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COLLIERS PROJECT LEADERS

Geotechnical Investigation

2 Colo Street, Mittagong NSW

E25829.G03_Rev1
15 February 2024

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Revision	Details	Date	Amended By
	Final	23 January 2024	
1	Updated Architectural Drawings	15 February 2024	GP

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1. Introduction

1.1 Project Background

At the request of Phillipa Aikenof Colliers Project Leaders (the Client) on behalf of their client, the Medich Corporation, EI Australia (EI) has carried out a Geotechnical Investigation (GI) for the proposed development at 2 Colo Street, Mittagong NSW (the Site).

This GI report has been prepared to provide advice and recommendations to assist in the preparation of designs for the proposed redevelopment. The investigation has been carried out in accordance with the agreed scope of works outlined in EI's proposal referenced P20798.2, dated 16 September 2022.

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

- Architectural drawings prepared by Snøhetta for buildings M1, M2 and Maltsters House– Job No. 18-17, Drawing Nos. 0100, 0300, 0301, 0302, 1101, 1102, 1801, 2000, 3000, MH 0300, MH 1100, MH 1101, MH 1801, MH 2000 and MH 3000, latest revision E, latest dated 12 February 2024;
- Architectural drawings prepared by Snøhetta for buildings M3 and M4 – Job No. 18-17, Drawing Nos. 0100, 300, 301, 302, 1100, 1101 to 1104, 1801, 2000 and 3000, latest revision E, latest dated 12 February 2024;
- Geotechnical Assessment prepared by JK Geotechnics – Referenced 33051PHrpt, Dated 16 April 2020; and
- Site survey plan prepared by Veris Australia– Referenced 201968, dated 2 December 2019. The datum in the survey plan is in Australian Height Datum (AHD), hence all Reduced Levels (RL) mentioned in this report are henceforth in AHD.

1.2 Site Background

The historic Maltings site located at 2 Colo Street, Mittagong NSW has received the approved DA Determination from the Land and Environmental Court on the 13 May 2022.

The Maltings is a Heritage site locally listed in the Wingecarribee Council's Local Environmental Plan 2010 (LEP). Under the LEP, it is designated as R2 low density residential. The site covers an area of 6.44 hectares and is positioned 600 meters northeast of Mittagong train station. It is surrounded by remnants of vegetation and is intersected by the Nattai River.

Within the site, there are various existing buildings in different states of disrepair, including the main Malthouse buildings (referred to as M1 to M4), sheds, large barley stores, pump rooms, and a company cottage. Bridges have been constructed to facilitate crossing the Nattai River.

The site faces several environmental constraints, such as bushfire risks, the presence of threatened flora species, Aboriginal Heritage considerations, and the presence of a riparian corridor along the Nattai River. These constraints have significantly influenced the concept design and have been utilized as opportunities to maximize the responsiveness of the proposed development.

1.3 Proposed Development

The proposed project aims to refurbish and restore the riparian corridor and conserve the existing heritage-listed buildings known as M1 to M4, which are currently in different states of disrepair. The goal is to transform these buildings into a six-star hotel with additional facilities such as multi-purpose spaces suitable for various cultural activities like art exhibitions, functions, recreation, and performances. The development plans also include ground improvements such as landscaping, parking areas, and vehicular access. Additionally, the ruins of the extensively damaged Maltster's Cottage will be demolished. The proposed development has been split into two stages with M1-M4 under Stage 1, and M5-M6 under Stage 2. A more detailed description of the proposed development is provided below:

1.1.1 Maltings 1, 2 and Maltsters House (northwest of Nattai River)

- The existing heritage building will be renovated and transformed into a four-story commercial structure that will include back-of-house facilities, versatile areas for performances and events, a gym, and various hall and gallery spaces.
- Construction of a shed on the north-eastern side of the existing building for gallery, office and amenities.
- An on-grade parking area and access road/driveway located off Colo Street, to the south of the existing building. Although the proposed road surface levels are not depicted, it is assumed that they will be at or near the current levels.
- Demolition of existing dilapidated Maltsters House building and construct a single-storey gallery and artists in residence/gallery building.

1.1.2 Maltings 3 and 4 (southeast of Nattai River)

- Refurbishment of the existing heritage building into a five-storey hotel.
- A six-story hotel extension will be built on the south-western side of the current building. The extension will have a single-level basement with a Finished Floor Level (FFL) set at RL622.0m. Given the sloping nature of the site, excavation will be necessary, reaching maximum depths of approximately 6.0m on the eastern side and 3.5m on the western side of the basement.
- An on-grade parking area situated to the south-east of the building, along with an access road/driveway accessible from Southey Street. Although the proposed road surface levels are not provided, given the sloping terrain in that specific area of the site, it is anticipated that certain earthworks, involving cutting and filling, will be necessary with maximum depths/heights of approximately 1.5m.

1.1.3 Maltings 5 and 6 (west of Southey Street boundary)

- There is a potential future development of constructing seven buildings ranging from three to four stories for residential, accommodation, tourist and visitor accommodation, and seniors living. However, the specific finished floor levels for these buildings have not been specified or indicated, and this area was of archaeologically sensitive landforms which geotechnical investigation was not able to carry out at time of writing this report.

1.4 Objectives

The objective of the GI was to assess site surface and subsurface conditions at 5 borehole locations and 18 test pit locations, and to provide geotechnical advice and recommendations to assist in the design of the proposed development.

1.5 Fieldwork Methodology

The scope of works for the GI included:

- Preparation of a Work Health and Safety Plan;
- Review of relevant geological maps for the project area;
- Site walkover inspection by two Geotechnical Engineers to assess topographical features and site conditions;
- Scanning of proposed borehole locations for buried conductive services using a licensed service locator with reference to Dial Before You Dig (DBYD) plans;
- Auger drilling of five boreholes (BH1M, BH2M, BH3, BH4M and BH5M) by a track-mounted drill rig using solid flight augers equipped with a 'Tungsten-Carbide' (T-C) bit and excavation at eighteen test pits (TP1 to TP18) using excavator. The boreholes were auger drilled and the test pits were excavated to depths to depths as shown in **Table1-1** and **Table1-2 below:**

Table 1-1 Auger Drilling and Rock Coring Depths of Boreholes

Borehole ID	Surface RL (m AHD)	Auger Drilling		Rock Coring	
		Depth (m)	RL (m AHD)	Depth (m)	RL (m AHD)
BH1M	625.3	3.32	621.98	8.00	671.30
BH2M	625.0	3.11	621.89	8.00	617.00
BH3	625.5	3.38	621.12	8.00	616.50
BH4M	624.7	3.00	621.74	8.32	616.42
BH5M	625.5	4.07	621.39	8.00	617.46

Table 1-2 Test Pit Excavation Depths

Test Pit ID	Surface RL (m AHD)	Depth (m)	RL (m AHD)
TP1	624.50	1.75	622.75
TP2	624.50	1.80	622.70
TP3	624.50	1.25	623.25
TP4	624.50	2.50	622.0
TP5	624.50	3.10	621.4
TP6	624.50	2.80	621.7
TP7	625.00	3.45	621.55
TP8	626.70	3.05	623.65
TP9	626.80	3.20	623.60

Test Pit ID	Surface RL (m AHD)	Depth (m)	RL (m AHD)
TP10	626.90	3.13	623.77
TP11	628.30	3.15	625.15
TP12	625.60	3.20	622.40
TP13	625.00	2.70	622.30
TP14	628.90	1.70	627.20
TP15	625.00	2.10	622.90
TP16	625.00	3.10	621.90
TP17	625.00	3.43	621.57
TP18	625.00	3.10	621.90

  - Standard Penetration Testing (SPT) was carried out (as per AS 1289.6.3.1-2004), where possible, during auger drilling of the boreholes to assess soil strength/relative densities.
  - Measurements of groundwater seepage/levels, where possible, during excavation of testpits and in the augered sections of the boreholes during and shortly after completion of auger drilling and ;
  - The strength of the bedrock in the augered sections of the boreholes was assessed by observation of the auger penetration resistance using a T-C drill bit and examination of the recovered rock cuttings. It should be noted that rock strengths assessed from augered boreholes are approximate and strength variances can be expected.
  - The approximate surface levels shown on the borehole and test pit logs were measured using a hand-held GPS. Approximate borehole and test pit locations are shown on **Figure 2**;
- Continuation of BH1M, BH2M, BH3, BH4M and BH5M using NMLC diamond coring techniques to termination depths shown above in **Table 1-1**. The rock core photographs are presented in **Appendix A**;
- Eighteen Dynamic Cone Penetrometer (DCP) tests (DCP1 to DCP18) were carried prior to excavation of test pits and were carried out to refusal depths ranging in between 1.25m (RL 619.2m) and 3.45m BEGL (RL 627.2).
- Measurement of groundwater test holes following the withdrawal of the rods;
- Borehole BH1M, BH2M, BH4M and BH5M was converted into groundwater monitoring wells with a depth of 8.0m (RL 617.3m), 8.0m (RL 610.3m), 8.32 m (RL 616.4m) and 8.0m BEGL (RL 617.5), to allow for long-term groundwater monitoring.
- Borehole BH3 and all test pits were backfilled with drilling spoils to surface upon completion;

- Soil and rock samples were sent to STS Geotechnics Pty Ltd (STS) and SGS Australia (SGS), which are National Australian Testing Authority (NATA) accredited laboratories, for testing and storage.
- Preparation of this GI report.

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

1.6 Constraints

The GI was limited by the intent of the investigation and the presence of existing site structures and archaeologically sensitive areas. The discussions and advice presented in this report are preliminary and intended to assist in the preparation of final designs for the proposed development. Further additional investigation in the form of boreholes and test pits in the eastern corner of the site is required following clearance from the archaeological investigations. Further geotechnical inspections should be carried out during construction to confirm the geotechnical and groundwater models, and the design parameters provided in this report.

2. Site Description

2.1 Site Description and Identification

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

Table 2-1 Summary of Site Information

Information	Detail
Street Address	2 Colo Street, Mittagong NSW
Lot and Deposited Plan (DP) Identification	Lot 21 in DP 1029384
Brief Site Description	At the time of the investigation, the site is currently occupied by six dilapidated single to five storey brick and metal framed buildings and pavements with asphaltic concrete. A timber bridge supported by concrete weirs is constructed on the Nattai river which is passing through the site. Majority of the site was occupied with thick vegetation with long grass and trees scattered all over the site.
Site Area	The site area is approximately 66,626m^2 (based on the information from survey plan referenced above).

Plate 1: Aerial photograph of the site.

2.2 Local Land Use

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

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description
North	Fitzroy Inn, property at 1 Ferguson Crescent, a Heritage listed double-storey restored colonial sandstone building with grassy areas, carpark, and tennis court. Property at 25 Southey Street, a single storey brick dwelling with a setback of 3m from the boundary.
East	Southey Street, a two-lane asphalt paved road. Beyond this are residential properties.
South	Properties at 1 to 15 Fernbrook Crescent, single and double storey timber and brick dwellings with grassy areas. Several trees are scattered around the properties and near the site boundaries. Apple Tree Cottage Estate on Colo Street, group of single storey dwellings with asphaltic concrete driveways. The south-western end of the site fronts Colo Street, a two-way asphalt paved road. Beyond this grassy vacant lot.
West	Railway Corridor Picton–Mittagong loop railway line, a double tracked railway track, which is a Transport Asset Holding Entity (TAHE) asset, and Ferguson Crescent. Beyond these are Memorial Park, Railway Crescent and residential properties.

2.3 Regional Setting

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

Table 2-3 Topographic and Geological Information

Attribute	Description
Topography	The area under discussion is located between the Great Southern Railway and Ferguson Crescent on the northwest side, Southey Street on the east side, and Colo Street on the south side. Colo Street and Southey Street are mostly level, whereas Ferguson Crescent is built partially on an embankment over the railway line, sloping downward to the northeast at an angle of around 3 degrees. The Nattai River runs through the site, flowing approximately in a northeast to southwest direction. On the western bank of Nattai River, the ground gently slopes (<5 degrees) to the north-northeast, while on the eastern bank of the river the ground gently slopes (<5 degrees) to the west towards the river. Beyond the 5-storey brick building (M5-M6), the ground falls west from Southey Street to the buildings at a moderate slope (6-7 degrees), from RL 638.5m to RL 626.0m.
Regional Geology	Information on regional sub-surface conditions, referenced from the New South Wales Seamless Geology dataset, single layer, version 2.3 [Digital Dataset] indicates the site to be underlain by Bringelly Shale (shale, carbonaceous claystone, laminite, lithic sandstone, rare coal) and Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with minor shale and laminite lenses).

