed excavation for this

development on the Sydney Metro assets running along southern elevation of proposed excavation at an offset of about 25m. Based on findings of this report, EI considers that the proposed excavation will induce 13 mm displacement of adjacent Sydney Metro assets along southern elevation. This lateral displacement is mainly due to stress release of high strength sandstone resulted from basement excavation. The structural engineer has to assess the estimated displacement with respect to acceptance criteria by Sydney Metro. If these values exceeds and mitigation measures should be prepared by the Structural Engineers and reviewed by Geotechnical Engineer.

5. WATER QUALITY MANAGEMENT

5.1 Responsibility

The Project Manager is responsible for implementing the water quality management procedures described in this DMP.

5.2 Adopted Criteria for Discharging Water

Storm and groundwater migrating from the site would ultimately discharge into the Cattai Creek. In accordance with NSW EPA minimum requirements for flows from site dewatering operations, extracted waters must be tested to ensure compliance with the ANZG (2018) *95% Freshwater Trigger Values* (and *99% Trigger Values* for bio-accumulative parameters) for the protection of the relevant receptor ecosystem. It is noted that the ANZG (2018) guidelines are largely based on the ANZECC/ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, with important updates. Where the ANZG (2018) guidelines do not provide values, relevant default criteria may be applied.

The discharge water criteria are summarised in **Table 5-1** and must be adhered to during the dewatering program, in compliance with the NSW *Protection of the Environment Operations Act 1997*. It is noted that if the dewatering from the site is treated and discharged into stormwater system as per this report, it will meet relevant EPA guidelines.

All extracted groundwater will be treated on-site using available water technologies prior to discharge to the stormwater network. A suitably qualified and experienced water treatment specialist will be engaged to design and install appropriate water treatment measures, which should include, but not necessarily be limited to:

- A treatment tank with minimum capacity capable of containing the estimated seepage inflow of 11.82 m^3/day (as described in **Section 4.2**);
- Groundwater filtration to reduce fine particulates;
- Automated in-line chemical dosing systems for the addition of buffering solutions and coagulants for the management of water pH and other parameters, which may be required from time to time, as described in **Section 6.5** *Dewatering Contingencies*;
- Groundwater treatment to reduce concentrations of the metals (if required) to below the adopted discharge criteria detailed in **Table 5-1**;
- Spare retention tank(s) to provide additional residence time and sedimentation, in the case that non-compliant water quality is identified during routine monitoring, triggering temporary redirection of discharge while adjustments to the water treatment system are being implemented; and
- A means of monitoring flow rate to enable the accurate determination of total discharge volume (addressed in more detail in **Section 5.3.7**).

Selection of the preferred water treatment system shall be made by the appointed dewatering contractor with guidance from the water treatment specialist. The water treatment system should be installed, tested and operational prior to the commencement of dewatering, to ensure that only treated water that meets the performance criteria is discharged to storm water.

Table 5-1 Discharge Water Quality Performance Criteria

Analyte	Discharge Water Criterion (µg/L) [1]
Physico-Chemical Parameters	
pH	6.5 to 8.0
Turbidity (NTU)	6-50
Metals	
Aluminium	55
Arsenic ^{III}	24
Arsenic ^{V}	13
Cadmium	0.2
Chromium ^{VI}	1 [3]
Copper	1.4
Lead	3.4
Mercury (inorganic)	0.06 [2]
Nickel	11
Zinc	8 [3]
Light Petroleum Hydrocarbons	
Surface films (petrochemical sheen)	*No visible surface films*
Volatile TRH (C_6 – <C_{10})	*If TRH is detected analysis for BTEX and PAH is required*
Semi-volatile TRH (>C_{10} – C_{40})	
Monocyclic Aromatic Hydrocarbons (BTEX)	
Benzene	950
Toluene	180 [4]
Ethylbenzene	80 [4]
o - xylene	350
p - xylene	200 [4]
m - xylene	75 [4]
Polycyclic Aromatic Hydrocarbons (PAH)	
Benzo(α)pyrene	0.1
Naphthalene	16
Chlorinated VOCs	
Tetrachloroethene (PCE)	70
Trichloroethene (TCE)	330
Chloroethene (vinyl chloride)	100
cis-1,2-Dichloroethene	60
trans-1,2-Dichloroethene	
1,1-Dichloroethane	700
1,2-Dichlorobenzene	160

Note 1 NEPM (2013) Groundwater Investigation Levels for fresh and marine water quality, based on ANZECC & ARMCANZ (2000).
Note 2 Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZG (2018) for further guidance.
Note 3 Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance.
Note 4 Low reliability toxicity data, refer to ANZECC & ARMCANZ (2000).

Trial Run Pump-Out

Prior to discharge of any extracted groundwater to the storm water network, the following pre-dewatering procedure will be undertaken during a Trial Run dewatering period:

1) The proposed excavation area will be excavated down to the standing groundwater level;
2) The initial dewatering discharge will be directed through the water treatment system and returned to the excavation where it will infiltrate back to the aquifer, thus allowing a reduction in suspended sediments, which are expected in the initial pump-out waters;
3) Samples of the treated groundwater will be collected and laboratory analysed for the water quality parameters listed in **Table 5-1**; and
4) After confirmation that the water quality complies with the discharge criteria, the extracted groundwater will be directed to the stormwater discharge point.

5.3 Monitoring

5.3.1 Visual Monitoring

Visual inspections of the site and dewatering equipment shall be undertaken regularly (daily where possible) by the Project Manager to identify:

- Quantity of chemical product within the dosing system (in the case that this is needed);
- Effective operation of all dewatering treatment equipment;
- Short circuiting of water around baffles and filter media in sediment retention tanks;
- Visible hydrocarbon sheens and odours at the sediment; and
- Green blue or extremely clear water indicating high levels of dissolved aluminium.

The Site Manager must keep a record of all visual observations, as well as flow rates to enable the determination of groundwater extraction/discharge volumes following the completion of dewatering activities (see also **Section 5.3.7**).

5.3.2 Discharge Water Quality Monitoring

To assess the ongoing suitability of extracted water for discharging to the municipal stormwater system, water quality monitoring will be undertaken prior to commencement and for the duration of dewatering activities at the site. The monitoring will include sampling analysis of the treated discharge water by a qualified environmental scientist or equivalent, with laboratory analysis for the parameters listed in **Table 5-1** using NATA-accredited analytical methods.

Due to the existing groundwater conditions it is assumed that water treatment will be continued for the duration of the dewatering program.

Discharge water quality monitoring will be self-certified by an experienced water quality expert and will be performed at the following frequencies:

- **(1) Initial Assessment:** An initial round of sampling should be conducted at an existing or new groundwater monitoring bore located close to the dewatering area, prior to the commencement of dewatering, which may coincide with the installation of the dewatering system. The collected groundwater sample(s) should be tested for the target quality parameters listed in **Table 5-1** as a minimum, to establish baseline (initial) groundwater quality conditions. A review of the proposed discharge water quality requirements will then be conducted. **NOTE:** Should deviations from the adopted Discharge Water Criteria be considered technically justifiable, approval from WaterNSW must be sought to allow any alternative discharge criteria to be applied.
- **(2) Trial-Run Period:** A semi-weekly (twice per week) sampling frequency is recommended during the trial-run of the onsite water treatment system. The sampling program should, as a minimum, comprise two samples of groundwater, one collected prior to treatment and one after treatment, to assess the performance of the water treatment system. The analytical results of samples from each sampling event should be documented to establish the trend of water quality change.

  The semi-weekly sampling frequency should be maintained for a minimum of two weeks or unless otherwise advised by the environmental consultant, or until the target parameters in treated water stabilise (i.e. consecutive tests are within ± 10% of the observed results) and are stabilised within the adopted discharge criteria for three consecutive sampling events. The Trial-Run period may be extended if stabilisation is not observed, or if the treated water does not satisfy the adopted discharge criteria (**Table 5-1**).

  The contractor should seek advice from an appropriately qualified consultant regarding the termination of the Trial-Run Period. During the Trial-Run period, all collected groundwater seepage (including treated water) should be retained on-site and stored in appropriate bulk containers, or allowed to infiltrate back to the aquifer. No collected groundwater should be discharged to the stormwater system until it is proven to meet the adopted discharge criteria.
- **(3) Discharge Monitoring Period (Weekly to Fortnightly):** After the Trial-Run Period, and subject to statutory authority approval, treated water may be discharged directly to the stormwater system. A weekly sampling frequency will be adopted for four weeks. The sampling program will comprise of one system discharge (i.e. treated) sample (as a minimum), tested for the target parameters (**Table 5-1)** to confirm the system is functioning as intended.

  After four weeks the weekly sampling frequency may be extended to fortnightly monitoring for the remaining duration of dewatering, provided the analytical monitoring results indicate the treated water quality consistently meets the adopted discharge criteria. If this is not the case, after implementation of contingency measures and water treatment adjustments weekly monitoring will need be continued, until discharge water quality consistency is re-established. The dewatering contingency measures described in **Table 6-1, Section 6.5** will be triggered should exceedances of the adopted criteria be reported in any one monitoring event.

5.3.3 Reporting of Discharge Water Quality Results

Dewatering management procedures and monitoring results will be reviewed by the appointed water quality expert to ensure that the treatment procedures are effective, and that the discharge waters are in compliance with the discharge water quality performance criteria (**Section 5.3.2**). Discharge water quality reporting will be as follows:

- A summary report will be prepared upon completion of the initial discharge monitoring (Item (3) in **Section 5.3.3**). The report will be submitted to the Site Manager, Dewatering Contractor upon request.
- Interim Monitoring Event Reports will be prepared upon receipt of laboratory data for each round of ongoing discharge water quality compliance monitoring. The interim reports will

display all data obtained during the previous monitoring events in addition to the data obtained during the most recent event, comparison to the adopted discharge water quality performance criteria with comments, corrective actions and recommendations based on the results.

- A Dewatering Completion Report will be prepared following completion of dewatering activities at the site. This report will be signed and dated by the appointed water quality expert and will include copies of all monitoring event reports issued during the temporary dewatering period.

Should dewatering samples give results that do not comply with the adopted discharge criteria, dewatering contingency measures described in **Section 6.5** will be triggered. Any such occurrences must be properly documented in the respective interim reports and in the final Dewatering Completion Report.

5.3.4 Reporting of Other Important Information

The Site Manager must keep records of complaints, water treatment chemicals and treatment methods employed and cumulative discharge volume records as measured from the installed calibrated flow meter. In addition, any periods of dewatering stoppage should also be recorded. These records must be available on-site at all times and should be provided to the appointed water quality expert for monitoring report purposes, as described in **Section 5.3.7**.

5.3.5 Potential ASS Issues

Based on the ASS risk review performed for this site (**Section 2.2**) projected groundwater levels (**Section 4.2**) are unlikely to expose or cause oxidation of ASS. As a safeguard however, water quality monitoring for dewatering discharge waters will include pH testing. A decreasing trend in pH levels will provide an early warning of potential ASS impacts. Should increasing acidic conditions (i.e. decreasing pH) be identified for the extracted groundwater between successive monitoring events, mitigation measures detailed in **Section 6.5** are to be implemented.

5.3.6 Groundwater Level Monitoring

Regular groundwater level monitoring will be undertaken for the duration of dewatering activities to identify potential impacts associated with water level drawdown levels beyond the site boundary. Groundwater levels should be routinely measured every few days (preferably at multiple monitoring wells) and recorded by a qualified site technician or by the Site Manager. Water level records will be reviewed by the appointed environmental consultant (water quality expert).

The groundwater level monitoring results will be incorporated into the monitoring event reports and will be included in the final dewatering completion report to be submitted to The Hills Shire Council and WaterNSW upon completion of the project.

5.3.7 Discharge Flow Monitoring and Discharge Volumes

The cumulative volume of water discharged to stormwater must be monitored by calibrated flow meter (or equivalent alternative means) to comply with regulatory requirements. This will require a regular (preferably) daily record to be maintained, to document the total volume discharged, and reporting of the cumulative volume discharged in each monitoring event report.

Flow monitoring will be undertaken by a suitably trained site employee under the supervision of the Site Manager and tabulated records should be maintained on site and made available to the environmental consultant for inclusion in the routine monitoring event reports.

These records will be used to calculate the total actual groundwater volume discharged from the site and will be included in the final Dewatering Completion Report to be issued to The Hills Shire Council and WaterNSW after the completion of dewatering activities.

5.3.8 System Maintenance

The groundwater treatment system(s) must be regularly maintained by the dewatering contractor. Maintenance must include:

- Regular cleaning and or replacement of the geo-fabric filters within the retention tanks; and
- Regular removal of sediment from the retention tanks by an appropriately-licensed waste contractor.

6. SITE MANAGEMENT CONTROLS

6.1 Deviations from this Plan

The Site Manager should seek advice from the water quality consultant in the case that any deviation from the agreed monitoring program is considered. To ensure the monitoring data set and the early warning objectives of the DMP are not compromised, only where technical justification exists will it possible to consider variations from the requirements detailed in this plan. Any deviations that may be accepted will be documented with corresponding technical justification in the following event monitoring report and the final Dewatering Completion Report.

6.2 Contact Details for Key Personnel

Once the site manager, dewatering contractor, water treatment specialist, water quality expert and geotechnical engineer have been appointed, their names and contact information are to be clearly displayed in the Site Office. An example format is as follows:

Site Manager	Name: Company:	Mobile phone: Email:
Dewatering Contractor	Name: Company:	Mobile phone: Email:
Water Treatment Specialist	Name: Company:	Mobile phone: Email:
Water Quality Expert	Name: Company:	Mobile phone: Email:
Geotechnical Engineer	Name: Company:	Mobile phone: Email:

6.3 Summary of Specific Activities

The appointed contractor and/or Site Manager will be responsible for ensuring that the following activities (requirements) are undertaken during the dewatering program:

- Maintain erosion and sediment control measures in a functioning condition, until all earthwork activities are completed.
- Perform daily visual inspection of stormwater diversions and sediment / erosion control devices, ensuring they are operating effectively and at full capacity.
- Implement appropriate remedial measures where any controls or devices are not functioning effectively or are inappropriate.
- Collate records and comments on the condition of existing erosion and run-off controls (drains, silt fences, catch drains etc.), dewatering procedures and test results, and any site instructions issued to sub-contractors to undertake remedial works.
- Maintain general rainfall records describing each day as dry, light rain, heavy rain and the approximate duration of the rain event (to be filed on site).

- Confirm water quality parameters meet the relevant discharge limits, by disclosing supporting documentation upon request.
- Reporting any incidents of poor drainage or uncontrolled discharge.
- Recording all daily inspection reports, environmental incidents and cumulative discharge volumes as read from the installed flow meter (described in **Section 5.3.7**), which may be reviewed during any dewatering audit that may be performed on the site.

6.4 Vibration, Noise, and Odour Management

The following vibration, noise and odour risks may occur during dewatering:

- Excessive vibration and noise levels associated with site plant / dewatering equipment; and
- Odours released from collected groundwater, which may pose a risk to human health and/or the aesthetic condition of the environment.

It is the responsibility of the Site Manager to ensure appropriate management of vibration, noise and odour during dewatering operations. Appropriate management methodologies include the following:

- Undertaking dilapidation surveys of neighbouring buildings, in accordance with potential for impacts in final design type.
- All sub-contractors to be managed to ensure they work only within defined hours set by the DA conditions.
- All reasonable steps shall be taken to muffle and acoustically baffle all plant and equipment. Noise and vibration levels generated by site works must be within the limits set by the DA conditions, the site specific environmental management plan and the *Protection of Environmental Operation Act 1997*.
- Give consideration to the noise emission of plant/equipment prior to its selection/mobilisation to site.
- Schedule the use of noisy equipment at the least-sensitive time of day.
- Situate noisy equipment at the greatest distance from the noise-sensitive area, or orient the equipment so that noise emissions are directed away from sensitive areas, to achieve the maximum attenuation of noise.
- Where there are several noisy pieces of equipment, schedule operations to minimise cumulative impacts.
- Keep equipment well maintained.
- Ensure engine shrouds (acoustic linings) are installed (where feasible).

6.5 Dewatering Contingencies

Contingent actions for scenarios that may arise during dewatering are detailed in **Table 6-1**.

Table 6-1 Mitigation Measures for Potential Dewatering Issues

Anticipated Problem	Corrective Actions
Water Quality Criteria Non-Compliance	
Performance Criteria Exceedance Laboratory analytical report for any monitoring event reveals that the quality of treated discharge water does not satisfy the adopted discharge performance criteria detailed in **Table 5-1**, **Section 5.2**.	Immediate action must be taken to halt the release of water into the municipal stormwater system, where water quality is found not to meet the discharge criteria detailed in **Table 5-1.** Discharge to the stormwater system must be suspended to enable the following procedure to be implemented: 1) Discharge water will be redirected to the spare retention basin; 2) A water sample will then be collected and sent to the laboratory for confirmation analysis for the non-compliant parameter(s) on an express (24hr) results turn-around basis; 3) Should the analytical result for the confirmation sample show that the previously non-compliant parameter(s) is/are now meet the adopted discharge water quality performance criteria, the treated water outlet may be redirected to the stormwater system; however 4) Should the analytical result for the confirmation sample show that the discharge water quality is confirmed not to comply with the discharge criteria, then the Water Treatment Specialist will be directed to modify the water treatment system accordingly to achieve compliant discharge water quality and a new treated water sample will be collected; 5) After laboratory confirmation that the revised treated water quality complies with the discharge criteria, the extracted groundwater may be re-directed to the stormwater discharge point; and 6) The frequency of treated discharge water quality monitoring will be returned to weekly, until such time that three consecutive compliant laboratory reports for weekly monitoring events are achieved, at which stage fortnightly monitoring may be reinstated. **Note:** It may be necessary to have collected waters removed by a licensed liquid waste contractor, should retained quantities exceed the onsite capacity for temporary storage.
Visible & Olfactory Impacts Visual and / or olfactory anomalies (e.g. change in water colour, turbidity, odour, presence of oil / grease) are observed in extracted groundwater.	Similar to the above procedure (Steps 1 to 6) treated water will be redirected to the spare retention basin/vessel, while the treatment system is adjusted to manage the observed water quality issues. It may be necessary to have collected waters removed by a licensed liquid waste contractor, should retained quantities exceed the onsite capacity for temporary storage. The contractor is to seek advice from a suitably experienced environmental consultant in regard to the additional assessment and treatment that may be required for any observed changes to water appearance or detectable odours.
Repeated Criteria Exceedances After three performance criteria non-compliances for discharge water quality	Retain extracted water onsite in spare retention basin(s) and/or appropriate bulk containers, until it can be removed by a licensed liquid waste contractor. Determine an alternative discharge method, if necessary, updating the DMP accordingly.