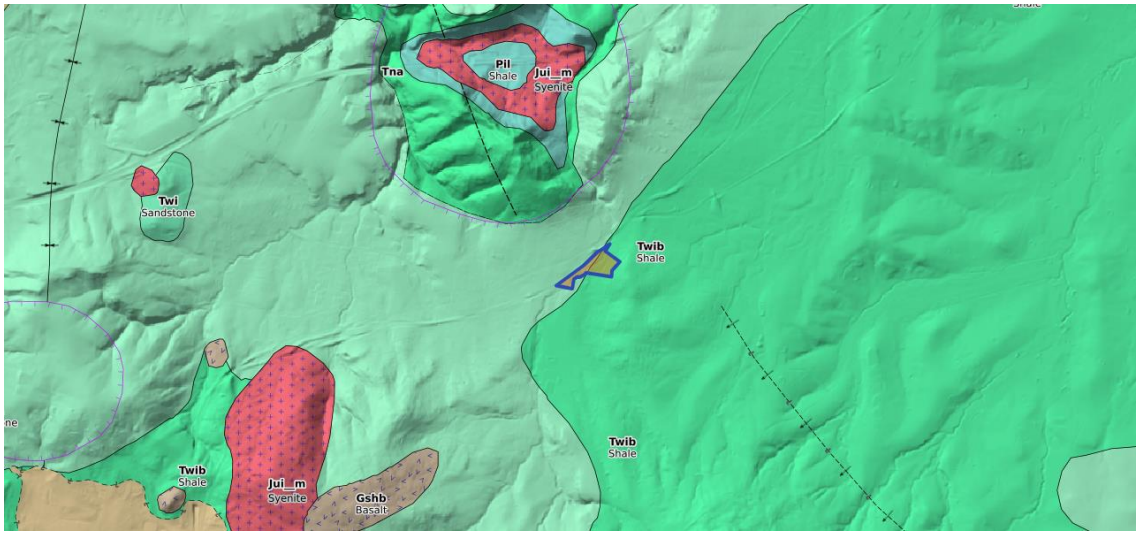


Plate 2: Excerpt of geological map showing location of site.

3. Investigation Results

3.1 Stratigraphy

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

Table 3-1 Summary of Subsurface Conditions

Unit	Material[2]	Depth to Top of Unit (m BEGL)[1]	RL of Top of Unit (m AHD)[1]	Observed Thickness (m)	Comments
1	**Topsoil/Fill**	Surface	624.5 to 628.9	0.15 to 3.43	Fill and topsoil of various composition, including low to medium plasticity silty clay / gravelly clay, fine to coarse sandy gravel, fine to medium grained gravelly sand / clayey sand, and sandy clay / clayey silt. The fill was assessed to be poorly compacted and uncontrolled.
2	**Residual Soil**	0.15 to 1.7	622.8 to 628.5	0.25 to 3.67	Medium to high plasticity silty clay and low to medium sandy clay, soft to firm becoming hard with depth. Occasional clayey silt and medium dense to dense clayey sand, grading into weathered sandstone / laminite with depth. SPT values ranged from 4 to refusal indicated by hammer bounce. DCP values ranged from 1 to refusal indicated by hammer bounce.
3	**Very Low to Low Strength Laminate / Claystone**	1.25 to 4.07	621.4 to 627.2	0.93 to 3.15	Encountered in BH4M and BH5M, and inferred from test pit refusal depths in all test pits. Not encountered in BH1M, BH2M, and BH3. Distinctly weathered, very low to low strength laminate / claystone. The laminate generally consisted of moderately spaced defects consisting of sub-vertical joints, sub-horizontal bedding partings and fractured zones.
4	**Medium to High Strength Laminate / Sandstone**	3.11 to 6.05	618.65 to 622.12	-[3]	Slightly weathered to fresh, medium to high strength laminite / sandstone. Observed in all boreholes BH1M, BH2M, BH3, BH4M, and BH5M.

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

3.2 Groundwater Observations

Groundwater seepage within the boreholes was observed during auger drilling of BH1M only. Following their completion, groundwater monitoring wells were installed in BH1M, BH2M, BH4M and BH5M and bailed dry. The groundwater levels were then measured within the monitoring wells as per **Table 3-2** below:

Table 3-2 Groundwater Levels within Boreholes

Borehole ID	Groundwater Seepage Level During Auger Drilling		Groundwater Level After Well Development	
	m BEGL	RL (m AHD)	m BEGL	RL (m AHD)
BH1M	1.5	623.8	1.77	623.53
BH2M	Not encountered	Not encountered	1.75	623.25
BH3	Not encountered	Not encountered	-	-
BH4M	Not encountered	Not encountered	2.58	622.16
BH5M	Not encountered	Not encountered	Not encountered	Not encountered

Note 1 BH3 had collapsed to the depths shown in Table 3.2, which prevented observation of groundwater levels below these depths.

We note that the groundwater levels may not have become evident or stabilised in the monitoring wells within the limited observation period. No long term groundwater monitoring was carried out.

Groundwater seepage observed within the test pits during excavation is summarised in **Table 3-3** below.

Table 3-3 Groundwater Seepage Observed in Test Pits

Borehole ID	Groundwater Seepage Level During Excavation	
	m BEGL	RL (m AHD)
TP1	1.4	623.10
TP2	1.6	622.90
TP3	Not encountered	Not encountered
TP4	2.5	622.0
TP5	2.0	622.5
TP6	2.8	621.7
TP7	2.5	622.5
TP8	2.4	624.3
TP9	2.5	624.3
TP10	2.3	624.6
TP11	2.4	625.9
TP12	3.2	622.4
TP13	Not encountered	Not encountered

Borehole ID	Groundwater Seepage Level During Excavation	
TP14	Not encountered	Not encountered
TP15	Not encountered	Not encountered
TP16	2.8	622.2
TP17	2.6	622.4
TP18	Not encountered	Not encountered

3.3 Test Results

Forty six soil and seven bulk samples were selected for laboratory testing to assess the following:

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

A summary of the soil test results is provided in **Table 3-4**, **Table 3-5,** and **Table 3-6** below. Laboratory test certificates are presented in **Appendix B**.

Table 3-4 Summary of Emerson Class Number and Atterberg Test Results

Test / Sample ID	Unit	Material Description[1]	Emersion Class Number	Atterberg Limits				
				Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Moisture Content (%)
TP1 0.5-0.6	2	Silty CLAY	5	-	-	-	-	-
TP1 1.5-1.6	2	Silty CLAY	-	37	20	17	10.0	19.8
TP2 0.5-0.6	2	Sandy CLAY	4	-	-	-	-	-
TP2 1.5-1.6	2	Sandy CLAY	-	39	18	21	12.0	20.4
TP3 1.1-1.2	2	Sandy CLAY	-	34	22	12	9.0	26.9
TP4 0.5-0.6	2	Silty CLAY	5	-	-	-	-	-
TP4 1.5-1.6	2	Sandy CLAY	-	30	15	15	8.0	17.4
TP5 1.7-1.8	2	Silty CLAY	-	33	16	17	10.0	21.1
TP6 0.5-0.6	2	Silty CLAY	2	-	-	-	-	-
TP6 1.5-1.6	2	Sandy CLAY	-	21	17	4	3.0	28.6

Test / Sample	Unit	Material Description[1]	Emersion Class	Atterberg Limits				
TP7 1.5-1.6	2	Sandy CLAY	2	-	-	-	-	-
TP8 2.5-2.6	2	Silty CLAY	-	37	17	20	10.0	24.6
TP10 1.2-1.3	2	Sandy CLAY	-	27	15	12	8.0	8.8
TP10 2.5-2.6	2	Silty CLAY	6	-	-	-	-	-
TP12 0.5-0.6	2	Silty CLAY	-	45	20	25	14.0	18.5
TP12 1.5-1.6	2	Silty CLAY	6	-	-	-	-	-
TP13 0.5-0.6	2	Silty CLAY	6	-	-	-	-	-
TP13 1.5-1.6	2	Silty CLAY	-	65	26	39	15.0	22.6
TP14 0.5-0.6	2	Silty CLAY	5	-	-	-	-	-
TP15 0.5-0.6	2	Silty CLAY	-	57	19	38	15.0	19.1
TP16 0.5-0.6	2	Silty CLAY	5	-	-	-	-	-
TP16 1.5-1.6	2	Silty CLAY	-	54	23	31	15.0	22.9
TP17 0.5-0.6	2	Silty CLAY	5	-	-	-	-	-
TP17 1.5-1.6	2	Silty CLAY	-	45	23	22	9.0	24.3
TP18 0.5-0.6	2	Silty CLAY	6	-	-	-	-	-
TP18 2.5-2.6	2	Sandy CLAY	-	35	20	15	8.0	17.1
BH2M 1.5-1.95	2	Silty CLAY	6	-	-	-	-	-
BH2M 2.0-2.2	2	Sandy Clay	-	52	18	34	17	22.8
BH3 1.5-1.95	2	Silty CLAY	-	50	23	27	12.0	88.8
BH5M 1.5-1.95	2	Gravelly CLAY	8	-	-	-	-	-

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

The Atterberg Limits result on the selected clay samples indicated silty clays to be of medium to high plasticity and of medium to high shrink-swell potential, while sandy clays to be of low to medium plasticity and of low to medium shrink-swell potential.

Table 3-5 Summary of Aggressivity Test Results

Test / Sample ID	Unit	Material Description	Aggressivity				
			Chloride Cl (ppm)	Sulfate SO_4 (ppm)	pH	Electrical Conductivity (µS/cm)	Moisture Content (%)
TP1 1.5-1.6	2	Silty CLAY	2.4	23	4.7	17	14.9
TP2 1.5-1.6	2	Sandy CLAY	0.55	63	5.1	34	17.8
TP3 1.1-1.2	2	Clayey SILT	2.9	16	6.9	61	21.5
TP4 2.3-2.4	2	Clayey SAND	1.6	14	6.7	24	14.5
TP5 0.5-0.6	1	Sandy GRAVEL	4.0	37	7.9	160	13.2
TP7 1.5-1.6	2	Clayey SILT	0.98	15	7.5	44	13.3
TP8 1.3-1.4	2	Silty CLAY	6.4	27	6.4	33	13.2
TP10 1.2-1.3	2	Clayey SILT	10	25	4.9	25	10.2
TP12 1.5-1.6	2	Silty CLAY	65	<5	5.4	43	17.6
TP13 0.5-0.6	2	Gravelly CLAY	92	30	4.7	81	16.2
TP15 0.5-0.6	2	Silty CLAY	3.9	66	4.8	42	13.1
TP15 1.5-1.6	2	Clayey SILT	9.1	37	5.2	28	16.2
TP16 1.5-1.6	2	Silty CLAY	23	23	6.3	37	20.4
TP17 2.5-2.6	2	Silty CLAY	3.0	34	6.0	25	23.9
TP18 1.5-1.6	2	Clayey SILT	20	11	5.5	29	16.0
BH1M 2.0-2.45	2	Sandy CLAY	4.8	29	5.7	21	14.9

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

- 'Mild' for buried concrete structural elements;
- 'Non-Aggressive' for buried steel structural elements; and
- 'A2' for concrete in sulfate soils.

Table 3-6 Summary of CBR Test Results

Test/ Sample ID	TP6	TP8	TP9	TP10	TP11	TP13	TP15
Depth (m BEGL)	0.4-0.7	0.3-0.6	0.3-0.6	0.3-0.6	0.3-0.6	0.3-0.6	0.3-0.6
Unit	1	1	1	1	1	1	2
Material Description [1]	Gravelly CLAY	Gravelly SAND	Gravelly SAND	Gravelly SAND	Gravelly SAND	Gravelly CLAY	Silty CLAY
CBR (4-day Soaked) (%)	8.0%	8.0%	8.0%	14.0%	15.0%	8.0%	5.0%
Maximum Dry Density (t/m^3)	1.91	1.53	1.68	1.96	1.74	1.66	1.76
Optimum Moisture Content (%)	13.4	20.5	17.0	10.3	13.3	20.1	17.8

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

Bulk samples of the Unit 1 fill material from TP6,TP8,TP9,TP10,TP11,TP13 were tested for compaction and four day soaked CBR, resulted in values of 8% to 15% when compaction to 100% of Standard Maximum Dry Density (SMDD) and surcharged with 9kg. TP15 was tested in residual silty clay and returned a value of 5%.

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

The point load strength index tests correlated reasonably well with our field assessments of rock strength. The approximate Unconfined Compressive Strength (UCS) of the rock core, estimated from correlations with the point load strength index test results, varied from <1 MPa to 92 MPa.

4. Recommendations

4.1 Geotechnical Issues

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

- Basement excavation and retention to limit lateral deflections and ground loss as a result of excavations, resulting in damage to nearby structures;
- Rock excavation;
- Groundwater within the depth of the excavation;
- Reactivity of the underlying natural clays;
- Existing footings of site structures;
- Foundation design for building loads; and
- Pavement thickness design.

4.2 Dilapidation Surveys

Prior to excavation and construction, we recommend that detailed dilapidation surveys be carried out on all structures and infrastructures within the site that falls within the zone of influence of the excavation for the new basement to allow assessment of the recommended vibration limits. The zone of influence of the excavation is defined by a distance back from the excavation perimeter of twice the total depth of the excavation. The reports would provide a record of existing conditions prior to commencement of the work. The reports should be carefully reviewed prior to demolition and construction.

4.3 Demolition Considerations

Care should be taken during demolition both internally and externally, particularly the concrete and steel structures, to avoid damaging existing structures that are to be retained. Demolition of concrete slabs, pavement and floor slabs may require breaking into smaller size prior to disposal offsite. We recommend that saw cut slots be provided near adjoining buildings to reduce the risk of vibrations being transferred to nearby structures. If possible, the concrete slabs should be removed using hydraulic equipment rather than impact hammers.

4.4 Existing Footings

Prior to any excavation, we recommend that at least two test pits be excavated adjacent to the existing footings especially at the southwestern end of M3 and M4, and be inspected by the geotechnical and structural engineers to inspect and assess the in-situ ground conditions at the founding level and footing details. The purpose of these test pits is to assess the requirement of underpinning of these neighbouring footings adjoining the site.

4.5 Site Preparation for On-grade Structures

Following removal of all vegetation and trees (including their root balls), demolition of the existing sheds, slabs and pavements, all grass, topsoil, root affected soils and any deleterious fill or contaminated soil should be stripped. Based on the results of the investigation, topsoil/root affected soil should be stripped to a nominal depth.

The boreholes and test pits indicate that the fill thickness across the site vary from 0.15m to 3.43m, the borehole and test pit logs should be referenced while preparing earthworks at this site. Additional test pits and geotechnical inspections may be required during site preparation and may be useful for confirming depths of fill as this could become a contractual issue.

Stripped topsoil and root affected soils should be stockpiled separately as they are considered unsuitable for reuse as engineered fill.

All existing fill will need to be stripped down to the surface of the underlying natural soils and stockpiled should it be considered for reuse onsite as engineered fill, subject to contamination and conformance status to the fill specification provided in section below.

4.6 Site Classification

The investigation results have indicated variable subsurface conditions, as well as variable soil reactivity across the site. The final site classifications will also be dependent on the following factors:

- The nature, thickness and age of proposed (site won and imported) fills;
- Level of earthworks control;
- The depth of proposed cuts;
- The depth of bedrock and groundwater if located within 1.5m depth below design surface level;
- The proximity of the proposed trees, their configuration in relation to the proposed houses, and their mature heights;
- The presence of existing mature trees, and their configuration in relation to the proposed houses;
- The control and maintenance of drainage; and
- The difference in surface levels for a particular lot between the ‘as sold’ condition and following and further preparatory earthworks (i.e. further less controlled cut and fill earthworks).

The site under the existing condition is considered to be Class ‘P’ in accordance with AS2870. No details on the existing fill (i.e. placement method, compaction specification, density test records, etc.) have been provided to us. Notwithstanding, based on the results of our investigation, the material is not considered to be a “structural fill” (i.e. controlled fill or engineered fill), as defined in Clause 1.2.13 of AS3798-2007 ‘Guidelines on Earthworks for Commercial and Residential Developments’. Accordingly, we consider this fill to be ‘uncontrolled’ and unsuitable as a bearing stratum under new footings and of ‘moderate risk’ (poor performance) under new pavements.

Where top soil/fill is striped and/or replaced with engineered/controlled fill and/or natural silty clay exposed, then the site can be reclassified as Class H1. We note that abnormal moisture conditions could also exist after stripping of existing pavements, structures, and trees and vegetation resulting in a more severe Class H2. Reference should also be made to AS2870 for design, construction, performance criteria and maintenance precautions on Class H1 sites.

4.7 Excavation Methodology

4.7.1 Excavation Assessment

Prior to any excavation commencing, we recommend that reference be made to the Safe Work Australia Excavation Work Code of Practice, dated January 2020.

EI assumes that the proposed basement at M3 and M4 will require a BEL of RL 621.7m, or an excavation depth of approximately 6.0m BEGL on the eastern side and 3.5m BEGL on the western side of the basement. Locally deeper excavations for footings, service trenches, crane pads and lifts overrun pits may be required.

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

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

Should rock hammers be required for the excavation of the medium to high strength bedrock, further advice should be sought from EI regarding vibration mitigation and monitoring.

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

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

4.7.2 Excavation Monitoring

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

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

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

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

- Before commencing installation of retaining structures where appropriate to determine the baseline readings. Two independent sets of measurements must be taken confirming measurement consistency;

- After installation of the retaining structures, but before commencement of excavation;
- After excavation to a depth of 1.5m, and every 1.5m interval thereafter.
- One month after completion of the permanent retaining structure or after three consecutive measurements not less than a week apart showing no further movements, whichever is the latter.

4.8 Groundwater Considerations

Groundwater within the borehole and test pits are summarised in **Table 3-2** and **Table 3-3**, the observed groundwater seepage was generally about 2m to 3m BEGL.

We expect that some minor seepage inflows into the excavation along the soil/rock interface and through any defects within the laminite and claystone bedrock (such as jointing, and bedding planes, etc.) particularly following a period of heavy rainfall. Due to the low permeability of the soil and bedrock profile, any groundwater inflows into the excavation should not have an adverse impact on the proposed basement for M3 and M4 or on the neighbouring sites and should be manageable. The initial flows into the excavation may be locally high, but would be expected to decrease considerably with time as the bedding seams/joints are drained. We recommend that monitoring of seepage be implemented during the excavation works to confirm the capacity of the drainage system.

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

In the long term, drainage should be provided behind all basement retaining walls, around the perimeter of the basement and below the basement slab. Relieve valves in basement slab should be installed to enable relief of upward hydrostatic pressures should groundwater levels rise and connected to a pump as appropriate to remove the water. The completed excavation should be inspected by the hydraulic engineer to confirm that adequate drainage has been allowed for. Drainage should be connected to the sump-and-pump system and discharging into the stormwater system. The permanent groundwater control system should take into account any possible soluble substances in the groundwater which may dictate whether or not groundwater can be pumped into the stormwater system.

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

Council and WaterNSW normally do not allow permanent dewatering and the basement may be required to be designed as a tanked structure. Should a drained basement be desired, additional investigations, monitoring and analysis will be required including seepage analysis, the installation of additional monitoring wells, long-term groundwater monitoring, and laboratory testing. EI should be contacted for further advice for the approval process for a drained basement.

4.9 Excavation Retention

4.9.1 Support Systems

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

Based on the provided architectural plans, the proposed basement at M4 abuts the northern existing building.

Based on the above, the encountered subsurface conditions, the depth of excavation, temporary batters of no steeper than a safe angle of 1 Vertical (V) to 1 Horizontal (H) may be feasible where space allows for the fill and residual soil profile at southern, western and eastern excavation perimeters of the proposed M4 basement. The above temporary batters should remain stable provided that all surcharge loads, including construction loads, are kept at a distance of at least 2h (where 'h' is the height of the batter in metres) from the crest of the batter. If steeper batters are to be used, then these must be supported by shotcrete and soil nail system designed by a suitable structural or geotechnical engineer. The stability of these batters can be assessed using computer slope stability analysis software such as Slope/W. we can complete such analysis, if commissioned to do so.

Where batters are used, the space between the batters and the permanent retaining walls will need to be carefully backfilled to reduce future settlement of the backfill. Only light compaction equipment should be used for compaction behind retaining walls so that excessive lateral pressures are not placed on the walls. This will require the backfill to be placed in thin layers, say 100mm loose thickness, appropriate to the compaction equipment being used. The compaction specification for the backfill will depend on whether paving or structures are to be supported on the fill. If the fill is to support paved areas it should be compacted to a density of at least 98% of Standard Maximum Dry Density (SMDD) for granular fill materials, but if it is only to support landscaped areas of lower compaction specification, say 95% of SMDD, may be appropriate, provided the risk of future settlement and maintenance can be accepted. An alternative for backfill would also be to use a uniform granular material, wrapped in a geofabric.

Where space for temporary batters is not available at the northern excavation perimeter adjacent to the existing M4 building (and could be used for the entire excavation perimeter), a suitable retention system will be required for the support of the entire depth of the excavation. For this site, we consider that a cantilevered soldier pile wall with shotcrete panels in between the piles installed to below BEL to be the most suitable. Anchors/props and mass concrete must be installed progressively as excavation proceeds. Contiguous pile walls may be required should a stiffer shoring system be required to safeguard the existing building to the north.

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

4.9.2 Retaining Wall Design Parameters

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

- Conventional free-standing cantilever walls which support areas where movement is of little concern (i.e. where only gardens or open areas are to be retained), may be designed using a triangular lateral earth pressure distribution and an 'active' earth pressure coefficient, K_a, as shown in **Table 4-1;**
- Cantilevered walls, where the tops of which are restrained by the floor slabs of the permanent structure or which support movement sensitive elements, should be designed using a triangular lateral earth pressure distribution and an 'at rest' earth pressure coefficient, K_o, as shown in **Table 4-1** below.
- All surcharge loading affecting the walls (including from construction equipment, construction loads, adjacent high level footings, etc.) should be adopted in the retaining wall design as an additional surcharge using an 'at rest' earth pressure coefficient, Ko.

- The retaining walls should be designed as drained and measures are to be taken to provide complete and permanent drainage behind the walls. Strip drains protected with a non-woven geotextile fabric should be used behind the shotcrete infill panels for soldier pile walls;
- For piles embedded into Unit 4 or better, the allowable lateral toe resistance values outlined in **Table 4-1** below may be adopted. These values assume excavation is not carried out within the zone of influence of the wall toe and the rock does not contain adverse defects etc. The upper 0.3m depth of the socket should not be taken into account to allow for tolerance and disturbance effects during excavation.

Table 4-1 Geotechnical Design Parameters

Material [1]		Unit 1 Fill	Unit 2 Residual Soil	Unit 3 Very Low to Low Strength Laminate / Claystone	Unit 4 Medium to High Strength Laminate / Sandstone
RL of Top of Unit (m AHD) [2]		624.5 to 628.9	622.8 to 628.5	621.4 to 627.2	618.65 to 622.12
Bulk Unit Weight (kN/m^3)		18	20	23	24
Friction Angle, ϕ' (°)		25	25	33	40
Earth Pressure Coefficients	At rest, K_o [3]	0.58	0.58	0.46	0.36
	Active, K_a [3]	0.41	0.41	0.29	0.22
	Passive, K_p [3]	-	-	3.39	4.6
Allowable Bearing Pressure (kPa) [5]		-	-	700	3500
Allowable Shaft Adhesion (kPa) [4, 5]	in Compression	-	-	70	350
	in Uplift	-	-	35	175
Allowable Toe Resistance (kPa)		-	-	-	500
Allowable Bond Stress (kPa)		-	-	30	300
Earthquake Site Risk Classification		▪ AS 1170.4:2007 indicates an earthquake subsoil class of Class C_e.(Shallow Soil) ▪ AS 1170.4:2007 indicates that the hazard factor (z) for Sydney is 0.08.			

Notes:

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

4.10 Foundations

4.10.1 Shallow Footings in Rock for M4 Basement

Following bulk excavation to RL 621.7m, we expect Unit 3 material to be exposed at BEL.

It is recommended that all footings for the building be founded within the claystone / laminite bedrock of similar strength of at least Unit 3 or better to provide uniform support and reduce the potential for differential settlements.

Pad or strip footings founded within Unit 3 may be preliminarily designed for an allowable bearing capacity of 700kPa, based on serviceability.

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

4.10.2 Pile Footings

Alternatively, the proposed development may be supported on deep foundations, such as piles, founded into Unit 4 medium to high strength laminite / sandstone bedrock.

For piles founded Unit 4 bedrock, these must be embedded a minimum of 0.5m into laminite / sandstone, and can be designed for a maximum allowable bearing pressure of 3,500kPa. The allowable shaft adhesion in the bedrock may be designed as 10% of the allowable bearing pressure (or 5% for uplift) for the socket length in excess of 0.5m.