Anticipated Problem	Corrective Actions
Groundwater Take Non-compliance	
Excessive Extraction Daily discharge rate is greater than expected and it is apparent that the projected total groundwater extraction volume will be exceeded	Advise the appointed environmental consultant who will review the reasons for the increased dewatering rate. If reduction in dewatering rate cannot be implemented, WaterNSW should be contacted to review options, which may include a combination of: ▪ Temporary retention of tail water onsite in appropriate bulk containers for subsequent removal by a licensed liquid waste contractor; ▪ Aquifer re-injection after obtaining regulatory approval; and/or ▪ Fast-tracking of construction works to complete dewatering sooner than the scheduled timeframe.
System Performance Issues	
Dewatering system failures	Ensure that spare equipment parts (where practical) are on hand. Ensure that the failed equipment can be serviced by site personnel or an appointed contractor who can rapidly report to site when needed.
Power outages	Ensure that a backup generator is readily available. In this event, an assessment across the site and surrounding sites should also be completed in order to identify whether any other lights and electrical equipment are working so to identify if the issue is site specific or if it is across a whole area. In addition to having the back-up generator running, the contractor should also seek advice from an electrician in regard to the additional assessment and repairs that may be required.
Unexpected contaminants found during monitoring	Contact the appointed water quality expert and assess against relevant criteria. If contaminant is found to exceed the adopted criteria, follow the corrective actions corresponding to "Performance Criteria Exceedance" above. Expand Discharge Water Criteria accordingly.
Chemical/ fuel spill and leaks from machinery	Stop earthworks, notify site project manager. Use accessible soil or appropriate absorbent material to absorb the spill (if practicable). Stockpile the impacted material in a secure location, on builder's plastic to avoid cross contamination. Inspect groundwater and note any visual and/or changes. The contractor should also seek advice from environmental consultant in regard to the additional assessment and treatment that may be required.
Excessive rainfall	Ensure sediment and surface water controls are in place and functioning as intended, as per the designs provided in the site specific Soil and Water Management Plan. Any non-conformance is to be documented and rectified. The capacity of the dewatering system to dispose larger volumes of water should be evaluated and if required, a temporary system should be utilised following correspondence with The Hills Shire Council / WaterNSW and the environmental consultant.
Excessive Noise	Identify the source and isolate if possible. Modify the actions of the source or erect temporary noise barriers if required.
Impacts on the stability of adjacent structures	Contractor to seek advice from qualified professional (such as a geotechnical engineer and/or structural consultant) in regards to the additional assessment and monitoring that may be required.

Anticipated Problem	Corrective Actions
Complaint Management	Notify Client, Project Managers and Environmental Consultant (if required) following complaint. Report complaint as per management procedures. Implement control measures to address reason of complaint (if possible). Notify complainant of results of remedial actions.
Excessive Organic Odours / Vapours	In accordance with Council's Contaminated Land Policy, no nuisance odours are to be detected at any site boundary during the dewatering stage. Should odour emissions be detected at a site boundary, the following measures will be implemented: 1. Stop work, to allow odour to subside. 2. Monitor ambient air across the site and boundaries with a portable photo-ionisation detector (PID). 3. Implement control measures, including respirators for on-site workers, use of odour suppressants and wetting down of excavated material. 4. Notify the occupants of adjoining premises regarding odour issues. Notification should be in writing, providing the contact details of the responsible site personnel. 5. Record logs for volatile emissions and odours.

7. MANAGEMENT SUMMARY

The requirements of this Dewatering Management Plan are summarised in

Table 7-1.

Table 7-1 Dewatering Management Summary

Item	Requirement / Procedure
Objective of DMP	Ensure that the proposed dewatering operations do not impact on the quality of the receiving surface waters (i.e. at the point of groundwater discharge). Where necessary, groundwater will be treated to achieve an acceptable water quality prior to discharge: ▪ *See **Section 3** for groundwater conditions.* ▪ *See **Section 5.2** for groundwater quality discharge requirements.* ▪ *See **Section 5.3** for groundwater treatment options.* Dependant on the shoring design implemented at the site, groundwater level changes that may occur during dewatering would either be negligible: ▪ *See **Sections 4.1** and **4.5** for summary of groundwater take assessment and dewatering drawdown impacts.* ▪ *See **Appendix D** for groundwater take assessment model.*
Person Responsible for Implementation of DMP	The construction contractor / project manager will be responsible for ensuring the implementation of appropriate treatment of extracted groundwater, as outlined in this document.
Operation Policy	To ensure that all extracted groundwater is effectively treated prior to discharge to the stormwater network.
Pre-Dewatering Groundwater Assessment	Previous groundwater assessment findings are discussed in **Section 3**.
Discharge Performance Criteria	All groundwater designated for discharge into the local stormwater network is to meet (at the very least) the performance criteria (Discharge Water Criteria) identified in **Table 5-1**.
Implementation Strategy	All extracted groundwater will be monitored and treated (where necessary). On-going testing to be performed, to confirm water quality meets the nominated discharge criteria prior to release into the stormwater network. Additional treatment / waste disposal to be undertaken if the discharge criteria are not met.
Monitoring Requirements	As specified in **Section 5.3.2**: ▪ 1. Initial Assessment = Prior to dewatering ▪ 2. Trial-run period = Twice per week* ▪ 3. Discharge monitoring period = Weekly to fortnightly* **provided the analytical results indicate treated water quality meets the adopted criteria, or risks are considered to be significantly low. Should analytical results exceed the adopted discharge criteria, contingencies listed in **Section 6.5** should be followed.*
Review	The appointed consulting Environmental Engineer and/or Scientist will undertake weekly review of data during the Trial-Run Period (if required), and monthly audits during the Monitoring Period, to ensure that all discharges to the stormwater network comply with the discharge criteria specified in **Section 5.2**.
Reporting	The contractor responsible for dewatering will keep records of all monitoring and laboratory test results, as well as quantities of

Item	Requirement / Procedure
	treatment agents applied during the dewatering process. All records should be made available for inspection onsite during the construction phase.
Corrective Actions	As specified in the contingency measures, outlined in **Section 6.5**.

8. STATEMENT OF LIMITATIONS

This plan has been prepared for the exclusive use of Deicorp Pty Ltd, whom is the only intended beneficiary of EI's work. The scope of work completed for the purpose of this plan is limited to that agreed with Deicorp 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 drafting similar plans by reputable members of the environmental industry in Australia, as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section must be read in conjunction with the whole of this plan, including its appendices.

EI's professional opinions are reasonable and based on its 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 or observations. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

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

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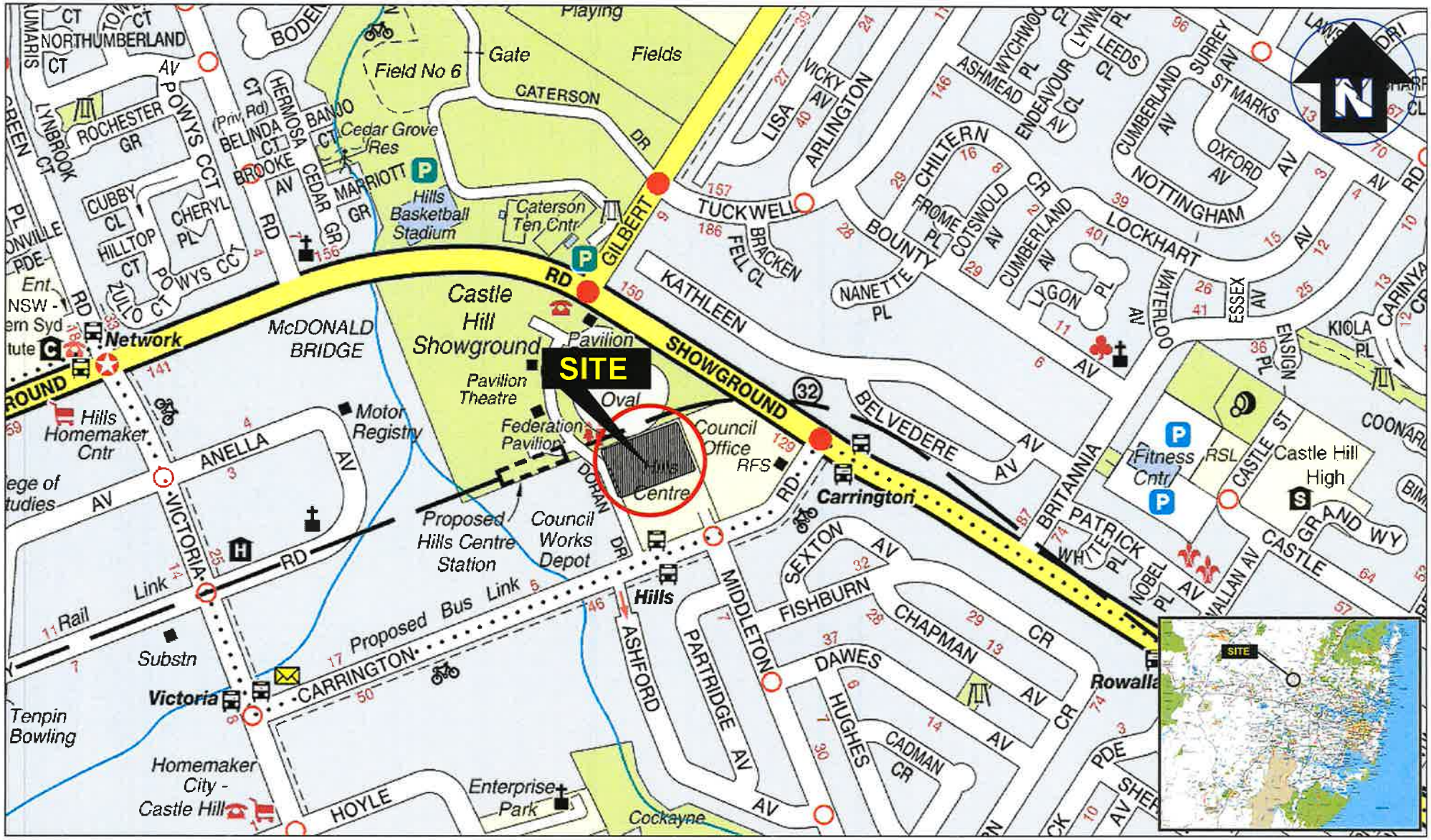
ABBREVIATIONS

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ANZG	Australian and New Zealand Guidelines
ASS	Acid Sulfate Soils
BEGL	Below Existing Ground Level
BEL	Bulk Excavation Level
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
CBD	Central Business District
DA	Development Application
DMP	Dewatering Management PLan
DP	Deposited Plan
DPI	NSW Department of Primary Industries (which includes the Office of Water)
DWC	Discharge Water Criteria
EC	Electrical Conductivity
ESA	Environmental Site Assessment
FFL	Finished Floor Level
GDSR	Geotechnical Desktop Study Report
GME	Groundwater Monitoring Event
GTA	Groundwater Take Assessment
km	Kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
LOR	Limit of Reporting (limit of reporting for respective analytical method)
m	metres
ML	Megalitres
mg/L	Milligrams per litre
µg/L	Micrograms per litre
µS/cm	Microsiemens per Centimetre
NA	Not Applicable
NATA	National Association of Testing Authorities
NC	No Criterion
NTU	Nepholemetric Turbidity Units
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
pH	Potential Hydrogen (a measure of the acidity or basicity of an aqueous solution)
PID	Photo-Ionisation Detector
PQL	Practical Quantitation Limit (quantitative limit for respective analytical method)
RL	Reduced Level
SWL	Standing Water Level
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TPH	Total Petroleum Hydrocarbons (superseded term equivalent to TRH)
TRH	Total Recoverable Hydrocarbons (non-specific analysis of organic compounds)

Appendix A - Figures



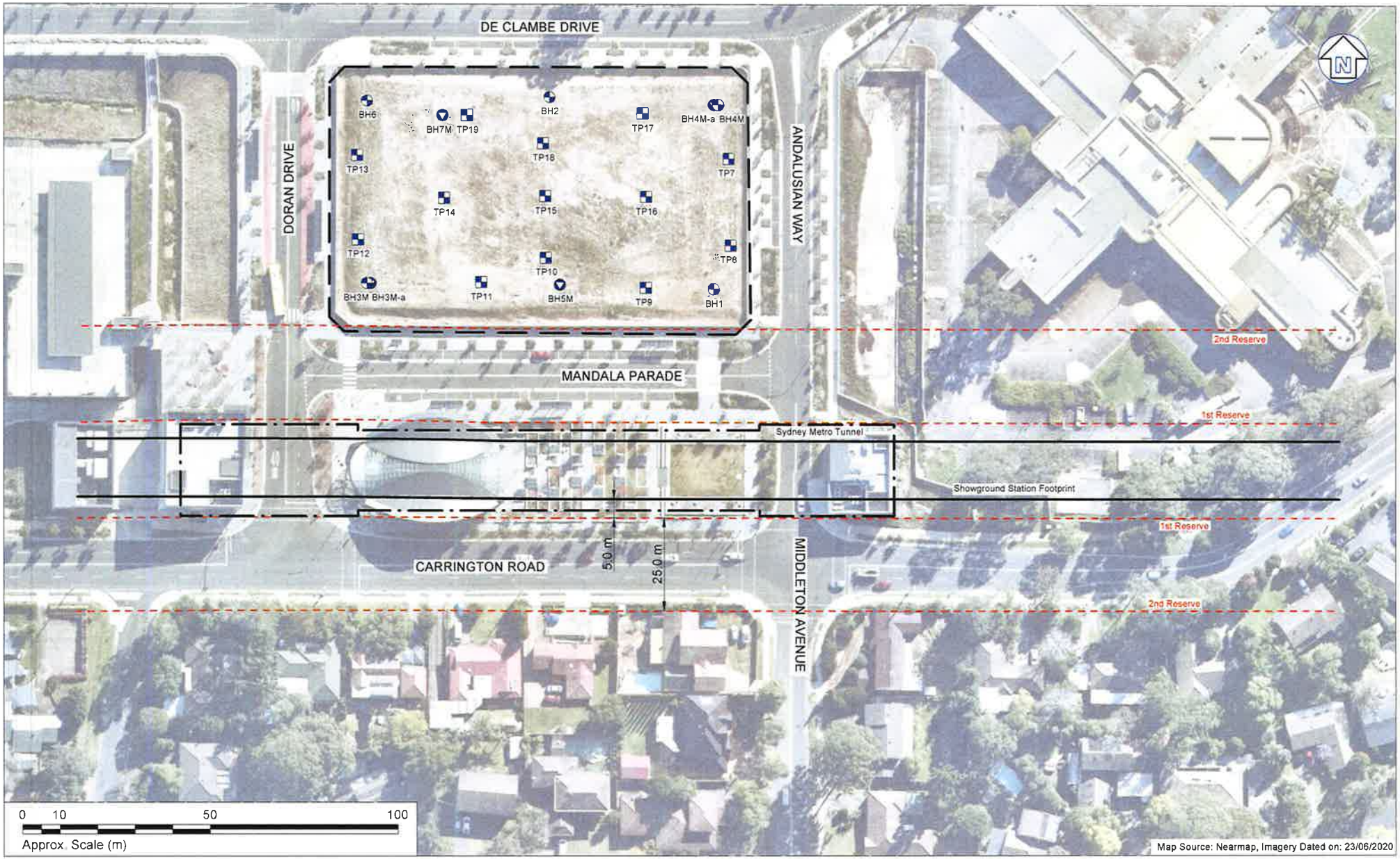
Drawn:	AM.H.	
Approved:	L.W.	
Date:	05-08-20	
Scale:	Not To Scale	

Deicorp Pty Ltd
Dewatering Management Plan
2 Mandala Parade, Castle Hill NSW
Site Locality Plan

Figure: 1

Project: E24724.E16

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088



LEGEND

- Approximate Site Boundary
- Approximate Sydney Metro Tunnel
- Approximate Showground Station Footprint
- Approximate 1st & 2nd tunnel reserve extents 5m & 25m away from the tunnel boundaries
- Approximate test pit location
- Approximate borehole / monitoring well location
- Approximate borehole location

eiaustralia
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	AM.H.
Approved:	L.W.
Date:	17-08-20

Deicorp Pty Ltd
Dewatering Management Plan
2 Mandala Parade, Castle Hill NSW
Sampling Location Plan