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

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

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

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

4.10.1 Shallow Footings in Residual Soil

The option of supporting structures on high level footings on residual clay is only suitable for lightly to moderately loaded structures that are not sensitive to some uneven foundation movements. If these shallow footings are to be used, the structures should be well articulated.

High level pad, strip, or stiffened raft slab founded in at least stiff natural silty clays may be designed for a maximum allowable bearing pressure of 100kPa. High level footing excavations should be cleaned out, inspected by a geotechnical engineer, and poured without delay. If delays in pouring are envisaged, then we recommend that a concrete blinding layer be provided over the base to reduce deterioration due to weathering.

This footing system should be designed for characteristic shrink-swell surface movement equivalent to a ‘Class H1’ site in accordance to AS2870, that is, in a range of 40mm to 60mm.

Reference should also be made to AS2870 for design, construction, performance criteria and maintenance precautions on Class H1 sites.

However, we note that for footings adjacent to the river there may be presence of soft clay / loose sands with low bearing capacity. The footings are susceptible to loose strength and bearing capacity when become wet from the water ingress possibly due to flooding. In view of the reactivity of the natural silty clay and to avoid differential settlement of footings from the softening of clay, we recommend structures at risk of differential movement be fully suspended on piles founded in weathered sandstone bedrock. The ground floor slab may be suspended over the piles and subgrade preparation would not be required.

4.11 Basement Floor Slab

Following bulk excavations for the proposed M4 basement, laminite / claystone bedrock is expected to be exposed at the basement floor BEL.

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

Permission may need to be obtained from the NSW Department of Primary Industries (DPI) and possibly Council for any permanent discharge of seepage into the drainage system. Given the subsurface conditions, we expect that seepage volumes would be low and within the DPI limits. However, if permission for discharge is not obtained, the basement may need to be designed as a tanked basement.

4.12 Subgrade Preparation and Engineered Fill

4.12.1 Subgrade Preparation

Earthworks recommendations provided in this report should be complemented by reference to AS3798.

- Fill should be fully excavated down to surface of the residual soils, and stockpiled separately since these materials are not suitable for re-use as engineered fill. Such excavation may need to be carried out with the excavation sides battered at an angle of no steeper than 1 Vertical to 1 Horizontal. The new fill must be 'keyed-in' the sides of these batters.
- The exposed subgrade at the base of the excavation should be proof rolled with a smooth drum roller (say 12 tonne) used in static or non-vibratory mode of operation. Caution is required when proof rolling near existing infrastructures and utilities (where present). The purpose of the proof rolling is to detect any soft or heaving areas, and to allow for some further improvement in strength or compaction.
- The final pass should be undertaken in the presence of an experienced geotechnician or geotechnical engineer, to detect any unstable or soft subgrade areas, and to allow for some further improvement in strength/compaction.
- If dry conditions prevail at the time of construction then any exposed residual clay subgrade may become desiccated or have shrinkage cracks prior to pouring any concrete slabs. If this occurs, the subgrade must be watered and rolled until the cracks disappear.

- Unstable subgrade detected during proof rolling should be locally excavated down to a sound base and replaced with engineered fill or further advice should be sought. Any fill placed to raise site levels should also be engineered fill, as per the specifications below.

If suspended floor slabs and pavement are designed, then it would be unnecessary to complete any particular subgrade preparation other than stripping of root affected soils from the footprint of the proposed building structures and replaced with surface levelling compacted fill for the floor slab formwork.

4.12.2 Engineered Fill Specifications

Any fill used to backfill unstable subgrade areas, raise surface levels or backfill service trenches should be engineered fill. Materials preferred for use as engineered fill are well-graded granular materials, such as ripped or crushed sandstone, free of deleterious substances and having a maximum particle size not exceeding 75 mm. such fill should be compacted in layers not greater than 200 mm loose thickness, to a minimum density of 98% of SMDD.

Density tests should be regularly carried out on the fill to confirm the above specifications are achieved. The frequency of density testing should be at least one test per layer per material type per 2500 m^2 or 1 test per 500m^3 distributed reasonably evenly throughout full depth and area or 3 tests per lot, whichever requires the most tests. We recommend that at least Level 2 control of fill compaction, as defined in AS3798-2007, be adhered to on this Site. Preferably, the geotechnical testing authority (GTA) should be engaged directly on behalf of the client and not by the earthworks subcontractor.

We recommend that the engineered fill layers extend a horizontal distance of at least 1m beyond the design geometry. The roller must extend over the edge of each placed layer in order to seal the batter surface. On completion of filling, the excess under-compacted edge fill should be trimmed back to the design geometry.

The ‘tying in’ of engineered fill to temporary cut batter slopes can be achieved by locally benching the cut slopes in no greater than 0.4m high steps. This can be carried out progressively as the height of engineered fill increases.

For backfilling confined excavations such as service trenches, a similar compaction to engineered fill should be adhered to, but if light compaction equipment is used then the layer thickness should be limited to 100mm loose thickness.

During construction of the fill, platform runoff should be enhanced by providing suitable falls to reduce ponding of water on the surface of the fill. Ponding of water may lead to softening of the fill and subsequent delays in the earthworks program. A poorly drained subgrade may become un-trafficable when wet. We recommend that if soil softening occurs, the subgrade be over-excavated to below the affected soil, and then replaced with engineered fill as specified above.

4.13 Pavement Design

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

Based on the laboratory test results, the samples collected from the proposed road alignments return the CBR value 5% in residual soil and 8% to 15% in existing fill. As there is no placement history of the in-situ fill, EI recommends that for the existing fill, a design CBR value of 5% be adopted. For any pavements with the residual soil acting as the subgrade, a design CBR value of 3% be adopted based on the limited CBR testing in this material.

Alternatively, an appropriate select fill layer comprising of good quality, well graded granular material (such as unbound base or ripped, crushed sandstone with CBR greater than 10%, a maximum particle size of 60mm, well graded and Plastic Index less than 10, compacted to at least 98% of SMDD) may be used below the pavement.

Further soaked CBR tests may be carried out on representative samples of the subgrade to obtain a large population of values to enable a proper statistical analysis to be performed and possibly an increase in the design CBR value. However, it should be borne in mind that even with more test values being obtained there will still be isolated pavement areas where the risk of potential failure and higher maintenance will occur due to the subgrade having a lower CBR value than the statistical characteristic value opted for design purposes.

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

All upper (base) course should be crushed rock to TfNSW QA specification 3051 (2020) unbound base and compacted to at least 100% of SMDD. All lower (sub-base) course should be crushed rock to RMS QA specification 3051 (2013) unbound base or ripped/crushed sandstone with CBR greater than 40%, maximum particle size of 60mm, well graded and Plastic Index less than 10. All lower course material should be compacted to an average of no less than 100% of SMDD, but with a minimum acceptance value of 98% of SMDD.

Concrete pavements should have a sub-base layer of at least 100mm thickness of crushed rock to TfNSW QA specification 3051 (2020) unbound base material (or equivalent good quality and durable fine crushed rock) which is compacted to at least 100% SMDD. Concrete pavements should be designed with an effective shear transmission of all joints by way of either doweled or keyed joints.

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

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

5. Further Geotechnical Inputs

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

- Additional Geotechnical Investigation in the form of cored boreholes and test pits at M5 and M6 area following clearance from archaeological investigation (if required);
- Long term groundwater monitoring and seepage modelling;
- Stability assessment of temporary batters using computer modelling, if required;
- Dilapidation surveys;
- Design of working platforms (if required) for construction plant by an experienced and qualified geotechnical engineer;
- Classification of all excavated material transported off site;
- Geotechnical inspections of all new footings/piles by an experienced geotechnical professional before concrete or steel are placed to verify their bearing capacity and the in-situ nature of the founding strata; and
- Ongoing monitoring of groundwater inflows into the bulk excavation;

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

6. Statement of Limitations

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

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

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

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

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

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

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

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

References

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

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

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

AS3600:2009, *Concrete Structures,* Standards Australia

GEOLOGICAL SURVEY OF NEW SOUTH WALES 2012. Surface geology of New South Wales 1:3 000 000 map. Geological Survey of New South Wales, Trade & Investment NSW (Edition 2).

Granular Pavement Base and Subbase Materials QA Specification 3051, dated June 2020 – Transport for NSW

Safe Work Australia Excavation Work Code of Practice, dated January 2020 – WorkCover NSW

Abbreviations

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

Figures

eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

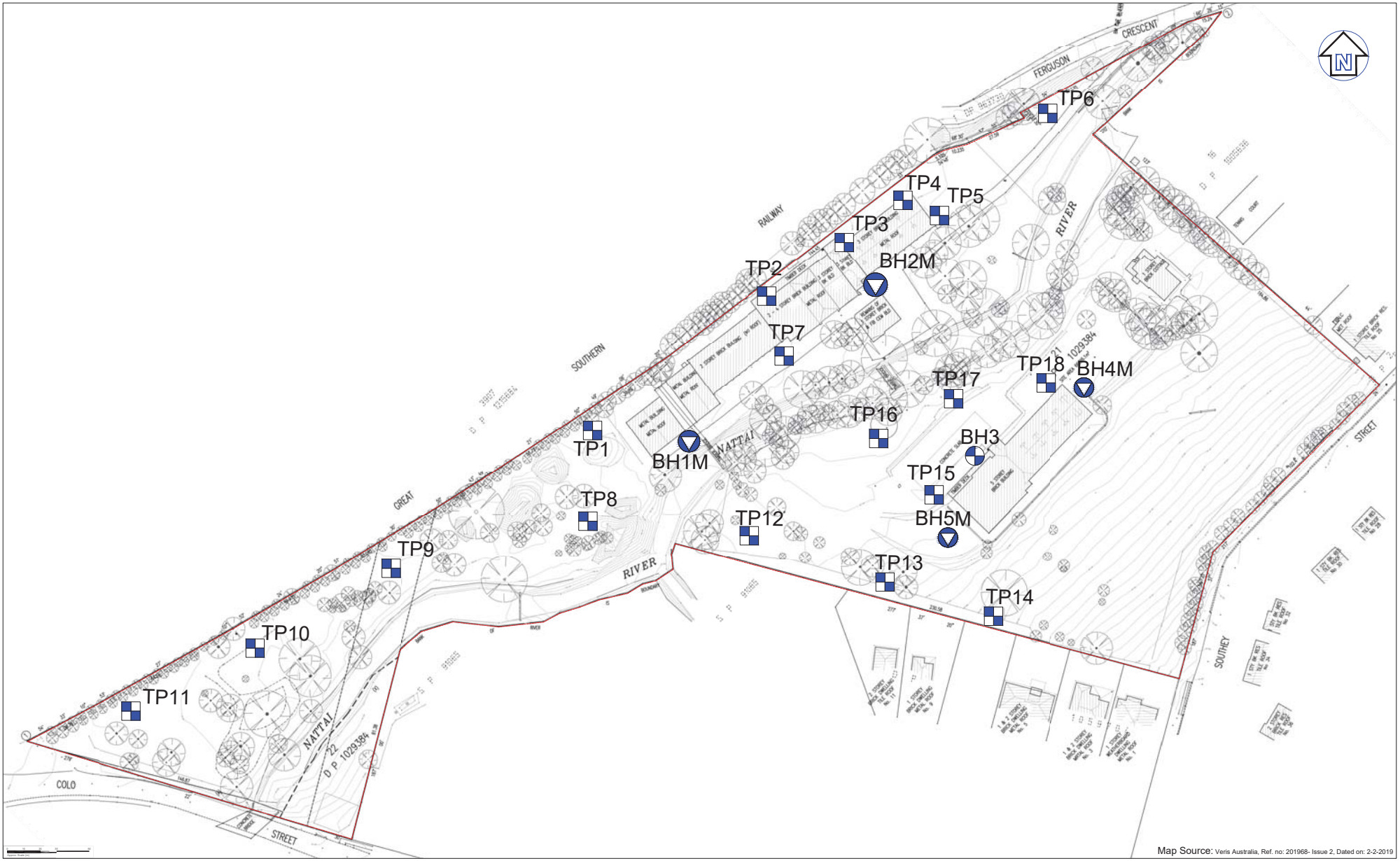
Drawn:	G.P.
Approved:	K.X.
Date:	13-07-23
Scale:	Not To Scale

Colliers Project Leaders Pty Ltd
Geotechnical Investigation
2 Colo Street, Mittagong, NSW

Site Locality Plan

Figure: 1

Project: E25829.G03



LEGEND (All Locations are Approximate)

- Site boundary
- Test Pit locations
- Borehole locations
- Borehole/monitoring well locations

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

Drawn:	G.P.
Approved:	K.X.
Date:	21-07-23

Colliers Project Leaders Pty Ltd
Geotechnical Investigation
2 Colo Street, Mittagong NSW

Sampling Location Plan

Figure: 2

Project: E25829.G03

Appendix A – Borehole Logs And Explanatory Notes

BOREHOLE LOG

BH ID: BH1M

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 22 May 2023
Sheets	1 of 2	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.30 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44897940 (WGS 84)		
Longtitude	150.45795770 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	▽			0 0.00		625.30	FILL: Sandy GRAVEL: dark grey, gravels are fine to medium basalt with brick fragments, trace concrete fragments, no odour	-		FILL
				0.80		624.50	FILL: Silty CLAY: low to medium plasticity, mottled brown-orange with fine to coarse grained sand, with brick fragments, trace tiles, no odour	M ≈ PL	-	FILL
		BH1M_1.00-1.45 SPT 1.00-1.45 1,2,1 N=3		1						
				1.60		623.70	Sandy CLAY: medium plasticity, mottled brown and orange-grey, sand is fine to medium grained trace fine sub-rounded sandstone gravel, no odour	M > PL	F	RESIDUAL SOIL
		BH1M_2.00-2.45 SPT 2.00-2.45 1,3,3 N=6		2						
		SPT 3.00-3.18 7,5/30 mm HB N=R		3						
				3.32		621.98	*Log continued on next page.*			
				4						
				5						
				6						
				7						
				8						
				9						
				10						

BOREHOLE LOG

BH ID: BH1M

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 22 May 2023
Sheets	2 of 2	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.30 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44897940 (WGS 84)		
Longtitude	150.45795770 (WGS 84)		

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral VL 0-1, L 0-3, M 1, H 3, VH 10, EH	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING 30, 100, 300, 1000, 3000
				0			*Log continued from previous page.*				
				1							
				2							
				3							
NMLC	80%	100	100	4			SANDSTONE: fine to medium grained, orange-grey, medium bedded	SW		4.51: JT 60° RO Fe SN	
				4.70		620.60	SANDSTONE: fine grained, grey, medium bedded	FR			
				5							
				6							
	70%	100	97	6.97		618.33	LAMINITE: fine grained grey sandstone and dark grey siltstone, thinly bedded	SW			
				7.22		618.08	SANDSTONE: fine grained, grey, medium bedded	FR			
				8		617.30	Terminated at 8.00m. Target Depth Reached.				
				9							
				10							

BOREHOLE LOG

BH ID: BH1M

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.30 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44897940 (WGS 84)		
Longtitude	150.45795770 (WGS 84)		

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION
		0.00	625.30	FILL: Sandy GRAVEL: dark grey, gravels are fine to medium basalt with brick fragments, trace concrete fragments, no odour	-
	BH1M_1.00-1.45 SPT 1.00-1.45 1,2,1 N=3	0.80	624.50	FILL: Silty CLAY: low to medium plasticity, mottled brown-orange with fine to coarse grained sand, with brick fragments, trace tiles, no odour	M ≈ PL
▷	BH1M_2.00-2.45 SPT 2.00-2.45 1,3,3 N=6	1.60	623.70	Sandy CLAY: medium plasticity, mottled brown and orange-grey, sand is fine to medium grained trace fine sub-rounded sandstone gravel, no odour	M > PL
	SPT 3.00-3.18 7,5/30 mm HB N=R				
80%		3.32	621.98	SANDSTONE: fine to medium grained, orange-grey, medium bedded	
		4.70	620.60	SANDSTONE: fine grained, grey, medium bedded	
70%		6.97	618.33	LAMINITE: fine grained grey sandstone and dark grey siltstone, thinly bedded	
		7.22	618.08	SANDSTONE: fine grained, grey, medium bedded	
		8	617.30	Terminated at 8.00m. Target Depth Reached.	

BACKFILL DETAILS

Cuttings
0.00m - 2.90m

Bentonite
2.90m - 3.90m

Sand
3.90m - 8.00m

STANDPIPE DETAILS

Well Stickup =0.0m
(RL 620.50m)

0.0m - 4.80m
PVC casing (50mm Ø)

4.80m - 8.0m
PVC screen (50mm Ø)

CORE PHOTOGRAPH OF BOREHOLE: BH1M

Project	Proposed Maltings Redevelopment	**Latitude**	-34.44897940 (WGS 84)	**Depth Range**	3.32m to 8.00m		
Location	2 Colo Street, Mittagong NSW	**Longitude**	150.45795770 (WGS 84)	**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 625.30m	**Drill Rig**	Commachio Geo 205		
Job No.	E25829.G03	**Inclination**	90°	**Logged**	DD	**Date**	22/5/2023
Client	Colliers Project Leaders	**Box**	1 of 1	**Checked**	KX	**Date**	7/7/2023

BOREHOLE LOG

BH ID: BH2M

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 22 May 2023
Sheets	1 of 2	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.00 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44918900 (WGS 84)		
Longtitude	150.45869900 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T		BH2M_0.50-0.95 SPT 0.50-0.95 1,2,2 N=4		0.00		625.00	FILL: Sandy GRAVEL: grey-dark grey, fine to medium angular basalt	-	-	FILL
				0.45		624.55	Silty CLAY: low to medium plasticity, mottled brown-orange, with sand, trace rootlets			RESIDUAL SOIL
		BH2M_1.50-1.95 SPT 1.50-1.95 2,3,3 N=6		1				M ≈ PL	F	
				2						
				3		621.89				
				3.11			*Log continued on next page.*			
				4						
				5						
				6						
				7						
				8						
				9						
				10						

BOREHOLE LOG

BH ID: BH2M

Location	2 Colo Street, Mittagong NSW			**Started**	22 May 2023
Client	Colliers Project Leaders			**Completed**	22 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 22 May 2023
Sheets	2 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.00 m (AHD)	**Latitude**	-34.44918900 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.45869900 (WGS 84)

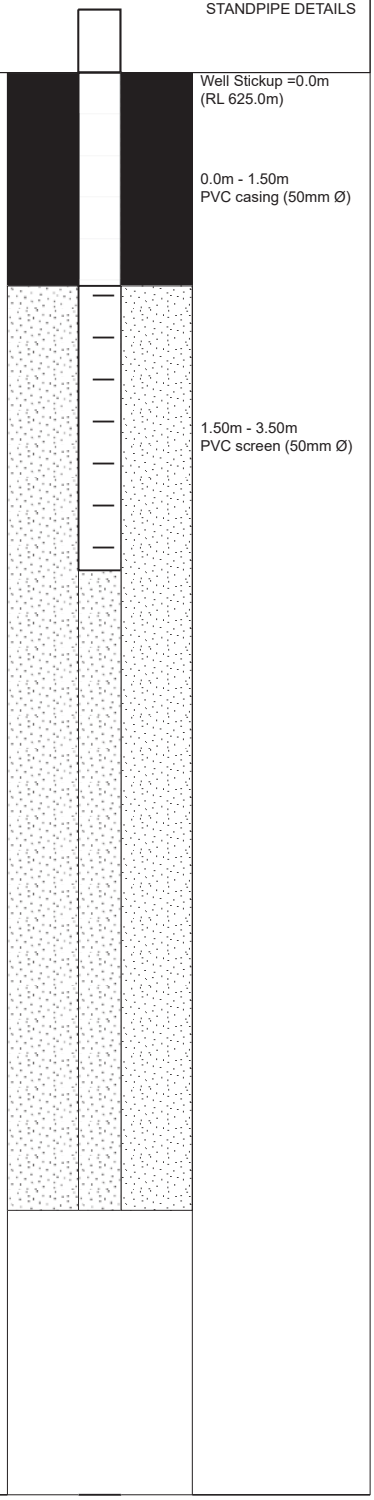
METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral (VL 0-1, L 0-3, M 1, H 3, VH 10, EH)	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING (30, 100, 300, 1000, 3000)
				0			*Log continued from previous page.*				
				1							
				2							
				3			SANDSTONE: fine to medium grained, orange brown and grey, medium to thickly bedded	SW			
				4							
NMLC	75%	100	86	5				DW		4.74-4.79: XWS Silt Infilled 4.80-4.85: JT 45° VR OP 5.03-5.05: XWS IR CN 5.12-5.20: XWS Silt Infilled	
				5.40		619.60	From 5.40m, fine to medium grained, grey				
				6							
	80%	100	96	7				FR		7.36-7.37: XWS CN 7.72: BP PR VR	
				8		617.00	Terminated at 8.00m. Target Depth Reached.				
				9							
				10							

BOREHOLE LOG

BH ID: BH2M

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.00 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44918900 (WGS 84)		
Longtitude	150.45869900 (WGS 84)		

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION
		0.00	625.0	FILL: Sandy GRAVEL: grey-dark grey, fine to medium angular basalt	-
	BH2M_0.50-0.95 SPT 0.50-0.95 1,2,2 N=4	0.45	624.5	Silty CLAY: low to medium plasticity, mottled brown-orange, with sand, trace rootlets	M ≈ PL
	BH2M_1.50-1.95 SPT 1.50-1.95 2,3,3 N=6				
75%		3.11	621.89	SANDSTONE: fine to medium grained, orange brown and grey, medium to thickly bedded	
80%		5.40	619.60	From 5.40m, fine to medium grained, grey	
		8	617.00	Terminated at 8.00m. Target Depth Reached.	



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

CORE PHOTOGRAPH OF BOREHOLE: BH2M

Project	Proposed Maltings Redevelopment	**Latitude**	-34.44918900 (WGS 84)	**Depth Range**	3.11m to 8.0m		
Location	2 Colo Street, Mittagong NSW	**Longitude**	150.45869900 (WGS 84)	**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈ 625.00m	**Drill Rig**	Commachio Geo 205		
Job No.	E25829.G03	**Inclination**	90°	**Logged**	DD	**Date**	22/5/2023
Client	Colliers Project Leaders	**Box**	1 of 1	**Checked**	KX	**Date**	7/7/2023

BOREHOLE LOG

BH ID: BH3

Location	2 Colo Street, Mittagong NSW			**Started**	23 May 2023
Client	Colliers Project Leaders			**Completed**	23 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 23 May 2023
Sheets	1 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.50 m (AHD)	**Latitude**	-34.44874620 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.45922800 (WGS 84)

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T		BH3_0.50-0.95 SPT 0.50-0.95 3,5,6 N=11		0.00 0.40		625.50 625.10	FILL: Silty CLAY: medium plasticity, grey-brown, with brick fragments, trace fine grained sand, no odour	-	-	FILL
		BH3_1.50-1.95 SPT 1.50-1.95 5,6,7 N=13		1 2			Silty CLAY: medium to high plasticity, mottled brown-orange and grey, trace fine sandstone gravel	M < PL	F	RESIDUAL SOIL
		BH3_3.00-3.40 SPT 3.00-3.40 8,15,10/100 mm HB N=R		2.50 3 3.38		623.00 622.12	From 2.50m, mottled grey-orange *Log continued on next page.*	M < PL	VSt	
				4 5 6 7 8 9 10						

BOREHOLE LOG

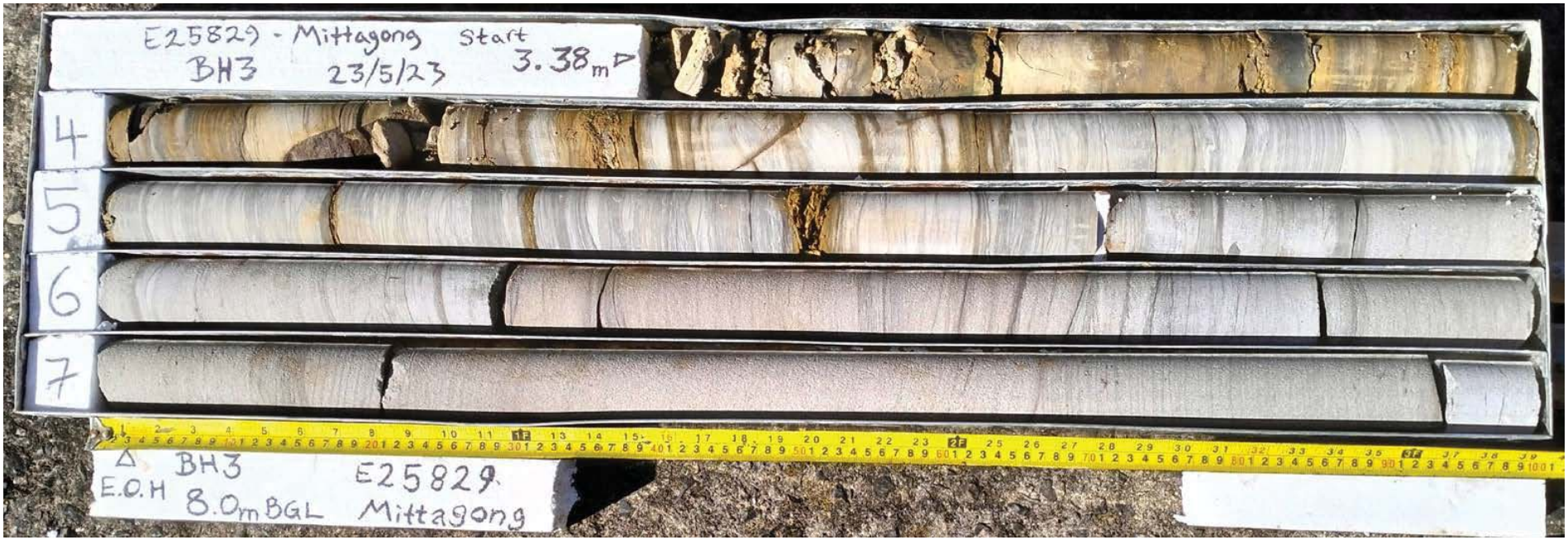
BH ID: BH3

Location	2 Colo Street, Mittagong NSW			**Started**	23 May 2023
Client	Colliers Project Leaders			**Completed**	23 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 23 May 2023
Sheets	2 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.50 m (AHD)	**Latitude**	-34.44874620 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.45922800 (WGS 84)