Figure: 2

Project: E24724.E16

Appendix B - Proposed Development Plans

Client
Deicorp

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Basement 06

Scale
1:200 @A1, 50%@A3

Status
DA Submission

Project No
19068

Dwg No
DA-110-002

Rev
02

TURNER

Client
Delcorp

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Basement 05

Scale
1:200 @A1, 50%@A3
Status
DA Submission

Project No.
19066
Drawing
DA-110-003
Rev
02

TURNER

Client
Delcorp

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Basement 04

Scale 1:200 @A1, 50%@A3
Project No. 19068
Dwg No. DA-110-004
Rev 02

TURNER

Subject
Delicarp

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Basement 03

Scale
1:200 @A1, 50%@A3

Project No.
19068

Drawing No.
DA-110-005

Rev
02

DA Submission

TURNER

Client
Delcorp

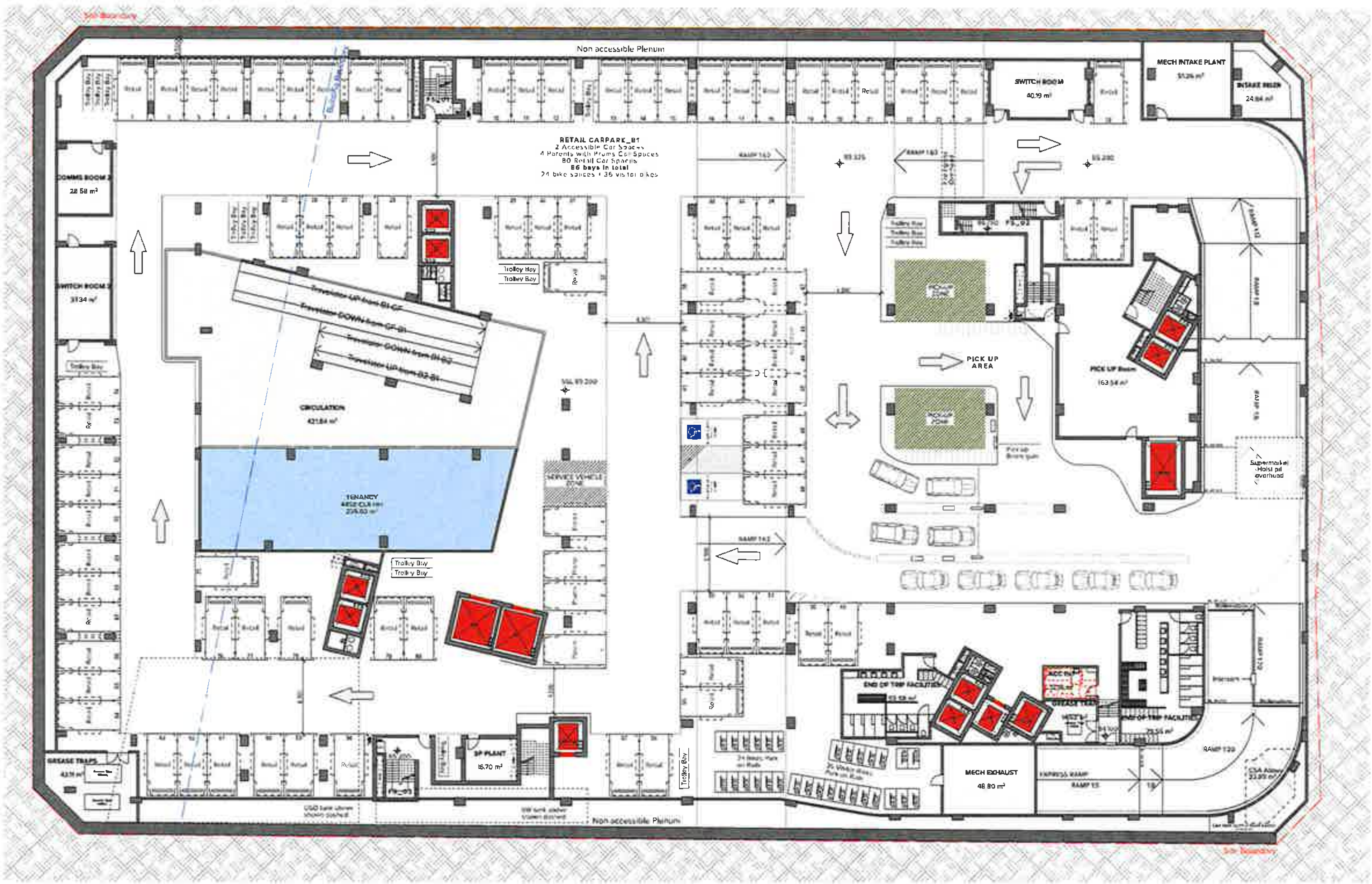
Rev	Date	Approved by	Revision Notes
a	07.06.21	JWC	Draft DA for Review
b1	25.06.21	JWC	Retail Update
C1	09.07.21	JWC	DA Submission

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Basement 02

Scale: 1:200 @A1, 1:400@A3
Status: DA Submission
Project No.: 19068
Drawing No.: DA-110-006
Rev: 02

TURNER



Delcorp

Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

GA PLANS
Basement 01

1:200 @A1, 50%@A3
DA Submission
19068
DA-110-007
02

TURNER

Client
Delcorp

Project Title
Doran Drive
Doran Drive, Castle Hill Castle Hill NSW 2154 Australia

Drawing Title
GA PLANS
Ground Level

Scale 1:200 @A1, 50%@A3
Status DA Submission
Project No. 19068
Dwg No. DA-110-008
Rev 03

TURNER

BORED PILES

1. [illegible]
2. THE BORED PILES ARE PROPORTIONED FOR THE SCHEDULED LOADS WITH ALLOWABLE SOCKET SKIN FRICTION AND END BEARING CAPACITY AS INDICATED IN THE REPORT. THE DEPTHS AND LENGTHS NOMINATED IN THE SCHEDULE ARE INDICATIVE ONLY. THEY MAY NEED TO BE VARIED DEPENDING ON THE SITE CONDITIONS ENCOUNTERED. THE PILING CONTRACTOR NEEDS TO INCORPORATE ANY DESIGN CHANGES REQUIRED.
3. [illegible]
4. THE BORED PILES SHALL BE LOCATED CONCENTRIC WITH THE COLUMNS AND WALLS UNLESS NOTED OTHERWISE.
5. DRILL AND INSTALL THE BORED PILES IN THE LOCATIONS SHOWN ON THE DRAWINGS AND THE ABOVE REQUIREMENTS.
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]
10. [illegible]
11. SPLICING TO LONGITUDINAL PILE REINFORCEMENT IS TO BE AVOIDED WHERE POSSIBLE I.E. FOR PILE CAGE LENGTHS LESS THAN 12m. SPLICES OF CAGE REINFORCEMENT ARE TO ENSURE MINIMUM SPACING BETWEEN TIES ARE MAINTAINED. LOCATION OF SPLICED CAGES ARE TO BE APPROVED BY THE STRUCTURAL ENGINEER.

BULK EARTHWORKS AND SHORING NOTES

GEOTECHNICAL REPORT
[illegible] REPORT [illegible] DATED 26 AUGUST [illegible] AND THE CONTRACTOR IS TO ENSURE GEOTECHNICAL REPORT RECOMMENDATIONS ARE ADHERED TO.

EROSION AND SEDIMENT CONTROL
PROVIDE GRAVEL SHAKEDOWN AREA FOR 10 METRES AT BOUNDARY OF SITE AND OTHER SEDIMENT CONTROL MEASURES GENERALLY CONSISTENT WITH THE REQUIREMENTS OF THE PUBLICATION SOIL AND WATER MANAGEMENT FOR URBAN DEVELOPMENT NSW DEPARTMENT OF HOUSING 1993, ISBN 0 7305 9473 0, FOR THE DURATION OF THE WORKS. NOTE THAT ALL WORKS ON SITE ARE TO COMPLY WITH COUNCIL SOIL AND EROSION CONTROL REQUIREMENTS. ALLOW TO SUBMIT DETAILS TO COUNCIL FOR APPROVAL IF REQUIRED. ENSURE STREETS ARE KEPT CLEAN OF ALL DEBRIS.

[illegible]

SHORING DESIGN CRITERIA

STRUCTURE IMPORTANCE LEVEL	[illegible]
DESIGN WORKING LIFE WIND ANNUAL PROBABILITY OF EXCEEDANCE	[illegible]
EARTHQUAKE ANNUAL PROBABILITY OF EXCEEDANCE EARTHQUAKE DESIGN CATEGORY	[illegible]
[illegible]	[illegible]
[illegible]	REFER LOADING PLANS
LATERAL PRESSURE TO SHOTCRETE WALL (SOIL / CLASS IV/V SHALE)	[illegible]

GEOTECHNICAL DESIGN PARAMETERS

[illegible]

PERMANENT SHORING WALLS HAVE BEEN DESIGNED IN ACCORDANCE WITH AS3600, AS1170, AS2159 AND AS5100 WITH A DURABILITY DESIGN LIFE OF 100 YEARS.

CONCRETE GRADE

ELEMENT CONCRETE QUALITY	STRENGTH f'c	MAX SIZE AGG. mm	SLUMP mm	CEMENT TYPE	ADMIXTURE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

COVERS			
ELEMENT	[illegible]	[illegible]	[illegible]
PILES	75mm	75mm	[illegible]
[illegible]	50mm	50mm	50mm
[illegible]	[illegible]	[illegible]	[illegible]

TOLERANCE

1. [illegible] CENTRE AS INDICATED ON THE PLANS.
2. [illegible]
3. [illegible]

MONITORING

[illegible]

GEOTECHNICAL ENGINEER TO APPROVE ALL PILE SPACINGS ON SITE AND TO CONFIRM RETAINED MATERIALS ABILITY TO ARCH BETWEEN PILES TEMPORARILY.

CONTRACTOR TO ALLOW FOR 15% INCREASE IN ANCHOR QUANTITIES OR SIZES TO ACCOMMODATE REQUIREMENTS BY GEOTECHNICAL CONSULTANT DURING EXCAVATION WORKS

BOND LENGTH AND DIAMETER OF ANCHOR HOLE TO BE CONFIRMED BY SHORING WALL CONTRACTOR. THE ANCHOR LENGTHS SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATIVE ONLY

CONSTRUCTION SEQUENCE FOR EXTERNALLY ANCHORED SOLDIER WALLS:

THE PROPOSED BASEMENT EXCAVATION WILL PROCEED IN THE FOLLOWING SEQUENCE:

[illegible]

ROCK ANCHORS - POST-TENSIONED STRAND

[illegible]

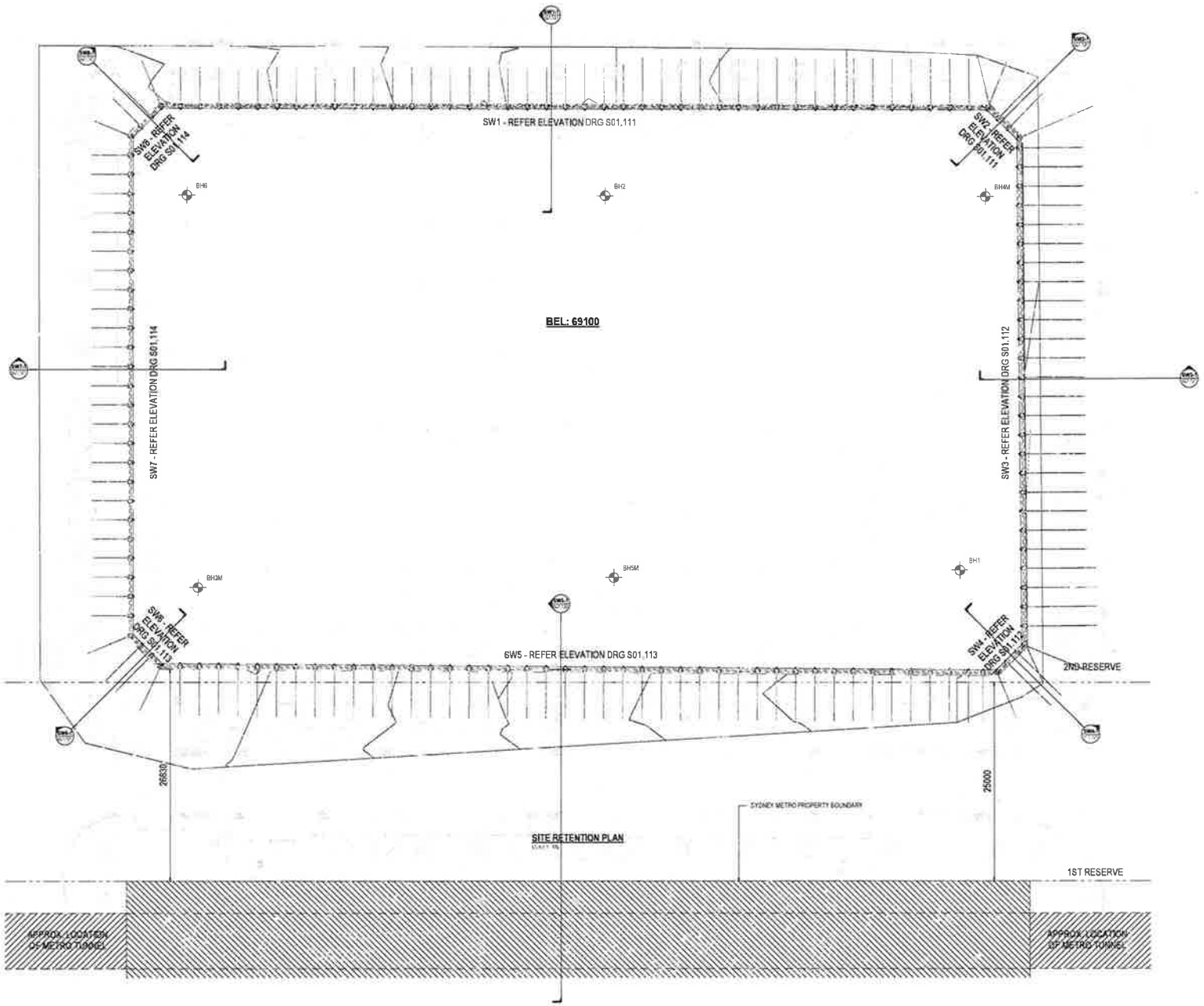
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

DORAN DRIVE PRECINCT
1 MANDALA PARADE
CASTLE HILL

SITE RETENTION NOTES

20025 | S01.101 | P3



SITE RETENTION PLAN

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWING. REFER TO ARCHITECTURAL PLANS FOR DIMENSIONS IN DETAIL

DEICORP

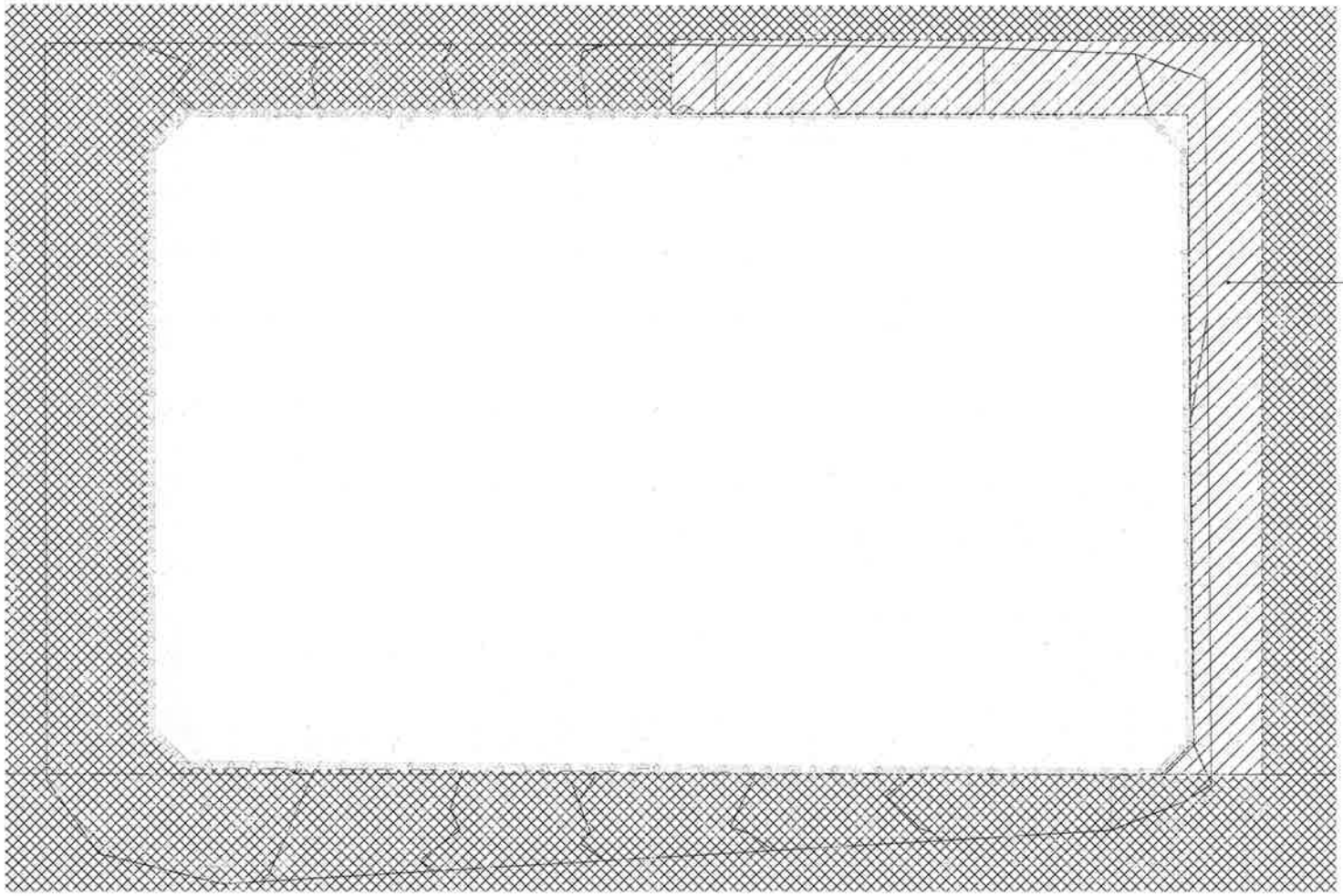
DORAN DRIVE PRECINCT
2 BANDALA PARADE
CASTLE HILL

SITE RETENTION PLAN

20025

S01.105

P4



SHORING SURCHARGE KEY

5 kPa SURCHARGE LOADING

20 kPa SURCHARGE LOADING

NOTE
5 kPa ZONE MAYBE INCREASED TO 20 kPa
AFTER INSTALLATION OF FIRST ANCHOR ROW.

SHORING SURCHARGE PLAN

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

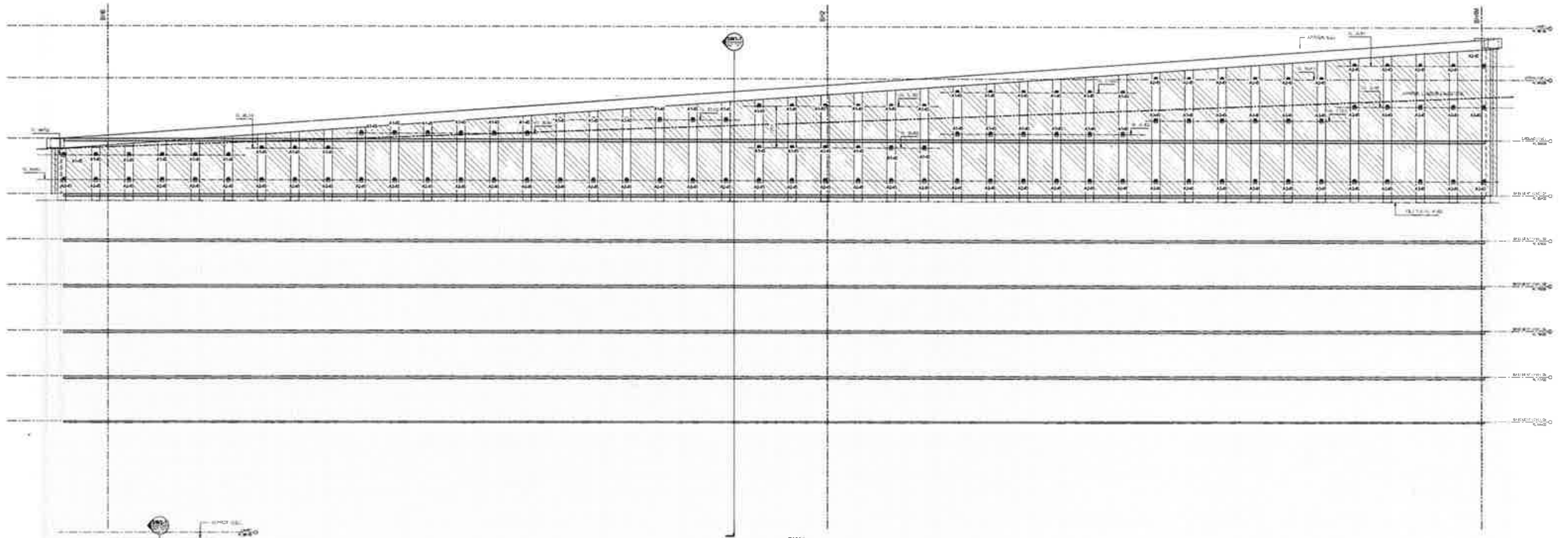
DORAN DRIVE PRECINCT
2 MANDALA PARADE
BRISTLE HILL

SHORING SURCHARGE LOADING PLAN

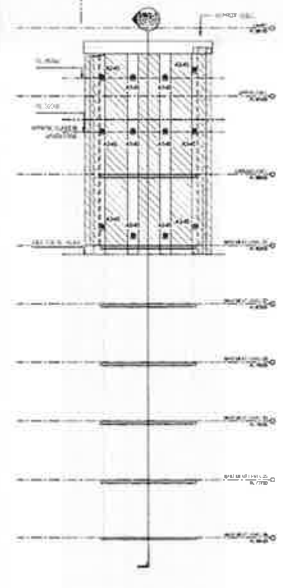
20025

S01.106

P1



SW1



SW2

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
[illegible]	[illegible]	[illegible]	[illegible]

GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS AND GROUND ANCHOR HORIZONTAL DEFLECTION ANGLES.