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral VL 0-1, L 0-3, M 1, H 3, VH 10, EH	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING 30, 100, 300, 1000, 3000
				0			*Log continued from previous page.*				
NMLC	75%	100	53	4			LAMINITE: fine grained grey sandstone and dark grey claystone	DW	▼ M	3.80-3.85: XWS clay 3.94-3.96: XWS clay 4.18: JT 70° SM Fe SN 4.33-4.38: XWS clay	
				4.68		620.82	SANDSTONE: fine grained, grey, medium bedded, interbedded with dark grey siltstone	SW	▼ H	4.70: JT VR CL	
	70%	100	98	5						5.51-5.53: CS	
				6				FR	▼ H		
				7					▼ H		
				8		617.50	Terminated at 8.00m. Target Depth Reached.				
				9							
				10							

CORE PHOTOGRAPH OF BOREHOLE: BH3

Project	Proposed Maltings Redevelopment	**Latitude**	-34.44874620 (WGS 84)	**Depth Range**	3.38m to 8.0m		
Location	2 Colo Street, Mittagong NSW	**Longitude**	150.45922800 (WGS 84)	**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈625.5m	**Drill Rig**	Commachio Geo 205		
Job No.	E25829.G03	**Inclination**	90°	**Logged**	DD	**Date**	23/5/2023
Client	Colliers Project Leaders	**Box**	1 of 1	**Checked**	KX	**Date**	7/7/2023



BOREHOLE LOG

BH ID: BH4M

Location	2 Colo Street, Mittagong NSW			**Started**	23 May 2023
Client	Colliers Project Leaders			**Completed**	23 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 23 May 2023
Sheets	1 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈624.70 m (AHD)	**Latitude**	-34.44893450 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.46119550 (WGS 84)

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T		BH4M_0.50-0.95 SPT 0.50-0.95 5,6,6 N=12		0.00		624.70	FILL: Silty CLAY: medium plasticity, grey-brown	-	-	FILL
				0.40		624.30	Silty CLAY: medium plasticity, mottled orange-grey			RESIDUAL SOIL
		BH4M_1.50-1.90 SPT 1.50-1.90 5,9,12/100 mm HB N=R		1				M < PL	St	
				2						
				2.90		621.80	*Log continued on next page.*			
				3						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

BOREHOLE LOG

BH ID: BH4M

Location	2 Colo Street, Mittagong NSW			**Started**	23 May 2023
Client	Colliers Project Leaders			**Completed**	23 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 23 May 2023
Sheets	2 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈624.70 m (AHD)	**Latitude**	-34.44893450 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.46119550 (WGS 84)

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING
				0			*Log continued from previous page.*				
NMLC	70%	100	0	3.00		621.70	CLAYSTONE: orange-brown, extremely weathered LAMINITE: grey and dark grey, thinly bedded	XW		3.00-3.60: CZ 3.60-3.82: XWS clay	
	80%	100	30	6.05		618.65	SANDSTONE: grey, fine grained medium bedded, interbedded with dark grey siltstone	DW SW FR		3.96-4.00: XWS clay 4.29-4.33: XWS clay 4.58-4.65: XWS clay 4.68: JT 80° SL Clay VN 5.70: JT 80° SM CL 7.05: JT 50° RO Fe SN 7.12: JT 60° RO Fe SN 7.28: JT 55° RO Fe SN 7.33: JT 58° RO Fe SN 7.62: JT 70° RO CN 7.98: JT RO Fe SN 8.08: JT 88° RO Fe SN	
	75%	100	50	8.32		616.38	Terminated at 8.32m. Target Depth Reached.				

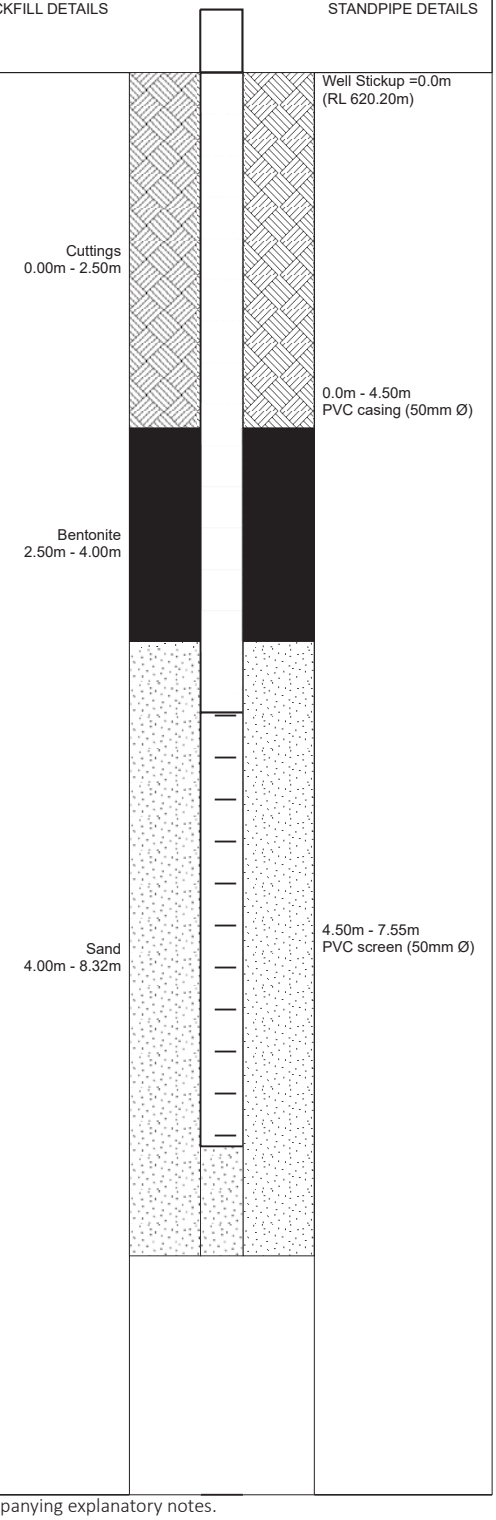
This log should be read in conjunction with EI Australia's accompanying explanatory notes.

BOREHOLE LOG

BH ID: BH4M

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈624.70 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44893450 (WGS 84)		
Longtitude	150.46119550 (WGS 84)		

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION
		0.00	624.70	FILL: Silty CLAY: medium plasticity, grey-brown	-
	BH4M_0.50-0.95 SPT 0.50-0.95 5,6,6 N=12	0.40	624.30	Silty CLAY: medium plasticity, mottled orange-grey	
	BH4M_1.50-1.90 SPT 1.50-1.90 5,9,12/100 mm HB N=R				M < PL
70%		2.90	621.80	CLAYSTONE: orange-brown, extremely weathered	
		3.00	621.70	LAMINITE: grey and dark grey, thinly bedded	
80%					
75%		6.05	618.65	SANDSTONE: grey, fine grained medium bedded, interbedded with dark grey siltstone	
		8.32	616.38	Terminated at 8.32m. Target Depth Reached.	



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

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project	Proposed Maltings Redevelopment	**Latitude**	-34.44893450 (WGS 84)	**Depth Range**	2.90m to 8.32m		
Location	2 Colo Street, Mittagong NSW	**Longitude**	150.46119550 (WGS 84)	**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈624.70m	**Drill Rig**	Commachio Geo 205		
Job No.	E25829.G03	**Inclination**	90°	**Logged**	DD	**Date**	23/5/23
Client	Colliers Project Leaders	**Box**	1 and 2 of 2	**Checked**	KX	**Date**	7/7/2023

BOREHOLE LOG

BH ID: BH5M

Location	2 Colo Street, Mittagong NSW	**Started**	24 May 2023
Client	Colliers Project Leaders	**Completed**	24 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 24 May 2023
Sheets	1 of 2	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.50 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44917970 (WGS 84)		
Longtitude	150.45873010 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T		BH5M_0.50-0.95 SPT 0.50-0.95 5,6,6 N=12		0.00		625.50	FILL: Gravelly CLAY: medium plasticity, silty, orange-brown, with fine grained sand, gravels are fine to medium sub-angular siltstone, no odour	-	-	FILL
				0.40		625.10	Silty CLAY: medium to high plasticity, mottled orange-brown, with fine grained sand, trace fine sub-angular siltstone gravel, no odour	M < PL	VSt	RESIDUAL SOIL
		BH5M_1.50-1.95 SPT 1.50-1.95 9,7,9 N=16		2.40		623.10	Clayey SILT: high plasticity, grey, no odour		H	WEATHERED ROCK
		BH5M_3.00-3.28 SPT 3.00-3.28 12,15/130 mm HB N=R		4.07		621.43	*Log continued on next page.*			

BOREHOLE LOG

BH ID: BH5M

Location	2 Colo Street, Mittagong NSW			**Started**	24 May 2023
Client	Colliers Project Leaders			**Completed**	24 May 2023
Job No.	E25829.G03			**Logged By**	DD **Date** 24 May 2023
Sheets	2 of 2			**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.50 m (AHD)	**Latitude**	-34.44917970 (WGS 84)
Plant	Comacchio Geo 205	**Inclination**	90°	**Longtitude**	150.45873010 (WGS 84)

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING
				0		*Log continued from previous page.*		VL 0-1, L 0-3, M 1, H 3, VH 10, EH		30, 100, 300, 1000, 3000
NMLC	75%	100	71	4.45	621.05	CLAYSTONE: fine to medium grained, brown, grey, distinctly weathered	HW			
						LAMINITE: fine grained pale grey sandstone laminited with dark grey siltstone, with iron staining	SW		4.71-4.74: CS IR VR CN	
				5.22	620.28	From 5.22m, grey, no iron staining.	FR		5.14: JT 75° RO Fe SN	
									5.71: JT 70° RO Fe SN	
									6.48-6.51: CS	
	80%	100	89	6.84	618.66	SANDSTONE: fine to medium grained, grey, fresh			7.39-7.52: JT 45° PR VR CN	
				8	617.50	Terminated at 8.00m. Target Depth Reached.				