ANCHOR SCHEDULE				
MARK	SWL	LO	INCLINATION	MIN. BOND LENGTH
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

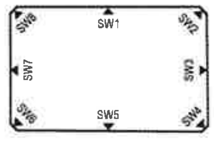
SWL DENOTES SAFE WORKING LOAD
LO DENOTES LOCK OFF LOAD

SHORING ANCHOR NOTES
BOND LENGTH NOMINATED IN SHORING ANCHOR SCHEDULE FOR COORDINATION PURPOSES ONLY. SHORING CONTRACTOR IS RESPONSIBLE FOR FINAL ANCHOR DESIGN. BOND LENGTHS MAY NEED TO BE VARIED DEPENDING ON SITE CONDITIONS ENCOUNTERED.
BOND LENGTH BASED ON A 130mm HOLE WITH ALLOWABLE BOND STRESS OF 350 kPa

NOTE:
GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE:
ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER

NOTE:
MAXIMUM 500mm EXCAVATION BELOW ANCHOR HEIGHT PERMITTED PRIOR TO INSTALLING ANCHOR



KEY PLAN

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

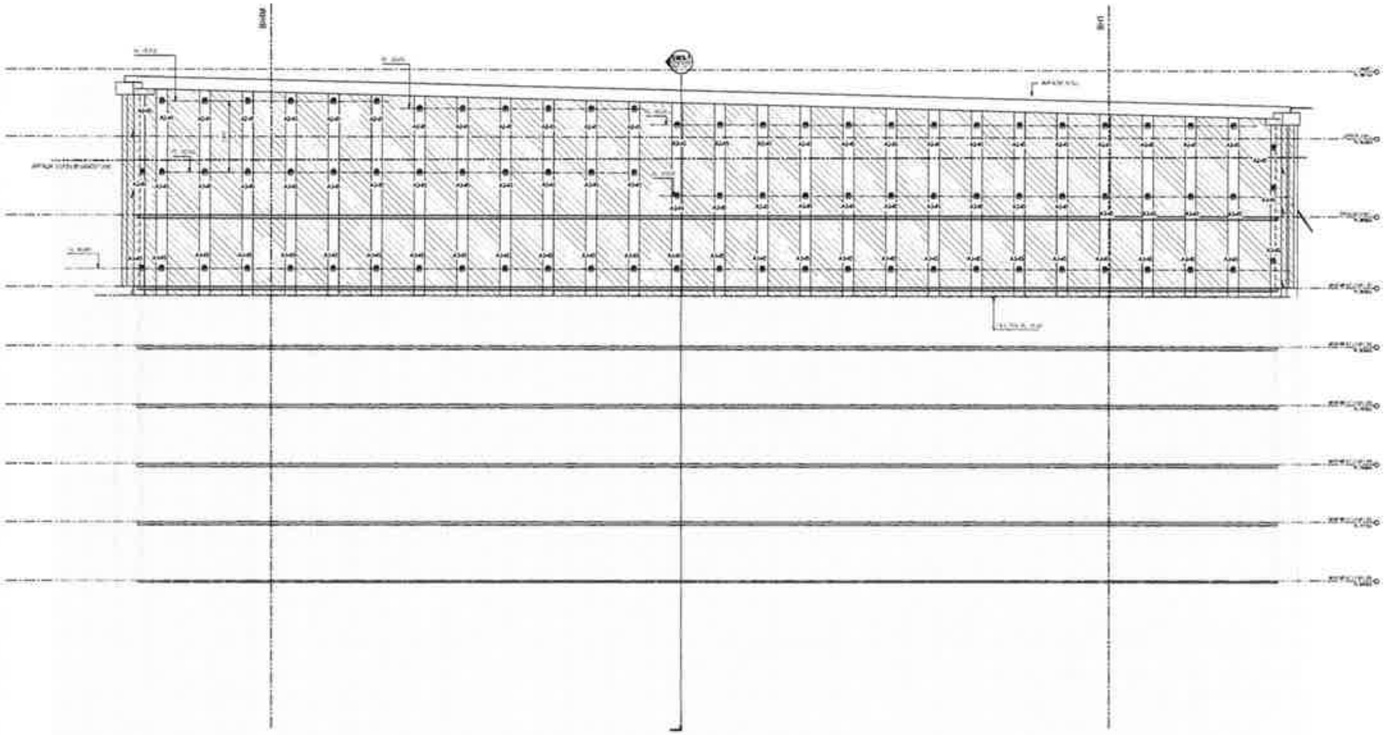
DORAN DRIVE PRECINCT
3 MANDALA PARADE
CASTLE HILL

SHORING WALL ELEVATIONS
SW1 & SW2

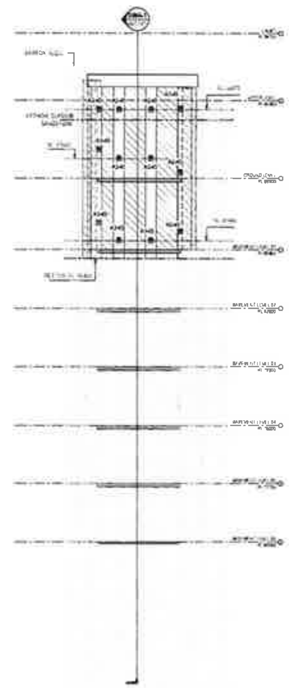
20025

S01.111

P4



SW3



SW4

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
[illegible]	[illegible]	[illegible]	[illegible]

ANCHOR SCHEDULE				
MARK	SWL	LO	INCLINATION	MIN. BOND LENGTH
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	450	[illegible]	45°	[illegible]
[illegible]	450	[illegible]	45°	[illegible]

SWL DENOTES SAFE WORKING LOAD
LO DENOTES LOCK OFF LOAD

SHORING ANCHOR NOTES
BOND LENGTH NOMINATED IN SHORING ANCHOR SCHEDULE FOR COORDINATION PURPOSES ONLY. SHORING CONTRACTOR IS RESPONSIBLE FOR FINAL ANCHOR DESIGN. BOND LENGTHS MAY NEED TO BE VARIED DEPENDING ON SITE CONDITIONS ENCOUNTERED.

HATCH DENOTES EXTENT OF [illegible] THE SHOTCRETE BETWEEN SHORING PILES

[illegible] EXPOSED ROCK FACE [illegible] WITH SHOTCRETE [illegible] TO GEOTECHNICAL ENGINEER

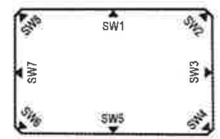
GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS AND GROUND ANCHOR HORIZONTAL DEFLECTION ANGLES.

NOTE:
GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR.

NOTE:
ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER.

NOTE:
MAXIMUM [illegible] EXCAVATION BELOW ANCHOR HEIGHT PERMITTED PRIOR TO INSTALLING ANCHOR.



KEY PLAN

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

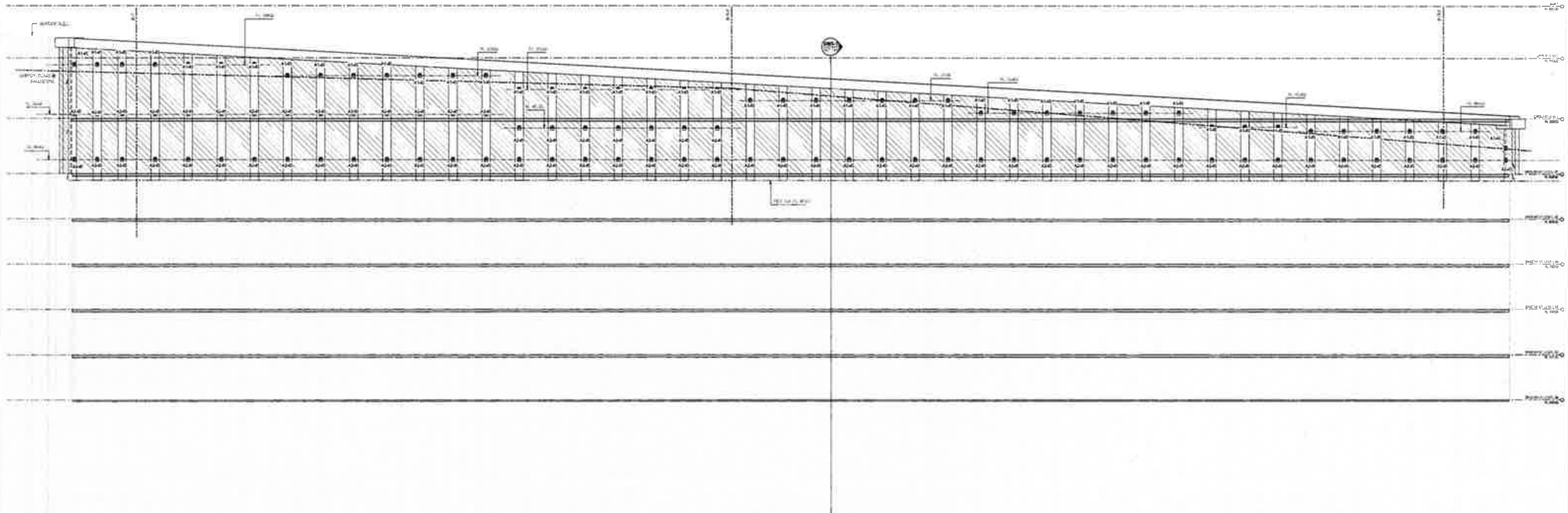
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING WALL ELEVATIONS
SW3 & SW4

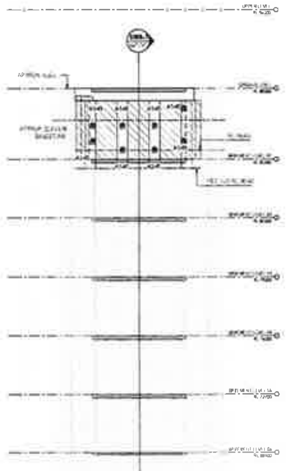
20025

S01.112

P4



SW5



SW6

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
[illegible]	[illegible]	[illegible]	[illegible]

GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01,101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS AND GROUND ANCHOR HORIZONTAL DEFLECTION ANGLES.

ANCHOR SCHEDULE				
MARK	SWL	LO	INCLINATION	MIN. BOND LENGTH
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

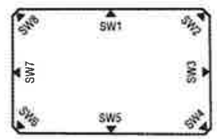
SWL DENOTES SAFE WORKING LOAD
LO DENOTES LOCK OFF LOAD

SHORING ANCHOR NOTES
BOND LENGTH NOMINATED IN SHORING ANCHOR SCHEDULE FOR COORDINATION PURPOSES ONLY. SHORING CONTRACTOR IS RESPONSIBLE FOR FINAL ANCHOR DESIGN. BOND LENGTHS MAY NEED TO BE VARIED DEPENDING ON SITE CONDITIONS ENCOUNTERED.
BOND LENGTH BASED ON A [illegible] HOLE WITH ALLOWABLE BOND STRESS OF [illegible]

NOTE:
[illegible]

NOTE:
ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER.

NOTE:
MAXIMUM 500mm EXCAVATION BELOW ANCHOR HEIGHT PERMITTED PRIOR TO INSTALLING ANCHOR.



KEY PLAN

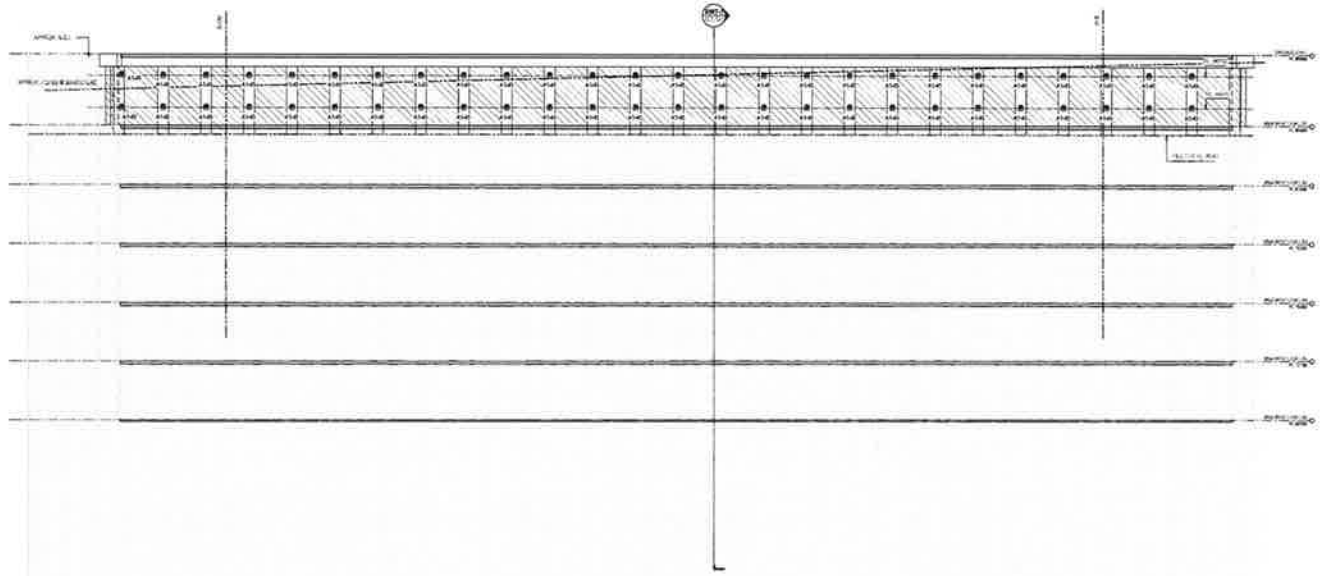
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

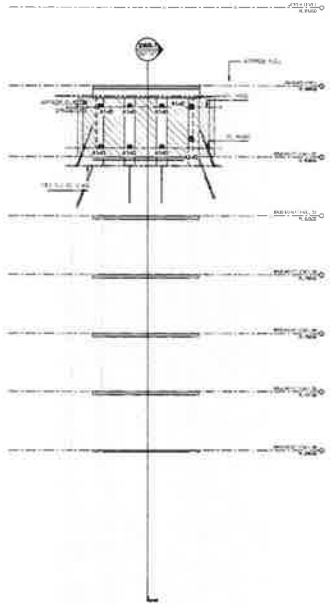
SHORING WALL ELEVATIONS
SW5 & SW6

20025 | S01,113 | P4



SW7

SCALE 1:100



SW8

SHORING PILE SCHEDULE

MARK	DIA.	VERT. BARS	TIES
[illegible]	[illegible]	[illegible]	[illegible]

HATCH DENOTES EXTENT OF ...mm THK SHOTCRETE BETWEEN SHORING PILES

GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS AND GROUND ANCHOR HORIZONTAL DEFLECTION ANGLES.

ANCHOR SCHEDULE

MARK	SWL	LO	INCLINATION	MIN. BOND LENGTH
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	45	[illegible]
[illegible]	[illegible]	[illegible]	45	[illegible]

SWL DENOTES SAFE WORKING LOAD

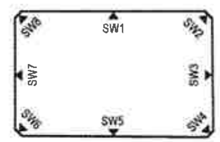
SHORING ANCHOR NOTES

BOND LENGTH NOMINATED IN SHORING ANCHOR SCHEDULE FOR COORDINATION PURPOSES ONLY. SHORING CONTRACTOR IS RESPONSIBLE FOR FINAL ANCHOR DESIGN. BOND LENGTHS MAY NEED TO BE VARIED DEPENDING ON SITE CONDITIONS ENCOUNTERED.

NOTE:
GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE:
ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER

NOTE:
MAXIMUM 500mm EXCAVATION BELOW ANCHOR HEIGHT PERMITTED PRIOR TO INSTALLING ANCHOR



KEY PLAN

SCALE 1:100

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

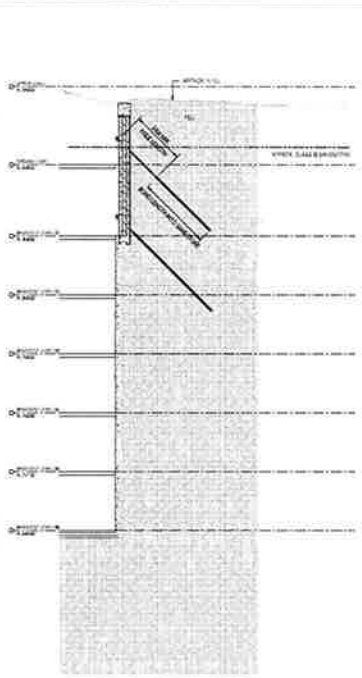
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING WALL ELEVATIONS
SW7 & SW8

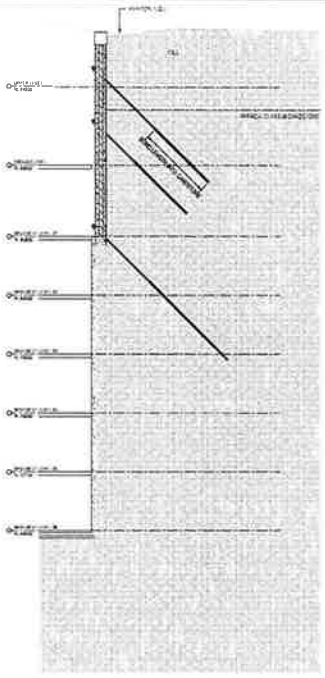
20025

S01.114

P4



SECTION SW1-1



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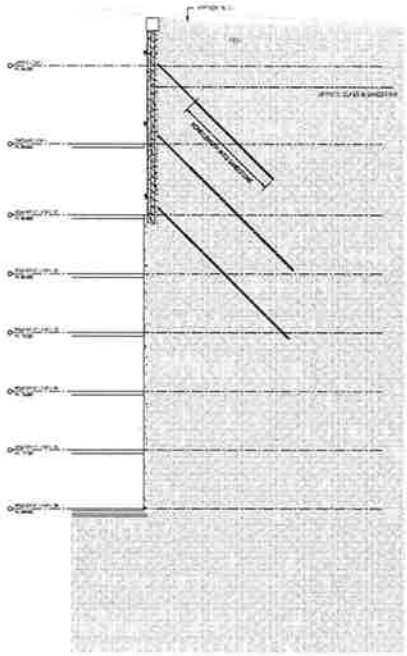

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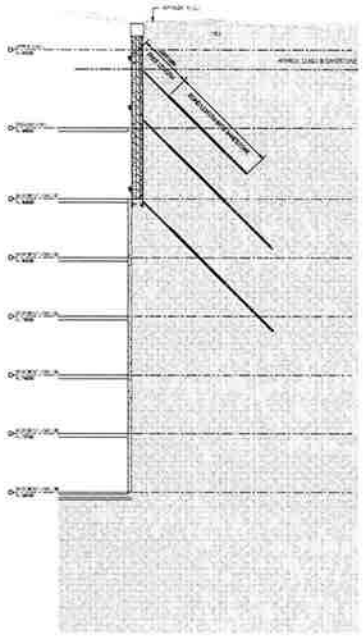

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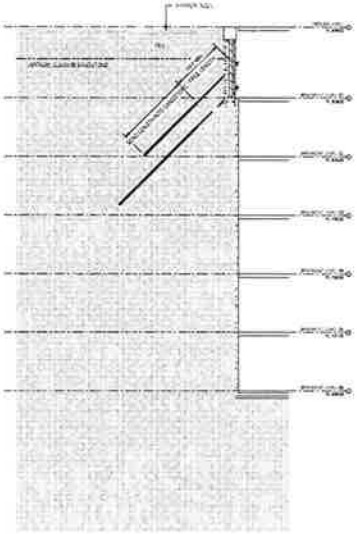

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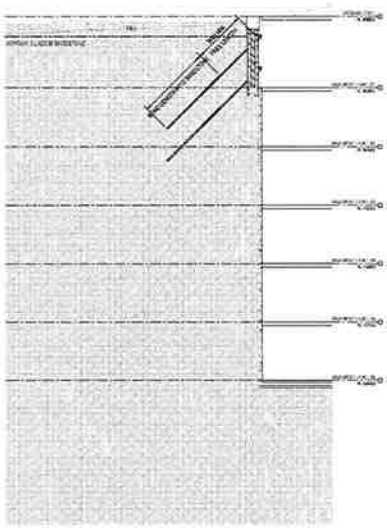

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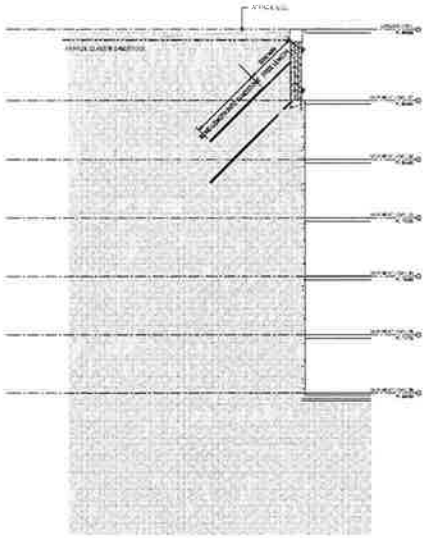


SECTION SW8-1

PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

DEICORP

ADG CONSULTANTS

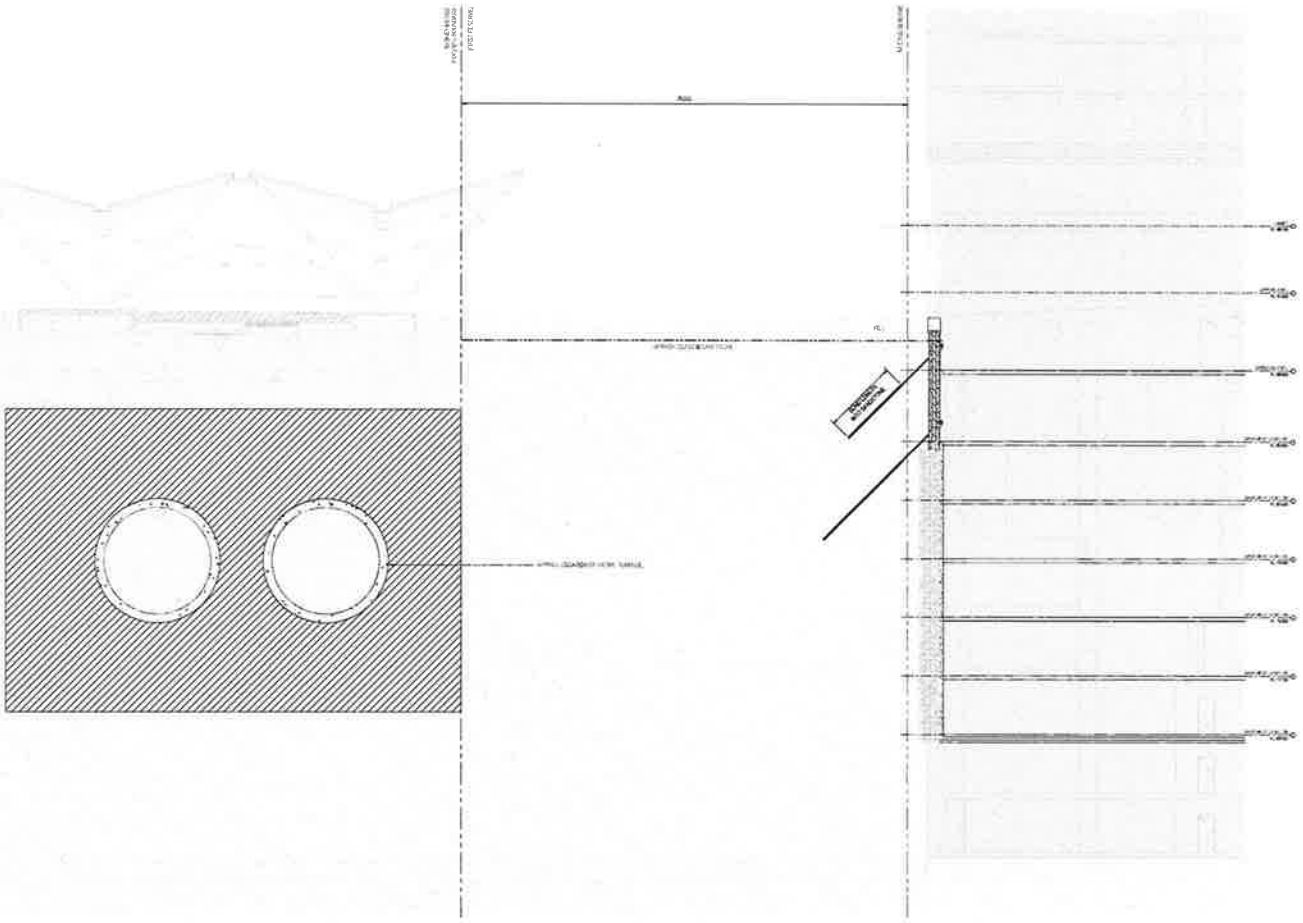
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING SECTIONS
SHEET 1

20025

S01.121

P4



SECTION

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWING. REFER TO ARCHITECTURAL PLANS FOR DIMENSIONS ON SITE

DEICORP

CYCLIC CONSULTANTS
Structural & Civil

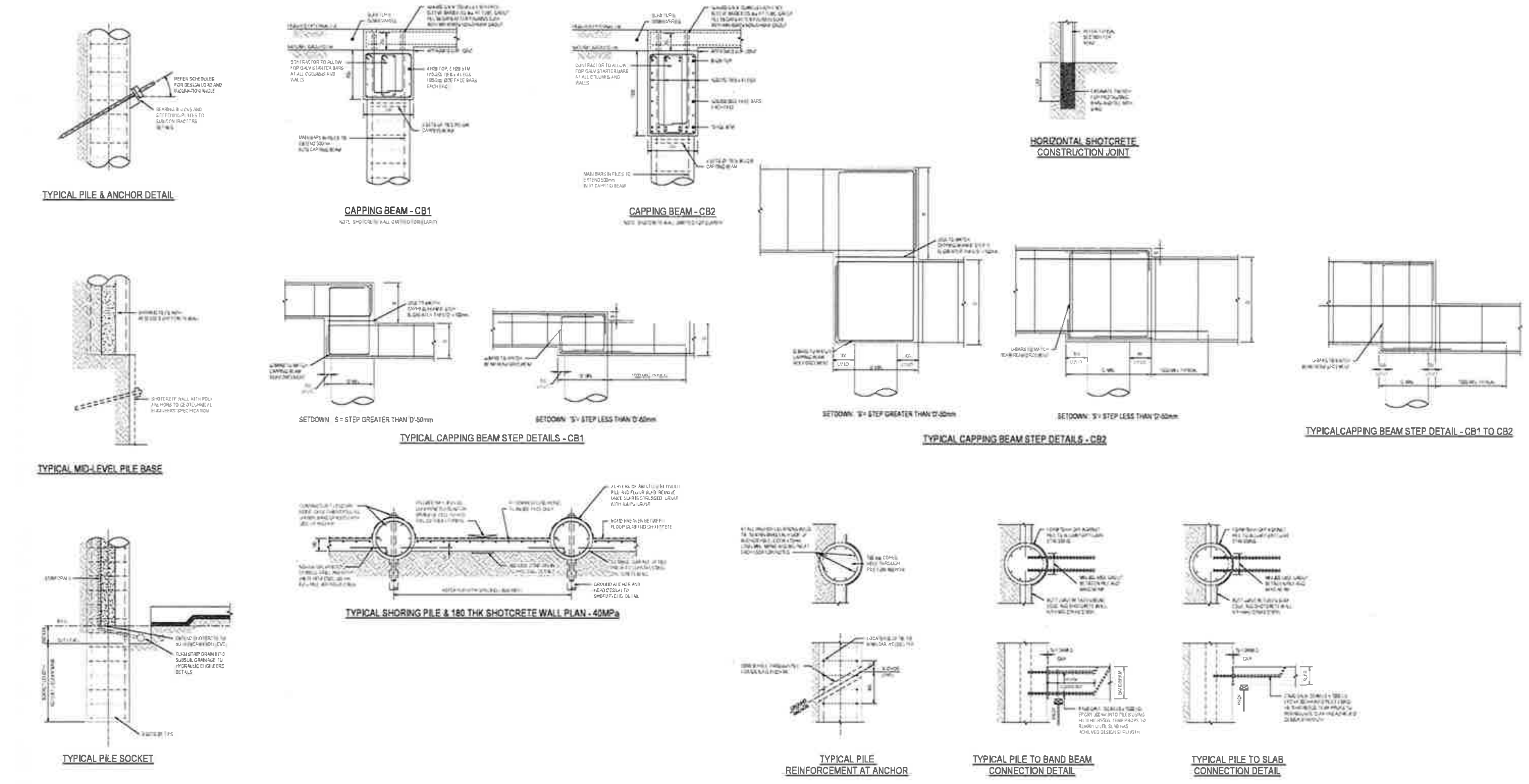
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

BOREHOLE SECTIONS
SHEET 2

20025

S01.122

P4


TYPICAL PILE & ANCHOR DETAIL
CAPPING BEAM - CB1
CAPPING BEAM - CB2
HORIZONTAL SHOTCRETE
CONSTRUCTION JOINT
TYPICAL MID-LEVEL PILE BASE
SETDOWN: 'S' = STEP GREATER THAN 'D'-50mm
SETDOWN: 'S' STEP LESS THAN 'D'-50mm
TYPICAL CAPPING BEAM STEP DETAILS - CB1
SETDOWN: 'S' = STEP GREATER THAN 'D'-50mm
SETDOWN: 'S' STEP LESS THAN 'D'-50mm
TYPICAL CAPPING BEAM STEP DETAILS - CB2
TYPICALCAPPING BEAM STEP DETAIL - CB1 TO CB2
TYPICAL SHORING PILE & 180 THK SHOTCRETE WALL PLAN - 40MPa
TYPICAL PILE SOCKET
TYPICAL PILE
REINFORCEMENT AT ANCHOR
TYPICAL PILE TO BAND BEAM
CONNECTION DETAIL
TYPICAL PILE TO SLAB
CONNECTION DETAIL

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEICORP

DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

TYPICAL SITE RETENTION DETAILS

20025

S01.125

P3

Appendix C - Existing Groundwater Quality and Borehole Logs

BOREHOLE LOG

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GW/NE	0	96.50	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, pale grey to red-brown, with sandstone and igneous gravel and sand.	M	-	FILL
				0.60	SPT 0.50-0.88 m 3,23,17/75mm HB N>30			CI	Silty CLAY; medium plasticity, pale grey, with ironstone gravel and sand, grading to extremely weathered material.	M (<PL)	H	RESIDUAL SOIL
			1									
					DS 1.40-1.50 m SPT 1.50-1.94 m 19/140mm HB N>30							
			2	2.10								
	M-H			94.40				-	SANDSTONE; fine to medium grained, pale grey and orange-brown, low to medium strength, slightly to distinctly weathered.	-	-	BEDROCK
				3.00								
			3						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

eiaustralia
Contamination | Remediation | Geotechnical

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3	3.00		Continuation from non-cored borehole				
HQ	100% RETURN				93.50		NO CORE; 300 mm thick.	-			
					3.30						
		81	62	4	93.20		SANDSTONE; fine to medium grained, pale grey and orange-brown, thinly to medium bedded, dark grey siltstone laminations, iron stained.	SW			
		100	100	5							
				6	6.35						
					90.15		From 6.35 m, pale grey, medium to thickly bedded.	FR			
		100	100	7						7.50: JT, 15°, CN, PR, RF	
				8							
				9							
		100	100	10	10.00						

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

CORED BOREHOLE LOG

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	100% RETURN	100	100	10	86.50		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
		100	100	12							
				13							
		100	100	14						14.28: JT, 10°, Clay VNR, IR, SM	
				15							
				16							
		100	100	17							
				18							
				19							
		100	97	20	20.00						

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

CORED BOREHOLE LOG

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	100% RETURN	100	97	20	76.50		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
		100	100	23						22.75: JT, 0°, CN, PR, RF	
		100	100	26						25.33: JT, 10°, Clay VNR, PR, SM	
		100	100	29	27.85						
				28	68.65		LAMINITE; fine to medium grained, pale grey sandstone interbedded with pale grey siltstone, medium bedded.				
				30	30.00						

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

CORED BOREHOLE LOG

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description			Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	100% RETURN	100	100	30	66.50		From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with pale grey siltstone, medium bedded.	FR			
				31	31.07						
					65.43		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.			31.45: Shale Lense	
		100	100	32							
				33							
				34							
		100	100	35							
				36							
					36.30						
					60.20		From 36.3 m, thickly to very thickly bedded.				
				37							
				38							
		100	100	39							
		100	100	40	40.00						

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

CORED BOREHOLE LOG

BH NO. BH1

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

Drilling Contactor	Hagstrom	**Surface RL**	≈96.50 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	100% RETURN	100	100	40	56.50		From 40.0 m, sandstone, fine to medium grained, pale grey, thickly to very thickly bedded, with dark grey siltstone laminations.	FR			
				41							
				42							
				43							
		100	97	44							
				45						45.58: JT, 45°, CN, PR, RF 45.62: JT, 40°, CN, PR, RF 45.70: JT, 10°, CN, PR, RF	
					45.84 50.66		Hole Terminated at 45.84 m Target Depth Reached.				
				46							
				47							
				48							
				49							
				50							

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

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CORE PHOTOGRAPH OF BOREHOLE: BH1

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

CORE PHOTOGRAPH OF BOREHOLE: BH1

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

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CORE PHOTOGRAPH OF BOREHOLE: BH1

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

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CORE PHOTOGRAPH OF BOREHOLE: BH1

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

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CORE PHOTOGRAPH OF BOREHOLE: BH1

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

BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	95.10	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, dark brown, with sub-rounded to angular sandstone and igneous gravel and sand.	M	-	FILL
					SPT 0.50-0.95 m 5,7,9 N=16							
			1	1.00 94.10					From 1.0 m, with weak odour.			
				1.40	DS 1.20-1.30 m							
				93.70	SPT 1.50-1.95 m 5,10,11 N=21			CI	Silty CLAY; medium plasticity, pale grey to red-brown, trace ironstone gravels and rootlets, with weak odour.			RESIDUAL SOIL
			2	2.00	DS 1.90-2.00 m				From 2.0 m, no odour.	M (<PL)	VSt	
				93.10	DS 2.40-2.50 m							
				3.00	DS 2.90-3.00 m							
			3	92.10	SPT 3.00-3.29 m 3,25/140mm HB N>30			CL	Sandy CLAY; low plasticity, pale grey, fine to medium grained sand, grading to extremely weathered sandstone.	M (<PL)	H	BEDROCK
	M-H			3.30 91.80				-	SANDSTONE; fine to medium grained, pale grey and orange-brown, low to medium strength, slightly to distinctly weathered.	-	-	
				3.95								
			4						Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

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

CORED BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	3.95		Continuation from non-cored borehole				
HQ	100% RETURN	100	100		91.15		SANDSTONE; fine to medium grained, pale grey and orange-brown, thinly to thickly bedded, with dark grey siltstone laminations, iron stained.	DW SW		3.98: JT, 15°, Fe SN, PR, RF 4.02: XWS, 40 mm 4.13: XWS, 30 mm	
				5							
				6						6.21: XWS, 10 mm	
				7	7.04 88.06 7.25 87.85		From 7.04 m, medium to thickly bedded. From 7.25 m, pale grey.	FR			
		100	88	8							
					8.60 86.50 8.82 86.28		From 8.6 to 8.76 m, dark grey siltstone band. From 8.82 to 8.85 m, sark grey siltstone band.				
		100	100	9							
				10	10.00						