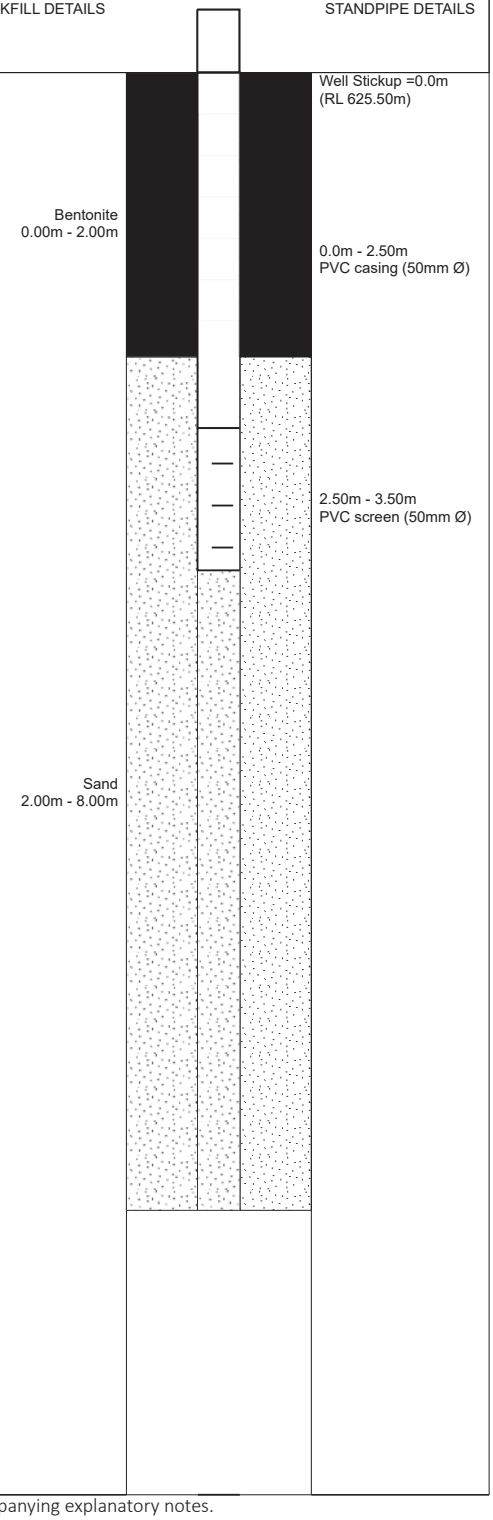
This log should be read in conjunction with EI Australia's accompanying explanatory notes.

BOREHOLE LOG

BH ID: BH5M

Location	2 Colo Street, Mittagong NSW	**Started**	24 May 2023
Client	Colliers Project Leaders	**Completed**	24 May 2023
Job No.	E25829.G03	**Logged By**	DD **Date** 24 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	Geosense Drilling & Engineering	**Surface RL**	≈625.50 m (AHD)
Plant	Comacchio Geo 205	**Inclination**	90°
Latitude	-34.44917970 (WGS 84)		
Longtitude	150.45873010 (WGS 84)		

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION
		0.00	625.50	FILL: Gravelly CLAY: medium plasticity, silty, orange-brown, with fine grained sand, gravels are fine to medium sub-angular siltstone, no odour	-
	BH5M_0.50-0.95 SPT 0.50-0.95 5,6,6 N=12	0.40	625.10	Silty CLAY: medium to high plasticity, mottled orange-brown, with fine grained sand, trace fine sub-angular siltstone gravel, no odour	
	BH5M_1.50-1.95 SPT 1.50-1.95 9,7,9 N=16				M < PL
		2.40	623.10	Clayey SILT: high plasticity, grey, no odour	
	BH5M_3.00-3.28 SPT 3.00-3.28 12,15/130 mm HB N=R				
75%		4.07	621.43	CLAYSTONE: fine to medium grained, brown, grey, distinctly weathered	
		4.45	621.05	LAMINITE: fine grained pale grey sandstone laminited with dark grey siltstone, with iron staining	
		5.22	620.28	From 5.22m, grey, no iron staining.	
80%		6.84	618.66	SANDSTONE: fine to medium grained, grey, fresh	
		8.00	617.50	Terminated at 8.00m. Target Depth Reached.	



CORE PHOTOGRAPH OF BOREHOLE: BH5M

Project	Proposed Maltings Redevelopment	**Latitude**	-34.44917970 (WGS 84)	**Depth Range**	4.07m to 8.00m		
Location	2 Colo Street, Mittagong NSW	**Longitude**	150.45873010 (WGS 84)	**Contractor**	Geosense Drilling Engineers Pty Ltd		
Position	See Figure 2	**Surface RL**	≈625.5m	**Drill Rig**	Commachio Geo 205		
Job No.	E25829.G03	**Inclination**	90°	**Logged**	DD	**Date**	24/5/23
Client	Colliers Project Leaders	**Box**	1 of 1	**Checked**	KX	**Date**	7/7/2023

Test Pit LOG

TP ID: TP1

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44883740 (WGS 84)		
Longtitude	150.45764130 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▷	TP 1_0.50-0.60		0.00		624.50	FILL: Silty CLAY: low plasticity, brown, organic peat with rootlets and gravels.	M	St	1, 4, 4	FILL
								M > PL	F	3, 2	
				0.60		623.90	Silty CLAY: low to medium plasticity, mottled red, brown with rootlets, egg smell odour	M > PL	St	1, 3, 3, 3, 4, 3, 3, 4, 5, 6, 7, 12	RESIDUAL SOIL
		TP 1_1.50-1.60		1.75		622.75	Terminated at 1.75m. Refusal on bedrock.			15/50mm	

DCP BLOWS: 0 5 10 15 20 25 30

Photographs

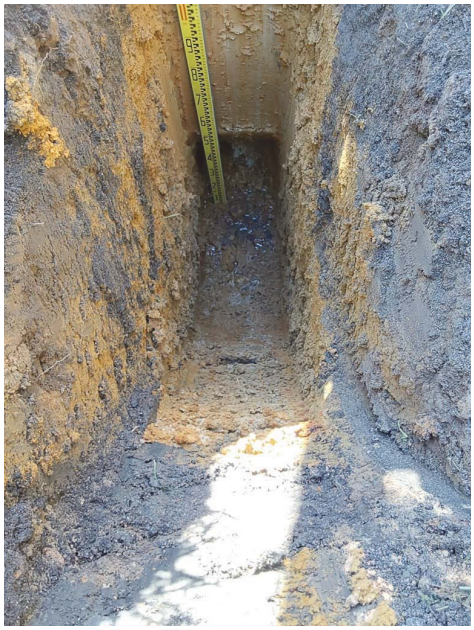
Test Pit LOG

TP ID: TP2

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44821750 (WGS 84)		
Longtitude	150.45831570 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX				0.00		624.50	FILL: Sandy GRAVEL: gravels are medium to coarse, dark grey, angular to sub-angular	M	St	5, 5, 4, 5, 3	FILL
		TP 2_0.50-0.60		0.50		624.00	Clayey SILT: low plasticity, brown	M ≈ PL	S	2, 2, 2, 3, 3	RESIDUAL SOIL
	▷	TP 2_1.50-1.60		0.90		623.60	Sandy CLAY: low to medium plasticity, mottled red, orange	M > PL	S	2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 12	RESIDUAL SOIL
				1.80		622.70	Terminated at 1.80m. Refusal on bedrock.				
				2							
				3							
				4							
				5							

Photographs



Test Pit LOG

TP ID: TP3

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44812150 (WGS 84)		
Longtitude	150.45861440 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 3_0.50-0.60		0.00		624.50	FILL: Sandy GRAVEL: gravels are medium to coarse, dark grey	M	F	3, 2, 4, 2, 3, 2	FILL
				0.60		623.90	FILL: SANDSTONE: yellow	M > PL	S	2, 2, 3	FILL
		TP 3_1.10-1.20		1.00		623.50	Clayey SILT: low plasticity, mottled red, orange	M > PL	S	2, 2, 12/50mm	RESIDUAL SOIL
						623.25	Terminated at 1.25m. Refusal on bedrock.				

DCP BLOWS: 0 5 10 15 20 25 30

Photographs

Test Pit LOG

TP ID: TP4

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44795270 (WGS 84)		
Longtitude	150.45858240 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▷	TP 4_0.50-0.60		0.00		624.50	FILL: Gravelly CLAY: low plasticity, dark brown, gravels are medium to coarse, with rootlets	M > PL	F	3, 2, 4, 2, 2, 2, 2	FILL
				0.60		623.90	Sandy CLAY: medium plasticity, pale grey, mottled red, orange, sand is fine to medium grained	M > PL	S	2, 2, 2, 1, 2, 2, 3, 3	RESIDUAL SOIL
		TP 4_1.50-1.60		1.80		622.70	Clayey SAND: mottled red, grey, sand is fine to medium grained	M > PL	F	3, 2, 2, 3, 14	RESIDUAL SOIL
		TP 4_2.30-2.40		2.00		622.00	Terminated at 2.50m. Refusal on bedrock.				

DCP BLOWS: 0 5 10 15 20 25 30

Photographs

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

Test Pit LOG

TP ID: TP5

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44792580 (WGS 84)		
Longtitude	150.45917980 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▷	TP 5_0.50-0.60		0.00		624.50	FILL: Sandy GRAVEL: gravels are medium to coarse, dark brown, with boulders	M > PL	St	4, 5, 5, 4, 6, 5, 7, 4, 6, 8	FILL
		TP 5_1.70-1.80		1.70		622.80	Silty CLAY: low plasticity, brown			6, 5, 4, 7, 6, 5, 6	RESIDUAL SOIL
		TP 5_2.30-2.40		2.10		622.40	From 2.10m, low to medium plasticity, mottled red, brown	M > PL	St	4, 3, 3, 4, 3, 5, 4, 7, 6, 7, 9, 8, 6	
				3		621.40	Terminated at 3.10m. Refusal on bedrock.			16	

Photographs

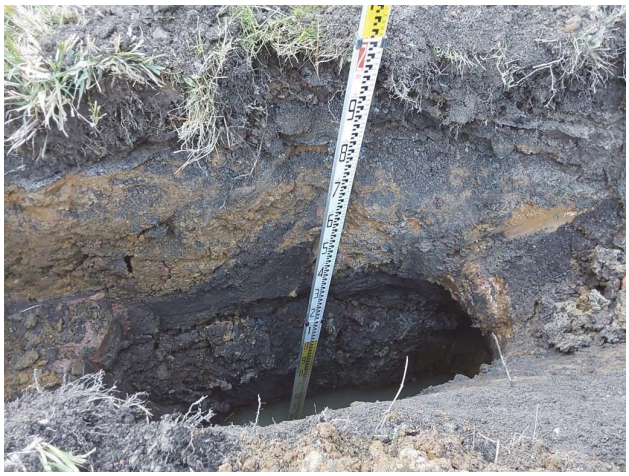
Test Pit LOG

TP ID: TP6

Location	2 Colo Street, Mittagong NSW			**Started**	22 May 2023
Client	Colliers Project Leaders			**Completed**	22 May 2023
Job No.	E25829.G03			**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1			**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈624.50 m (AHD)	**Latitude**	-34.44774700 (WGS 84)
Plant	Excavator	**Inclination**	90°	**Longtitude**	150.45956310 (WGS 84)

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▷	TP 6_0.40-0.70 TP 6_0.50-0.60		0.00		624.50	FILL: Sandy GRAVEL: medium to coarse, dark grey	M	-		FILL
				0.30		624.20	FILL: Sandy SILT: low plasticity, orange, sand is fine to medium grained	M < PL	-		FILL
		TP 6_1.50-1.60		0.90		623.60	Silty CLAY: medium plasticity, dark grey	M > PL	St	6, 7, 7, 8, 7, 7, 6, 6, 8, 8, 6, 7, 7, 5, 4, 4, 3, 4, 4	RESIDUAL SOIL
		TP 6_2.50-2.60		2.40		622.10	From 2.40m, mottled red / orange, yellow				
						621.70	Terminated at 2.80m. Refusal on bedrock.				

Photographs



Test Pit LOG

TP ID: TP7

Location	2 Colo Street, Mittagong NSW	**Started**	22 May 2023
Client	Colliers Project Leaders	**Completed**	22 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 22 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44870410 (WGS 84)		
Longtitude	150.45867250 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
				0						0 5 10 15 20 25 30	
EX				0.00		625.00	ASPHALT: 100mm thick	-	-		ASPHALT
		TP 7_0.50-0.60		0.10		624.90	FILL: Sandy GRAVEL: medium to coarse gravels, dark brown, with rootlets, gravels are angular to sub-angular	M	St	4, 12, 11, 4, 3	FILL
				0.60		624.40	FILL: Clayey SAND: fine to medium grained, dark brown, angular to rounded	M		3, 6, 5	FILL
		TP 7_1.50-1.60		0.90		624.10	Clayey SILT: low plasticity, brown, mottled orange	M > PL	VSt	14, 8, 10, 8, 10, 8, 9, 11, 9, 10, 12	RESIDUAL SOIL
		TP 7_2.50-2.60		2.10		622.90	Sandy CLAY: medium plasticity, orange, sand is fine to medium grained.	M > PL	St	10, 9, 8, 9, 3, 5, 4, 3, 4, 2, 3, 2, 2, 9 15/50mm	RESIDUAL SOIL
						621.55	Terminated at 3.45m. Refusal on bedrock.				