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CORED BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, Eh)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	100% RETURN	100	100	10	85.10		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
				12							
	95% RETURN	100	100	13							
				14							
				15						15.55: JT, 45°, CN, ST, RF	
		100	100	16							
				17							
				18	18.30						
					76.80		From 18.3 m, slightly iron stained.	SW		18.65: JT, 60°, CN, PR, RF	
		100	100	19							
								FR			
				20	20.00						

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CORED BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description			Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	95% RETURN	100	100	20	75.10		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
		100	97	23							
		100	100	26	26.64						
					68.46		LAMINITE; fine to medium grined, pale grey sandstone interbedded with dark grey siltstone, medium bedded.				
		100	100	29							

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

CORED BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description			Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	95% RETURN	100	100	30	30.10 65.00		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR		30.07: XWS, 10 mm	
		100	99	31						32.46: JT, 45°, CN, PR, RF	
		100	100	32							
				33							
				34							
				35							
				36							
				37	36.70 58.40		From 36.7 m, very thickly bedded.				
		99	99	38							
				39							
				40	40.00						

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

CORED BOREHOLE LOG

BH NO. BH2

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

Drilling Contactor	Hagstrom	**Surface RL**	≈95.10 m AHD
Drill Rig	Hydrapower Scout V (DR011)	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
HQ	95% RETURN	100	97	40	55.10		From 40.0 m, sandstone, fine to medium grained, pale grey, thickly to very thickly bedded, with dark grey siltstone laminations.	FR			
				41							
				42	42.15						
					52.95		From 42.15 m, medium to thickly bedded.				
		100	100	43							
				44	44.12						
					50.98		Hole Terminated at 44.12 m Target Depth Reached.				
				45							
				46							
				47							
				48							
				49							
				50							

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

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CORE PHOTOGRAPH OF BOREHOLE: BH2

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

CORE PHOTOGRAPH OF BOREHOLE: BH2

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

CORE PHOTOGRAPH OF BOREHOLE: BH2

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

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CORE PHOTOGRAPH OF BOREHOLE: BH2

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

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CORE PHOTOGRAPH OF BOREHOLE: BH2

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

BOREHOLE LOG

BH NO. BH3M

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

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

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	▽	0	91.00	DS 0.10-0.20 m			-	FILL: Silty CLAY; low plasticity, brown-dark grey to dark brown, with sub-rounded to angular, sandstone and igneous gravel and sand, trace rubber fragments.	M	-	FILL
			1		SPT 0.50-0.95 m 2,3,5 N=8 DS 0.70-0.80 m							
					DS 1.20-1.30 m							
			2		SPT 1.50-1.95 m 8,7,8 N=15 DS 1.70-1.80 m							
					DS 2.20-2.30 m							
				2.60 88.40								
				2.90	DS 2.80-2.90 m			CI	Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.	M	VSt	RESIDUAL SOIL
			3						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

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BH NO. BH3M

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

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

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
					2.90 88.10		Continuation from non-cored borehole				
NMLC	100% RETURN	100	97	3			SANDSTONE; fine to medium grained, pale grey and orange-brown, medium to thickly bedded, with dark grey siltstone laminations, iron stained.	SW		3.34: XWS, 10 mm 4.47: XWS, 20 mm	
				4							
					4.90 86.10						
		100	99	5			From 4.9 to 10.53 m, pale grey.	FR			
				6							
		100	100	7							
				8							
		100	100	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**	3 OF 6
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date** 24/08/2020

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

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	10							
					10.30 80.70		From 10.3 m, sandstone, fine to medium grained, brown and pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11				SW			
				12						12.60: XWS, 20 mm	
		100		13						13.52: XWS, 20 mm	
				14							
				15							
		100		16							
				17							
				18							
					18.65 72.35		From 18.65 m, pale grey.	FR			
		100		19							
				20	20.00						

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

CORED BOREHOLE LOG

BH NO. BH3M

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

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

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100		20	71.00		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				21							
		100	100	22						22.04: JT, 5°, CN, IR, RF	
				23	23.33						
					67.67		LAMINITE; fine to medium grained, pale grey sandstone (70%) interbedded with dark grey siltstone (30%), medium bedded.			23.31: XWS, 20 mm	
				24						23.90: XWS, 20 mm	
										24.11: XWS, 40 mm	
		100	97	25							
				26							
					27.00					26.81: XWS, 10 mm	
				27	64.00		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.				
				28							
		100	100	29							
				30	30.00						

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

CORED BOREHOLE LOG

BH NO. BH3M

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

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

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	30	61.00		From 30.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				31							
				32							
		100	100	33							
				34							
				35							
				36							
				37							
		100	100	38							
				39							
		100	100	40	40.00						

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

CORED BOREHOLE LOG

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BH NO. BH3M

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

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

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC		100	100	40	51.00		From 40.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
					40.56 50.44		Hole Terminated at 40.56 m T/C Bit Refusal on Sandstone. Target Depth Reached.				
				41							
				42							
				43							
				44							
				45							
				46							
				47							
				48							
				49							
				50							

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

MONITORING WELL LOG

MW NO. BH3M

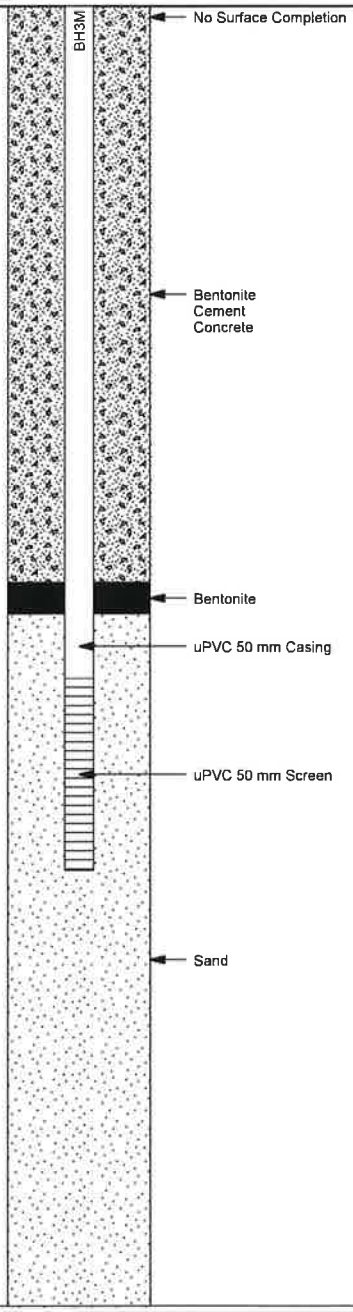
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date**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

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

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

PIEZOMETER CONSTRUCTION DETAILS

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



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

MONITORING WELL LOG

MW NO. BH3M-a

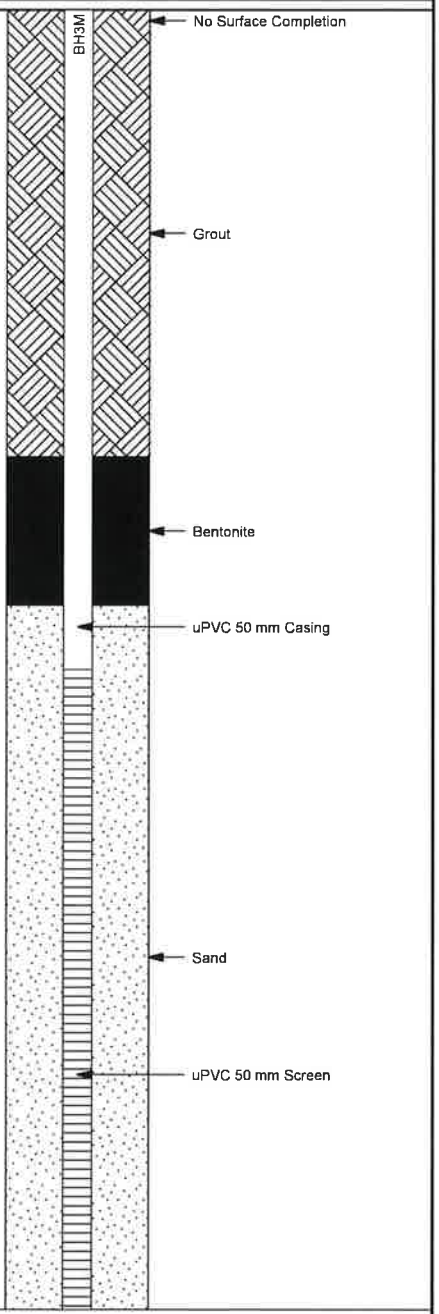
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** DS	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By**	**Date**

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

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

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Slick Up & RL	Tip Depth & RL	Installation Date Static Water Level
BH3M	Standpipe	-1.00 m 92.00 m	6.10 m 84.90 m	



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

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CORE PHOTOGRAPH OF BOREHOLE: BH3M

Project	Proposed Development			**Depth Range**	2.9m to 12.0m BEGL		
Location	2 Mandala Parade, Castle Hill NSW			**Contractor**	Hagstrom		
Position	See Figure 2	**Surface RL**	≈ 91.0m	**Drill Rig**	Hydrapower Scout V (DR011)		
Job No.	E24724.G03_Rev1	**Inclination**	-90°	**Logged**	DS	**Date**	14 / 07 / 2020
Client	Deicorp Projects Showground P/L	**Box**	1-2 of 8	**Checked**	SR	**Date**	24 / 08 / 2020

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CORE PHOTOGRAPH OF BOREHOLE: BH3M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH3M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH3M

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

BOREHOLE LOG

BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	GWNE	0	98.00	DS 0.30-0.50 m SPT 0.50-0.95 m 10,12/150HB N>12			-	FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.	-	-	FILL
			1	1.10 96.90	DS 0.90-1.00 m				Fom 1.1 m, orange-brown, with medium sandstone gravel.			
				1.60 96.40	DS 1.40-1.50 m SPT 1.50-1.95 m 3,4,4 N=8				From 1.6 m, grey.			
	H			2.00 96.00	DS 1.90-2.00 m			-	FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.			
	L		2		DS 2.40-2.50 m					-	-	
			3		DS 2.90-3.00 m SPT 3.00-3.45 m 15,16,18 N=34							
			4	4.00 94.00	DS 3.90-4.00 m			CI	Silty CLAY; medium plasticity, red mottled grey.	M (<PL)	VSt - H	RESIDUAL SOIL
	M			4.60 93.40	DS 4.40-4.50 m DS 4.60-4.70 m			CI	Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.	D	VSt - H	
			5	5.00	DS 4.90-5.00 m				Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

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

CORED BOREHOLE LOG

BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5	5.00		Continuation from non-cored borehole				
NMLC	70% RETURN	100	100		93.00		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.	SW		5.34-5.35: XWS, Gravels 5.37: XWS, Clay, Gravels, 6 mm 5.45: JT, 55°, CN, PR, RF	
				6	6.32 91.68		From 6.32 m, thinly to medium bedded.			6.04-6.05: XWS, Clay, Gravels 6.05-6.23: JT, 70 - 85°, CN, IR, RF 6.16-6.26: JT, 80 - 85°, CN, IR, RF 6.26-6.32: XWS, Clay	
				7				FR			
				8				SW			
	100% RETURN	100	100	9	9.44 88.56		From 9.44 m, pale grey, fresh.	FR			
				10	10.00						

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

CORED BOREHOLE LOG

BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	70% RETURN	100	100	10	88.00		From 10.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey shale laminations.	FR			
		100	100	11							
				12							
		100	100	13							
				14							
				15	14.92 83.08		From 14.92 to 15.16 m, dark grey siltstone band.				
		100	94	16							
				17							
				18							
		100	100	19							
				20	20.00						

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

CORED BOREHOLE LOG

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BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	70% RETURN	100	100	20	78.00		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
		100	100	21							
				22							
				23							
				24							
		100	95	25						25.72: SS 25.79: SS, Clay	
				26							
				27						27.44: JT, 55°, CN, PR, RF	
		100	99	28							
					28.89						
				29	69.11		LAMINITE; fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.			28.89-28.91: XWS, Clay	
		100	97	30	30.00						

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

CORED BOREHOLE LOG

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BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	70% RETURN	100	97	30	68.00		From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.	FR			
				31							
				32	32.28					32.22-32.26: XWS, Clay	
		99	99		65.72		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.				
				33							
				34							
				35							
				36							
		100	99	37	37.33						
					60.67		From 37.33 to 37.36 m, dark grey, siltstone band.				
				38							
				39							
		100	100	40	40.00						

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

CORED BOREHOLE LOG

BH NO. BH4M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	70% RETURN	100	100	40	58.00		From 40.0 m, sandstone, medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				41							
		100	100	42							
				43						43.64: XWS, Clay	
				44							
				45							
		100	100	46							
				47						47.20: XWS, Clay	
					47.69						
				48	50.31		Hole Terminated at 47.69 m T/C Bit Refusal. Target Depth Reached.				
				49							
				50							

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

MONITORING WELL LOG

MW NO. BH4M

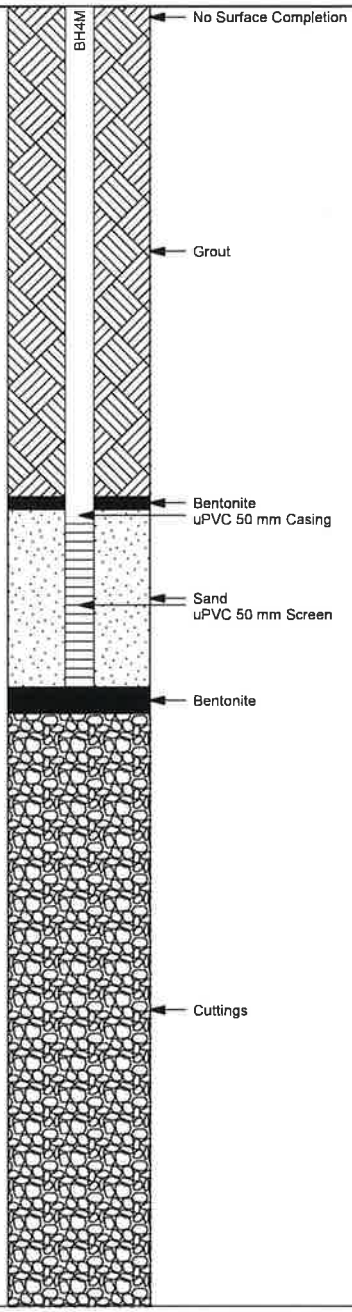
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date**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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	GWNE	0	98		FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.
					From 1.1 m, orange-brown, with medium sandstone gravel.
			95		From 1.6 m, grey.
					FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.
		5			Silty CLAY; medium plasticity, red mottled grey.
	100% RETURN				Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
			90		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.
		10			From 6.32 m, thinly to medium bedded.
					From 9.44 m, pale grey, fresh.
NMLC					From 10.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey shale laminations.
			85		
		15			From 14.92 to 15.16 m, dark grey siltstone band.
			80		
		20			From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
			75		
	70% RETURN	25			
			70		
		30			LAMINITE; fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded. From 30.0 m, laminite, fine to medium grained, pale grey sandstone interbedded with dark grey siltstone, medium bedded.
			65		SANDSTONE; fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
		35			
			60		From 37.33 to 37.36 m, dark grey, siltstone band.
		40			From 40.0 m, sandstone, medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.
			55		
		45			
			50		Hole Terminated at 47.69 m T/C Bit Refusal. Target Depth Reached.
		50			

PIEZOMETER CONSTRUCTION DETAILS

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



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

MONITORING WELL LOG

MW NO. BH4M-a

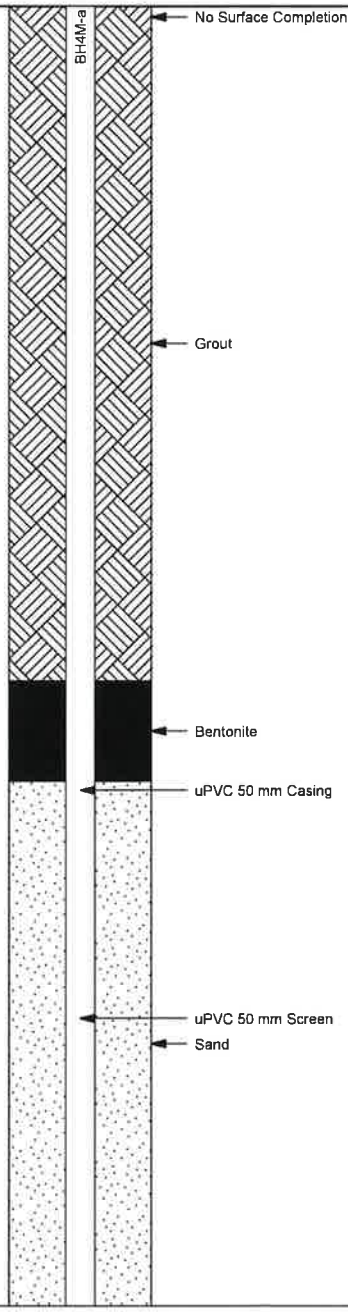
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	14/07/2020
Position	Refer to Figure 2	**Date Completed**	14/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 14/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By**	**Date**

Drilling Contactor	Geosense Drilling	**Surface RL**	≈98.00 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	GWNE	0	98		FILL: Silty SAND; fine to medium grained, brown, with clay and concrete fragments.
		1	97		From 1.1 m, orange-brown, with medium sandstone gravel.
					From 1.6 m, grey.
		2	96		FILL: Silty CLAY; medium plasticity, red mottled grey-brown, with sub-angular to sub-rounded gravel.
		3	95		
		4	94		Silty CLAY; medium plasticity, red mottled grey.
					Sandy CLAY; medium plasticity, pale grey and orange-brown, fine to medium grained sand, grading to extremely weathered sandstone.
NMLC	70% RETURN	5	93		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, with dark grey siltstone laminations, iron stained.
		6	92		
		7	91		
		8	90		Hole Terminated at 7.70 m T/C Bit Refusal. Target Depth Reached.

PIEZOMETER CONSTRUCTION DETAILS

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



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

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CORE PHOTOGRAPH OF BOREHOLE: BH4M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH4M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH4M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH4M

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

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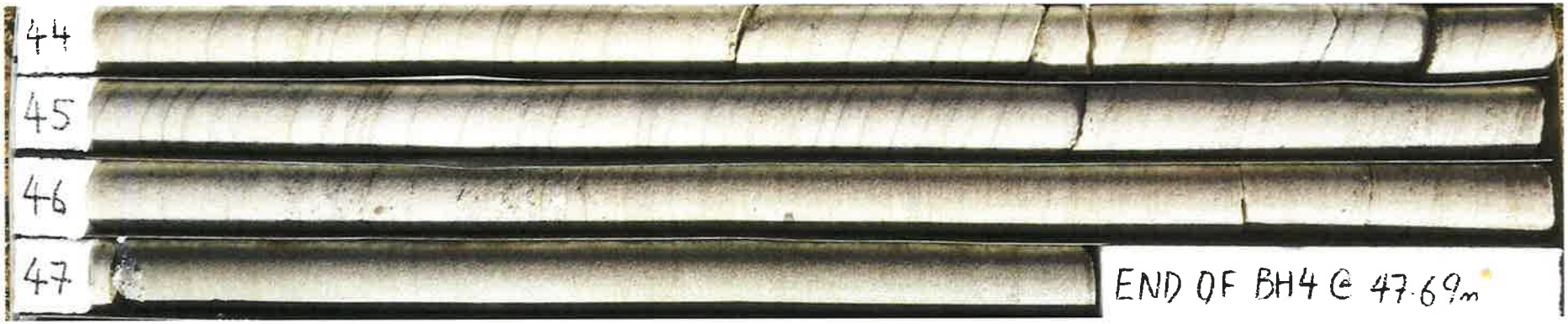
CORE PHOTOGRAPH OF BOREHOLE: BH4M

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



BOREHOLE LOG

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BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	GWNE	0	94.10	DS 0.00-0.10 m			-	FILL: Gravelly SAND; fine to medium grained, brown, fine to medium, sub-angular to sub-rounded gravels, with clay, plastic fragments.	-	-	FILL
			1		DS 0.50-0.60 m SPT 0.50-0.95 m 1,5,9 N=14 DS 1.00-1.10 m							
				1.80 92.30 92.30 1.80	DS 1.50-1.60 m SPT 1.50-1.90 m 12/100mm HB N>12 DS 1.90-2.00 m			CI	Silty CLAY; medium plasticity, red-brown. From 1.9 m, grey, grading to extremely weathered sandstone.	M <PL	VSt	RESIDUAL SOIL
			2						Continued as Cored Borehole			
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

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

CORED BOREHOLE LOG

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Contamination | Remediation | Geotechnics

BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN			0							
				1							
				2	2.00		Continuation from non-cored borehole				
		100	0		92.10		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, distinctly weathered.	DW			
					2.41						
					91.69		From 2.41 m, thinly to medium bedded, with dark grey siltstone laminations.	SW			
				3							
		100	93								
				4						4.06: XWS, Clay	
				5						4.89: XWS, Clay, 10 mm 4.98: XWS, Clay and Gravels, 20 mm	
				6							
					6.75						
		100	100		87.35		From 6.75 m, pale grey, medium bedded.	FR			
				7							
				8							
				9							
		100	100							9.32: XWS, Clay	
				10	10.00						

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

CORED BOREHOLE LOG

BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description			Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	10	84.10		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
				11							
					11.40						
					82.70		From 11.4 m, dark grey siltstone band.				
				12						11.92: SS, 30°, Clay and Gravels	
										12.34-12.37: XWS, Clay, 30 mm	
		100	99	13						12.75: XWS, Clay	
				14							
				15							
		100	100	16							
				17							
				18							
		100	100	19							
				20	20.00						

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

CORED BOREHOLE LOG

BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	20	74.10		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
		100	100	21							
		100	100	22							
		100	100	23							
		100	100	24							
		100	100	25							
		100	100	26							
		100	100	27	26.32 67.78		LAMINITE; fine to medium grained, pale grey, sandstone interbedded with dark grey siltstone, thinly to medium bedded.				
		100	100	28							
		100	100	29	29.14 64.96		SANDSTONE; fine to medium grained, pale grey, with dark grey shale laminations.				
		100	100	30	30.00						

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

CORED BOREHOLE LOG

BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	30	64.10		From 30.0 m, sandstone, fine to medium grained, pale grey, with dark grey shale laminations.	FR			
				31							
		100	100	32							
				33							
		100	100	34						34.51: XWS, Clay	
				35							
				36							
		100	100	37							
				38							
				39							
		100	100	40	40.00						

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

CORED BOREHOLE LOG

BH NO. BH5M

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	40	54.10		From 40.0 m, medium grained, pale grey, thickly bedded, with dark grey shale laminations.	FR			
				41							
				42						41.94-42.07: JT, 80 - 85°, CN, PR, RF	
		100	100	43						42.88-43.20: JT, 75 - 85°, CN, PR, RF	
				44	44.76						
					49.34		Hole Terminated at 44.76 m T/C Bit Refusal. Target Depth Reached.				
				45							
				46							
				47							
				48							
				49							
				50							

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

MONITORING WELL LOG

MW NO. BH5M

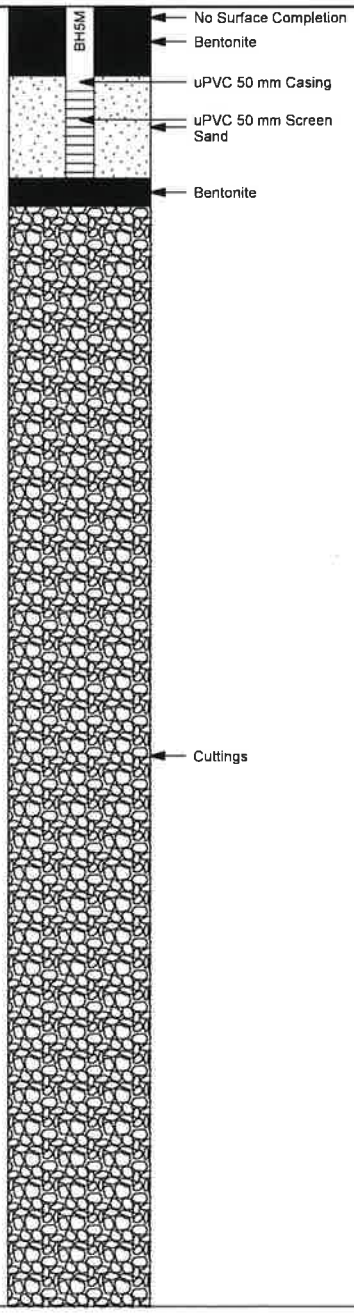
Project	Proposed Development	**Sheet**	1 of 2
Location	2 Mandala Parade, Castle Hill NSW	**Date Started**	16/07/2020
Position	Refer to Figure 2	**Date Completed**	16/07/2020
Job No.	E24724.G03_Rev1	**Logged By** SL	**Date** 16/07/2020
Client	Deicorp Projects Showground P/L	**Reviewed By** SR	**Date**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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈94.10 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

METHOD	WATER	DEPTH (m)	RL (m AHD)	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION
AD/T	GWNE	0			FILL: Gravelly SAND; fine to medium grained, brown, fine to medium, sub-angular to sub-rounded gravels, with clay, plastic fragments.
					Silty CLAY; medium plasticity, red-brown.
					From 1.9 m, grey, grading to extremely weathered sandstone.
			90		SANDSTONE; fine to medium grained, grey and orange-brown, thinly bedded, distinctly weathered.
		5			From 2.41 m, thinly to medium bedded, with dark grey siltstone laminations.
					From 6.75 m, pale grey, medium bedded.
			85		
		10			From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.
					From 11.4 m, dark grey siltstone band.
			80		
		15			
			75		
		20			From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.
NMLC	100% RETURN		70		
		25			LAMINITE; fine to medium grained, pale grey, sandstone interbedded with dark grey siltstone, thinly to medium bedded.
			65		SANDSTONE; fine to medium grained, pale grey, with dark grey shale laminations.
		30			From 30.0 m, sandstone, fine to medium grained, pale grey, with dark grey shale laminations.
			60		
		35			
			55		
		40			From 40.0 m, medium grained, pale grey, thickly bedded, with dark grey shale laminations.
			50		
		45			Hole Terminated at 44.76 m T/C Bit Refusal. Target Depth Reached.
			45		

PIEZOMETER CONSTRUCTION DETAILS

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



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

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CORE PHOTOGRAPH OF BOREHOLE: BH5M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH5M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH5M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH5M

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

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CORE PHOTOGRAPH OF BOREHOLE: BH5M

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

BOREHOLE LOG

BH NO. BH6

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY REL. DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	90.80				-	FILL: Silty CLAY; low plasticity, pale grey mottled red-brown, with gravels and sand.	-	-	FILL
			1	1.20	SPT 0.50-0.95 m 7,8,8 N=16							
	M			89.60				CI	Sandy CLAY; medium plasticity, pale grey, fine to medium grained sand, grading to extremely weathered sandstone.	D	VSt	RESIDUAL SOIL
				1.50	DS 1.40-1.50 m				Continued as Cored Borehole			
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

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

CORED BOREHOLE LOG

BH NO. BH6

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description			Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
				0							
				1							
					1.50		Continuation from non-cored borehole				
NMLC	100% RETURN	100	92	2	89.30		SANDSTONE; fine to medium grained, pale grey-orange, thinly bedded, ironstained, with dark grey siltstone laminations.	SW		2.42: JT, 85°, CN, PR, RF	
				3						3.17-3.21: XWS, Clay, Gravels	
		100	95	4						3.95: XWS, Clay	
					4.70					4.55: XWS	
				5	86.10		From 4.7 m, pale grey, medium bedded.	FR			
		100	100	6	6.18		From 6.18 m, medium to thickly bedded.				
				7	84.62						
				8							
		100	100	9							
				10	10.00						

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

CORED BOREHOLE LOG

BH NO. BH6

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	10	80.80		From 10.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey siltstone laminations.	FR			
				11							
		100	98	12							
				13							
				14							
		100	100	15							
				16							
				17							
				18							
		100	98	19						19.64-19.67: SS 19.80: XWS, Clay	
				20	20.00						

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

CORED BOREHOLE LOG

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BH NO. BH6

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	98	20	70.80		From 20.0 m, sandstone, fine to medium grained, pale grey, medium to thickly bedded, with dark grey shale laminations.	FR			
		100	100	21							
				22							
				23							
					23.94						
		100	100	24	66.86		LAMINITE; fine to medium grained, pale grey siltstone interbedded with dark grey siltstone, thinly to medium bedded.				
				25							
				26							
				27							
					27.44						
		100	100	28	63.36		SANDSTONE; fine to medium grained, pale grey, thickly bedded.				
				29							
		100	100	30	30.00						

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

CORED BOREHOLE LOG

BH NO. BH6

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

Drilling Contactor	Geosense Drilling	**Surface RL**	≈90.80 m AHD
Drill Rig	Hanjin DB8	**Inclination**	-90°

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	Average Defect Spacing (mm) (30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	100	30	60.80		From 30.0 m, sandstone, fine to medium grained, pale grey, medium bedded, with dark grey siltstone laminations.	FR			
				31							
				32							
		100	100	33							
				34							
				35							
				36							
				37							
		100	100	38							
				39							
		93	93	40	40.00		Hole Terminated at 40.00 m T/C Bit Refusal. Target Depth Reached.			39.47: JT, 50 - 70°, CN, CU, RF	

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

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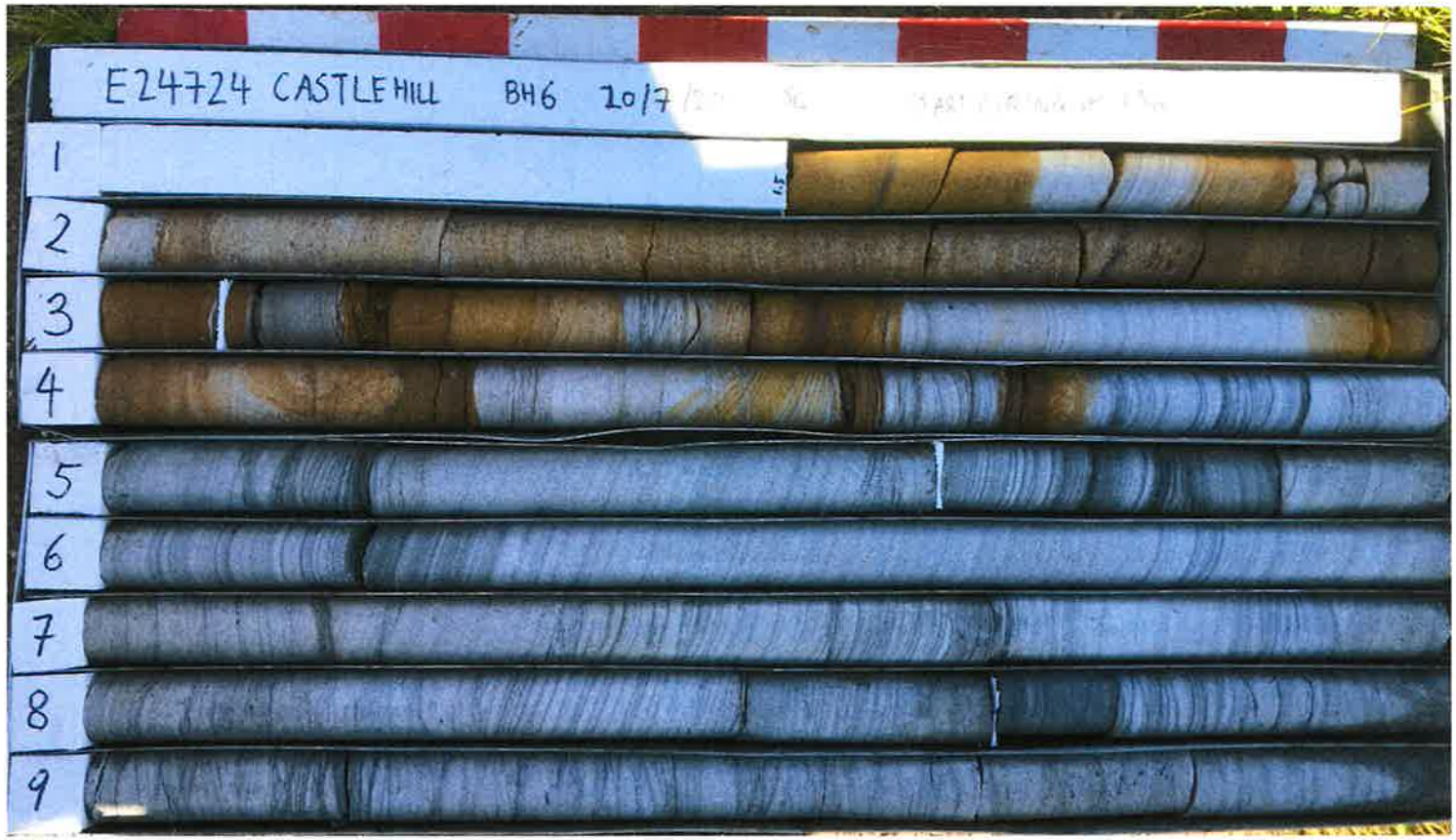
CORE PHOTOGRAPH OF BOREHOLE: BH6

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



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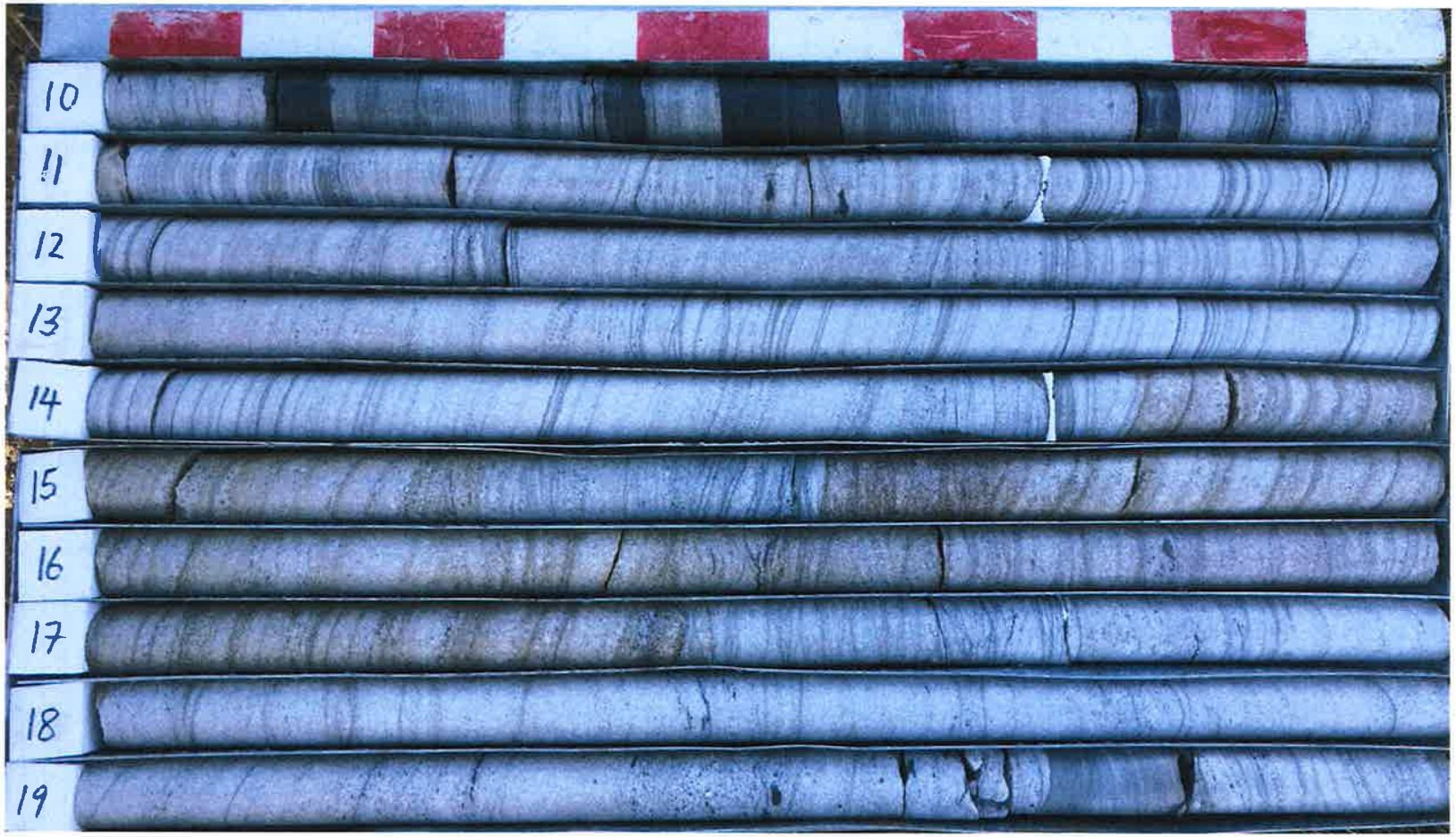
CORE PHOTOGRAPH OF BOREHOLE: BH6

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



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CORE PHOTOGRAPH OF BOREHOLE: BH6

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

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CORE PHOTOGRAPH OF BOREHOLE: BH6

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

BOREHOLE: BH7M

Project	Detailed Site Investigation			Sheet	1 OF 1
Location	2 Mandala Parade, Castle Hill NSW			Date Started	21/7/20
Position	Refer to Figure 2			Date Completed	22/7/20
Job No.	E24724.E02	Contractor	Hagstrom	Logged LW	Date:21/7/20
Client	Deicorp Pty Ltd	Drill Rig	Hydrapower Scout V (DR011)	Checked	Date:
		Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID Static Water Level BH7M
AD/T	-	GWNE	0					-	FILL: Gravelly SAND; medium to coarse grained, light brown, with fine to coarse, sub-angular to angular gravel, sandstone, shale, with some foreign material, brick, metal, concrete, PVC, no odour.	-	-	Grout
			1	1.40								Bentonite
				1.50				CL-CI	Silty CLAY; low to medium plasticity, light brown mottled orange, grading to extremely weathered sandstone, no odour.	-	-	uPVC 50 mm Casing
			2						Borehole Terminated at 1.50 mBGL; T/C Bit Refusal on Sandstone.			
			3									Sand
			4									uPVC 50 mm Screen
			5									
			6									
			7									
			8									
			9									
			10									

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

Table T1 - Summary of Groundwater Analytical Results

Sample ID	Sampling Date	Metals								PAHs			BTEX					TRHs				VOCs				pH	EC (µS/cm)
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total PAHs	Benzo(a)pyrene	Naphthalene	Benzene	Toluene	Ethylbenzene	o-xylene	m/p-xylene	F1	F2	F3	F4	Chloroform (THM) *	Bromodichloromethane (THM) *	Dibromochloromethane (THM) *	Total VOC		
Detailed Site Investigation (EI, 2020)																											
BH3M-a	29/7/2020			1	22			26	74													9.2	2.3	0.6	13	5.1	1,200
BH4M-a				170	24			3	21									52				39	6.6	1.6	48	6.3	980
BH5M		1	0.2	3	23	11		27	180										76			1.7				4.6	4,100
BH4M-a	18/8/2020	2	0.2	1	22	30		38	240																		
Statistical Analysis																											
Maximum Concentration		2	0.2	170	24	30		38	240									52	76			39	6.6	1.6	48	6.3	4,100
GILs																											
GILs	Fresh Waters [1]	24 (AsIII) 13 (AsV)	0.2	1 [3] (Cr VI)	1.4	3.4	0.06 [2]	11	8 [3]			16	950	180 [4]	80 [4]	350	275 [4]	50 [5]	60 [5]	500 [5]	500 [5]						
	Marine Waters [1]		0.7 [2]	27 (Cr III) 4.4 (Cr IV)	1.3	4.4	0.1 [2]	7	15 [3]			50 [5]	500 [3]	180 [4]	5 [4]	350 [4]	275 [4]	50 [5]	60 [5]	500 [5]	500 [5]						
	Recreational Water [6]	100	20		1,000 *	100	10	200	3,000*				10	25*	3*	20 *	20 *					2,500					

Notes:

Highlighted indicates criteria exceeded

All values are µg/L unless stated otherwise

HSL A & B	NEPC 1999 Amendment 2013 'HSL A & B' Health Based Screening Levels for vapour intrusion applicable for low-high density residential settings.
HSL C	NEPC 1999 Amendment 2013 'HSL C' Health Based Screening Levels for vapour intrusion applicable for recreational/open space settings.
HSL D	NEPC 1999 Amendment 2013 'HSL D' Health Based Screening Levels for vapour intrusion applicable for commercial / industrial settings.
NL	Not Limiting
NA	'Not Analysed' i.e. the sample was not analysed.
ND	Not Detected - i.e. concentration below the laboratory PQL.
F1	To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.
F2	To obtain F2 subtract naphthalene from the >C10-C16 fraction.
F3	(>C16-C34)
F4	(>C34-C40)
*	Only thoes VOC values above the laboratory PQL have been tabulated.
1	NEPM (2013) Groundwater Investigation Levels for fresh and marine water quality, based on ANZECC & ARMCANZ (2000).
2	Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZG (2018) for further guidance.
3	Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
4	Low reliability toxicity data, refer to ANZECC & ARMCANZ (2000)
5	In lack of a criteria the laboratory PQL has been used (DEC, 2007).
6	Based on NHMRC (2011 - update August 2018 v.3.5) Drinking Water Guidelines. The lowest of the Health Guideline x10 or the Aesthetic Guideline has been chosen as the assessment criteria. Aesthetic based criteria have been indicated by *

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Appendix D - Groundwater Take Assessment

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5 November 2021
E24724.G12

Greg Colbran
Deicorp Pty Ltd
Level 4, 161 Redfern Street
REDFERN NSW 2016

Groundwater Take Assessment
2 Mandala Parade, Castle Hill, NSW

1. INTRODUCTION

At the request of Greg Colbran of Deicorp Pty Ltd (the Client), EI Australia (EI) has prepared this Groundwater Take Assessment (GTA) for the proposed development at 2 Mandala Parade, Castle Hill, NSW (the Site).

The following documents were used to assist in the preparation of this GTA:

- Architectural Drawings prepared by Turner – Project No. 19068, Drawing No. DA-110-002 to DA-110-007 (Rev_02), DA-110-008 to DA-110-010 (Rev_03), DA-110-020 to DA-110-210 (Rev_04), and DA-210-101 to DA-210-401 (Rev_03), dated 6 July 2021;
- Shoring Plans prepared by ABC Consultants – Job No. 20025, Dated 12 April 2021;
  - Rev P1, Drawing No. S01.106,
  - Rev P3, Drawing No. S01.101 and S01.125
  - Rev P4, Drawing No. S01.105, S01.111 to S01.114 and S01.122
- A site survey plan prepared by Daw & Walton Consulting Surveyors – Job No. 5042-20, Revision 1, dated 7 August 2020.

EI has previously prepared a Geotechnical Investigation (GI) Report referenced E24724.G03_Rev2 and dated 9 July 2021.

Based on the provided documents and email correspondence with Ms Poonam Chauhan, EI understands that the proposed development involves the construction of four 20-storey mixed-use building overlying a common podium structure with a stepped 6-storey basement. The lowest basement level (B06) will require a Finished Floor Level (FFL) of RL 69.4m AHD. A Bulk Excavation Level (BEL) of RL 69.1m will be required for the lowest basement level, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths of 20.5m Below Existing Ground Level (BEGL) at the Doran Drive end of site to 29.0m BEGL at the Andalusian Way end of site have been estimated. Locally deeper excavations may be required for footings, service trenches, crane pads and lift overrun pits.

1.1. ASSESSMENT OBJECTIVES

The objective of this GTA is to provide an estimation of the groundwater inflow volumes that require pumping out during the construction and operational stage of the development and to assess if tanking is required for control of groundwater inflows into the proposed basement during and after construction.

2. SITE DESCRIPTION

2.1. REGIONAL GEOLOGY

Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Penrith 1:100,000 Geological Series Sheet 9030 (DMR 1991) indicates the site is underlain by Hawkesbury Sandstone, which typically comprises medium to coarse-grained quartz sandstone, minor laminated mudstone and siltstone lenses.

3. SITE MODEL

3.1. SUBSURFACE CONDITIONS AND PERMEABILITY

For the purpose of this GTA, the subsurface conditions from our previously referenced GI report have been adopted. Groundwater and subsurface condition data from boreholes have been used to find the average depth and thickness of each unit as well as the average depth of groundwater across the site. A summary of the average depths of each soil unit and permeability values is shown below in **Table 1**.

Table 1 Subsurface Conditions and Adopted Permeability Values

Unit	Material [2]	Modelled Depth to top of Unit (m BEGL) [1]	Modelled RL of top of Unit (m AHD) [1]	Modelled Thickness (m)	Material Description [2]	Adopted Permeability, k_x (m/s) [3]	Anisotropic permeability k_y / k_x
1	Fill	0	98.0	2.0	Silty Sand Fill	1×10^{-4}	1
2	Residual Soil	2.0	96.0	1.0	Silty Clay	1×10^{-7}	1
3	Sandstone	3.0	95.0	35.0	Sandstone	5×10^{-8}	0.15

Note 1 Approximate depth and level at the time of our assessment. Depths and levels may vary across the site.
Note 2 For more detailed descriptions of the subsurface conditions, reference should be made our original GI report.
Note 3 The permeability of the Unit 3 Sandstone was based on EI's pump-out test results, while the permeability of Units 1 and 2 are based on published data from Look (2009)

3.2. GROUNDWATER OBSERVATIONS

The groundwater levels were measured within the monitoring wells installed by EI as given in **Table 2** below.

Table 2 Summary of Groundwater Levels

Monitoring Well / Borehole ID	Date of Observation	Approximate Depth to Groundwater (m BEGL)	Approximate RL of Groundwater (m AHD)
BH3M	14/7/20	15.4	75.6
BH4M	14/7/20	20.5	77.5
BH3M	11/10/21	15.2	75.8
BH3Ma	11/10/21	2.9	88.2
BH4M	11/10/21	19.9	78.1
BH4Ma	11/10/21	4.6	93.4
BH5M	11/10/21	4.2	89.9
BH7M	11/10/21	4.8	88.4

3.3. SHORING SYSTEM

Based on the provided structural plans by ABC Consultants, the shoring system for the proposed excavation consists of anchored / propped soldier pile walls for the retention of the fill, residual soil and Class V/IV sandstone above the Unit 4, Class II/I sandstone, which is to be cut vertically. The soldier pile wall is to consist of 600mm diameter piles with 2.4m c/c spacing and socketed into the Unit 4 sandstone with pile toe at RL 85.4m.

This assessment does not assess the overall stability of the shoring system, which will need to be designed to satisfy stability considerations by the structural engineer. If the assumptions or shoring design adopted in the model differ from the final design, this report should be revised.

4. GROUNDWATER TAKE ASSESSMENT

4.1. ASSESSMENT OF GROUNDWATER TAKE DURING CONSTRUCTION PHASE

Seepage analysis for groundwater inflows following excavation has been undertaken using SEEP/W, a finite element groundwater seepage analysis software. This model estimates the volume of water which will be required to be dewatered during the construction of the basement and until the dewatering is turned off.

For the purpose of this modelling, it has been assumed that:

- The ground surface is level across the site and lies at an elevation of RL 98.0m AHD.
- The subsurface conditions were horizontal along the site. Permeability values presented in **Table 1** above were adopted for each unit.
- The fill and residual soil layers have the potential to be unsaturated with maximum soil suction pressures of 100kPa.
- Saturated volumetric water content for the fill and clay are 43% and 51%, respectively.
- Dewatering will be required for 12 months, which is the assumed time required to complete the basement construction.
- The perimeter soldier pile will be free draining;
- Temporary dewatering will be undertaken within the basement excavation down to the BEL of RL 69.1m AHD.
- An external design groundwater level of RL 93.4m AHD (which is based on the highest observed groundwater level) was assumed to be constant at 40m away from the shoring wall.
- A "No-Flow" boundary is defined along the symmetric line (the centre of the excavation), at 35m from the perimeter shoring walls.
- The shoring walls surrounding the basement excavation has a total length of about 350m.

The SEEP/W model is presented in **Appendix A.** The estimated groundwater inflow rate into the basement is provided in **Table 3** below:

Table 3 Summary of Groundwater Seepage Analysis Results

Inflow per m length of perimeter wall (m^3/sec)	Inflow per m length of perimeter wall (m^3/day)	Inflow into excavation (m^3/day)	Total Inflow during construction (ML/365 days)
3.91×10^{-7}	0.0338	11.82	4.32

5. CONCLUSIONS AND COMMENTS

Based on the findings of this report and within the limitations of available data, EI concludes that:

- Construction phase groundwater take will be approximately 4.32 ML / 365 days based on the following assumptions:
  - Continuous dewatering will take place at BEL, and construction of the basement will take 365 days;
  - The perimeter shoring wall is assumed to be free draining;
  - Groundwater inflow rates are constant during the excavation and construction of the basement;
- Groundwater within bedrock is confined to any defects within the rock and these are expected to be drained of groundwater as the excavation proceeds, resulting in a considerable reduction of seepage rates into the excavation overtime. Hence, EI considers that the modelled groundwater inflow rates into the excavation (which are constant overtime) are a conservative, upper-bound estimate.
- Measured groundwater levels which were used as the basis of our model should be considered in relation to the monitoring well depth, screening interval and number of defects contained within the excavated bedrock.
- Considering the above, we expect that control of groundwater inflows into the basement during and permanently after construction will be feasible using a suitably designed sump and pump system and hence tanking of basement structures will not be required for groundwater control.
- Should any design or construction conditions differ from that adopted in this report; this assessment report should be reviewed and updated as required.

6. LIMITATIONS

The advice and parameters presented in this Groundwater Take Assessment are for preliminary assessment of the expected groundwater take based upon the proposed development and encountered site conditions of the previous GI. This report is not a dewatering management plan. This assessment does not assess the overall stability of the assumed shoring system. The shoring system will need to be designed to satisfy stability, piping, founding and groundwater cut-off considerations by the structural engineer. A suitably qualified dewatering contractor should be engaged to confirm dewatering requirements.

Your attention is drawn to the document "Important Information", attached as **Appendix B** at the end of this letter 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.

This letter report was prepared by EI for the sole use of Deicorp Pty Ltd for the particular project and purpose described. No responsibility is accepted for the use of any part of this letter report in any other content or for any other purpose.

EI has used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality and has relied on the accuracy of information provided by Deicorp Pty Ltd. No other warranty expressed or implied is made or intended.

EI retains the property of this letter report subject to payment of all fees due for the services. The letter report shall not be reproduced except in full and with prior written permission by EI.

7. CLOSURE

Please do not hesitate to contact the undersigned should you have any questions.

For and on behalf of:
EI AUSTRALIA

Authors

David Saw
Geotechnical Engineer

Technical Reviewer

Sam Kazemi
Geotechnical Engineer

Attachments: Appendix A – Seep/W Model
Appendix B – Important Information

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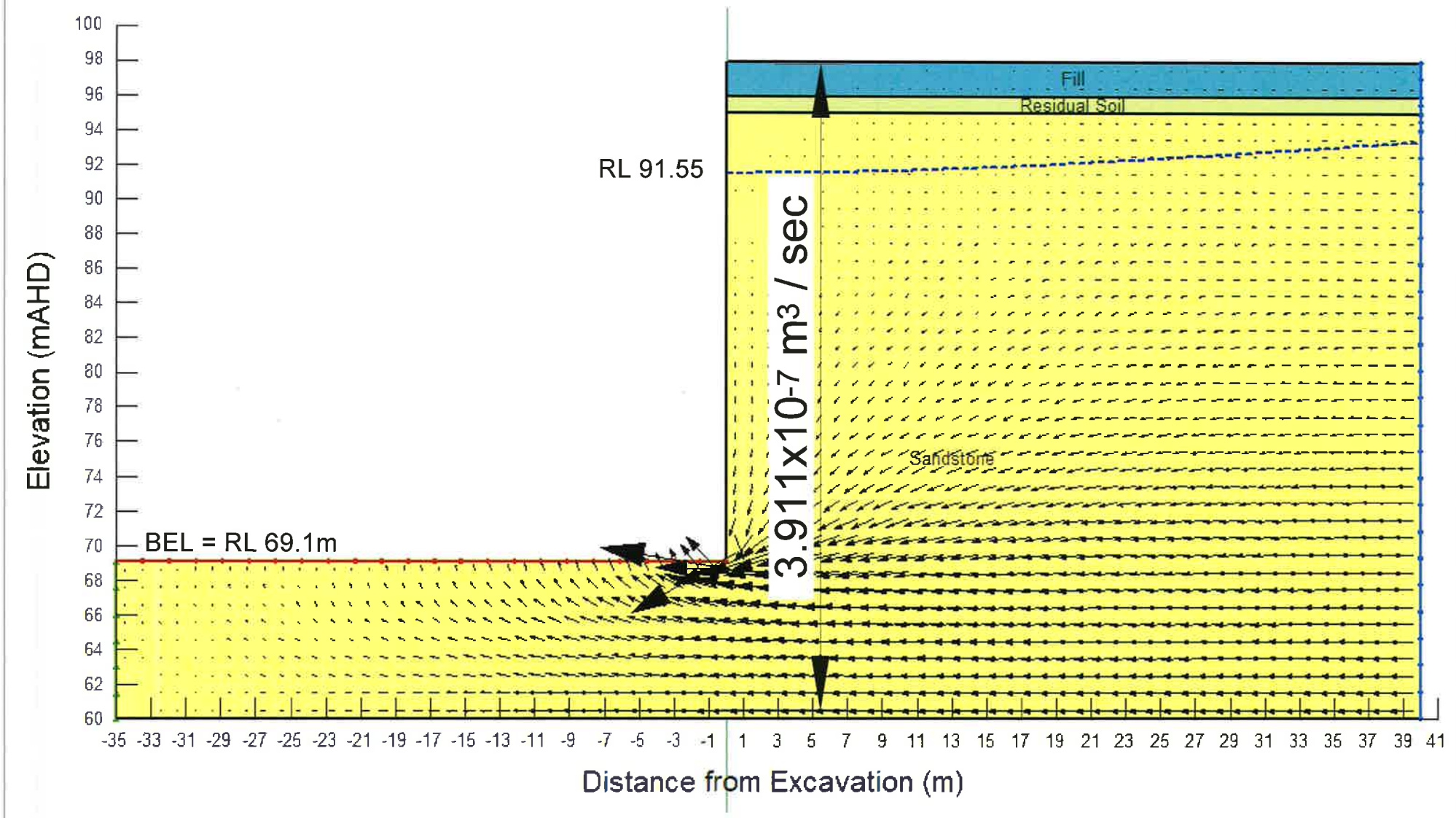
APPENDIX A

Seep/W Model



LEGEND

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Drawn:	D.S.
Approved:	S.Ka
Date:	05/11/2021

Deicorp Pty Ltd
Groundwater Take Assessment
2 Mandala Parade, Castle Hill, NSW
SeepW Results

Appendix: A

Project: E24724.G12

APPENDIX B

Important Information

Important Information

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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.