Photographs

Test Pit LOG

TP ID: TP8

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈626.70 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44925550 (WGS 84)		
Longtitude	150.45760200 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS (0 5 10 15 20 25 30)	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 8_0.30-0.60		0.00		626.70	FILL: Sandy GRAVEL: gravels are medium to coarse, yellow	M	-		FILL
				0.30		626.40	From 0.30m, dark grey	M ≈ PL	-		
		TP 8_1.30-1.40		0.80		625.90	Silty CLAY: high plasticity, orange, mottled red	M > PL	St	6, 5, 6, 7, 8, 6, 6, 9, 8, 6, 7, 7, 8, 6, 7, 7, 5, 9, 8, 6, 7, 7, 10/50mm	RESIDUAL SOIL
		TP 8_2.50-2.60		3		623.65	Terminated at 3.05m. Refusal on bedrock.				

Photographs

Test Pit LOG

TP ID: TP9

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈626.80 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44950500 (WGS 84)		
Longtitude	150.45683920 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▷	TP 9_0.30-0.60		0.00		626.80	FILL: Sandy GRAVEL: medium to coarse, dark brown, angular to sub-angular	M	-		FILL
				0.60		626.20	Clayey SILT: low plasticity, orange	M ≈ PL	St	6, 8, 7, 6, 5, 8, 8	RESIDUAL SOIL
				1.30		625.50	Silty SAND: fine to medium grained, grey, orange, sub-angular to rounded	M	MD to D	7, 6, 7, 9, 10, 9, 6, 9, 9, 5, 8, 7, 6, 8, 7, 9, 10, 8, 15	RESIDUAL SOIL
				3.20		623.60	Terminated at 3.20m. Refusal on bedrock.				

DCP BLOWS scale: 0 5 10 15 20 25 30

Photographs

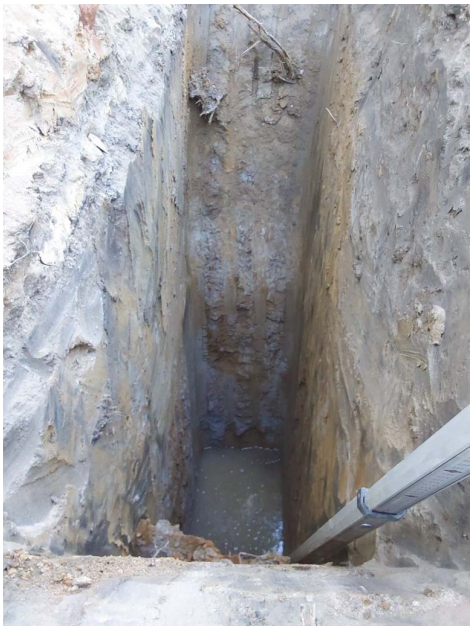
Test Pit LOG

TP ID: TP10

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈626.90 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44996230 (WGS 84)		
Longtitude	150.45599030 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▽	TP 10_0.30-0.60		0.00		626.90	FILL: Sandy GRAVEL: gravels are medium to coarse, yellow, angular to sub-angular	M	-	5, 9, 12, 16	FILL
				0.40		626.50	From 0.40m, dark grey	M	-	15, 18, 18, 16, 7	
		TP 10_1.20-1.30		0.90		626.00	Clayey SILT: medium plasticity, mottled red, orange	M < PL	St	6, 4, 7, 8, 8, 7, 7, 6	RESIDUAL SOIL
		TP 10_2.50-2.60		1.70		625.20	Sandy CLAY: medium plasticity, grey, mottled red, orange, sand is fine to medium grained	M ≈ PL	St	9, 11, 8, 4, 3, 3, 5, 4, 7, 6, 7, 8, 8, 8	RESIDUAL SOIL
				3.13		623.77	Terminated at 3.13m. Target depth reached.			15/30mm	

Photographs



Test Pit LOG

TP ID: TP11

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈628.30 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.45027360 (WGS 84)		
Longtitude	150.45561670 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▽	TP 11_0.30-0.60		0.00		628.30	FILL: Sandy GRAVEL: gravels are medium to coarse, yellow, angular to sub-angular	M	-		FILL
				0.10		628.20	FILL: Gravelly SAND: fine to medium grained, dark grey, with rootlets, gravels are sub-angular to rounded	M	-		FILL
				0.45		627.85	Silty SAND: fine to medium grained, orange	M < PL	St	5, 6, 4, 3, 4, 4, 3	RESIDUAL SOIL
				1.20		627.10	Sandy CLAY: low plasticity, orange, mottled red, grey, sand is medium grained	M > PL	St	5, 6, 7, 6, 8, 9, 7, 9, 4, 8, 7, 6, 5	RESIDUAL SOIL
				2.40		625.90	Silty CLAY: high plasticity, orange, grey	M > PL	St	4, 4, 3, 5, 7, 9, 10	RESIDUAL SOIL
				3.15		625.15	Terminated at 3.15m. Refusal on bedrock.			10/50mm	

DCP BLOWS: 0 5 10 15 20 25 30

Photographs

Test Pit LOG

TP ID: TP12

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.60 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44924510 (WGS 84)		
Longtitude	150.45842140 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 12_0.50-0.60		0.00		625.60	FILL: Gravelly SAND: fine to medium grained, dark grey	M	-	10	FILL
				0.15		625.45	Clayey SILT: low plasticity, orange	M < PL	St	5, 4, 4, 5, 7, 7, 8, 8, 7, 10, 9, 10	RESIDUAL SOIL
		TP 12_1.50-1.60		1.30		624.30	Silty CLAY: medium to high plasticity, grey, mottled red, orange	M > PL	VSt	13, 14, 16, 17, 21, 15, 17, 14, 13, 10, 17, 15, 17, 18, 16, 15, 9, 9, 14/60mm	RESIDUAL SOIL
		TP 12_2.50-2.60									
						622.40	Terminated at 3.20m. Refusal on bedrock.				

Photographs

Test Pit LOG

TP ID: TP13

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44914770 (WGS 84)		
Longtitude	150.45912000 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 13_0.30-0.60		0.00		625.00	FILL: Sandy GRAVEL: fine to medium gravels, dark grey	M	-		FILL
		TP 13_0.50-0.60		0.20		624.80	FILL: Gravelly SAND: dark brown, fine to medium grained sand, with rootlets	M	-		FILL
				0.65		624.35	Clayey SILT: medium plasticity, mottled red, orange, grey	M < PL	VSt	8, 9, 7, 10, 12, 9, 11, 16	RESIDUAL SOIL
		TP 13_1.50-1.60		1					H	13, 16, 17, 17, 19, 20, 16, 17, 19, 16, 20, 18, 19	
		TP 13_2.50-2.60		2							
						622.30	Terminated at 2.70m. Refusal on bedrock.				
				3							
				4							
				5							

Photographs

Test Pit LOG

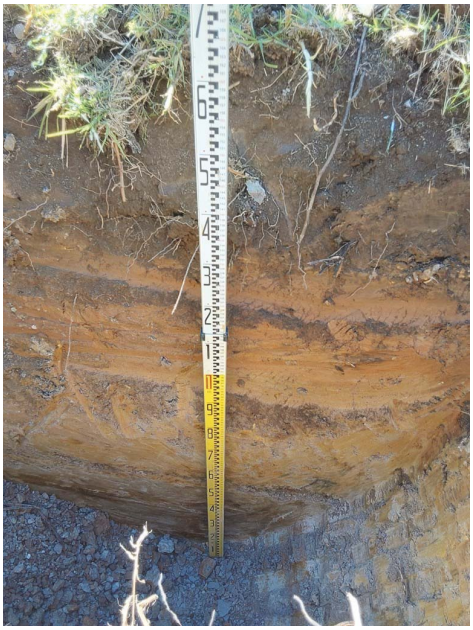
TP ID: TP14

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈628.90 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44951480 (WGS 84)		
Longtitude	150.45950170 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 14_0.30-0.60		0.00		628.90	FILL: Sandy CLAY: low plasticity, dark brown, sand is fine to medium grained, with rootlets and bricks.	M < PL	-		FILL
		TP 15_0.50-0.60		0.40		628.50	Silty CLAY: high plasticity, mottled red, orange, grey	M < PL	VSt	7, 9, 10, 8, 10, 12, 9, 11, 9, 10, 12, 15, 15	RESIDUAL SOIL
		TP 15_1.60-1.70		1.60		627.20	Terminated at 1.70m. Refusal on bedrock.				

DCP BLOWS: 0 5 10 15 20 25 30

Photographs



Test Pit LOG

TP ID: TP15

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44894180 (WGS 84)		
Longtitude	150.45930980 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX		TP 15_0.30-0.60 TP 15_0.50-0.60 TP 15_1.50-1.60		0.00 0.30 1 1.20 2 3 4 5		625.00 624.70 623.80 622.90	FILL: Gravelly CLAY: low plasticity, dark brown, gravels are fine to medium Silty CLAY: medium plasticity, mottled red, orange, grey From 1.20m, low plasticity, grey Terminated at 2.10m. Refusal on bedrock.	M < PL M < PL	- VSt H	7, 9, 10, 10, 12 16, 14, 15, 16, 14, 14, 12 19, 17, 18, 16, 16, 19	FILL RESIDUAL SOIL

Photographs

Test Pit LOG

TP ID: TP16

Location	2 Colo Street, Mittagong NSW	**Started**	23 May 2023
Client	Colliers Project Leaders	**Completed**	23 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 23 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44872230 (WGS 84)		
Longtitude	150.45889060 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▽	TP 16_0.50-0.60		0.00		625.00	FILL: Gravelly CLAY: low plasticity, dark brown, gravels are fine to medium, with rootlets.	M ≈ PL	-		FILL
				0.30		624.70	Silty CLAY: medium plasticity, orange, grey	M < PL	St	5, 4, 6, 5, 8, 7, 7	RESIDUAL SOIL
		TP 16_1.50-1.60		1.30		623.70	From 1.30m, grey, mottled red, orange	M ≈ PL	VSt	9, 11, 10, 8, 7, 9, 6, 12, 10, 11, 9, 11, 14, 15, 10, 12, 13, 10, 14, 11, 12	
		TP 16_2.50-2.60		3.10		621.90	Terminated at 3.10m. Refusal on bedrock.				

Photographs

Test Pit LOG

TP ID: TP17

Location	2 Colo Street, Mittagong NSW	**Started**	24 May 2023
Client	Colliers Project Leaders	**Completed**	24 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 24 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44871210 (WGS 84)		
Longtitude	150.45918000 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX	▽	TP 17_0.50-0.60		0.00		625.00	FILL: Gravelly CLAY: medium plasticity, dark grey mottled brown, gravels are fine to medium, with rootlets, sand and bricks	M < PL	-	4, 2, 2, 2, 3, 2, 2, 2, 5, 5	FILL
		TP 17_1.50-1.60		1.10		623.90	FILL: Silty CLAY: high plasticity, brown orange	M > PL	F	4, 4, 3, 3, 3, 2, 2, 2, 3, 3, 3, 4, 4, 6, 8, 10, 13, 13, 16, 16, 21, 29, 30/25mm	FILL
		TP 17_2.50-2.60		3.43		621.57	Terminated at 3.43m. Refusal on bedrock.				

Photographs

Test Pit LOG

TP ID: TP18

Location	2 Colo Street, Mittagong NSW	**Started**	24 May 2023
Client	Colliers Project Leaders	**Completed**	24 May 2023
Job No.	E25829.G03	**Logged By**	GP **Date** 24 May 2023
Sheets	1 of 1	**Review By**	**Date**
Drilling Contractor	AB 11	**Surface RL**	≈625.00 m (AHD)
Plant	Excavator	**Inclination**	90°
Latitude	-34.44857560 (WGS 84)		
Longtitude	150.45970850 (WGS 84)		

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
EX				0.00		625.00	FILL: Gravelly CLAY: low plasticity, dark brown, gravels are fine to medium grained, with rootlets	M	-	8	FILL
		TP 18_0.50-0.60		0.40		624.60	Clayey SILT: low plasticity, brown, orange, with rootlets	M < PL	VSt	3 3 3 3 4 4 5 8 13	RESIDUAL SOIL
		TP 18_1.50-1.60		1.40		623.60	Clayey SILT: low plasticity, grey	M < PL	VSt	7 12 7 7 10 11 12 12 13 13 15 17 16 15 15 13 14 17 19 21 22	RESIDUAL SOIL
		TP 18_2.50-2.60		3.10		621.90	Terminated at 3.10m. Refusal on bedrock.				

DCP BLOWS: 0 5 10 15 20 25 30

Photographs

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

DRILLING/EXCAVATION METHOD

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

PENETRATION RESISTANCE

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

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

WATER

Standing Water Level — **Partial water loss**

Water Seepage — **Complete Water Loss**

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

SAMPLING AND TESTING

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

GEOLOGICAL BOUNDARIES

———— = Observed Boundary (position known)

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

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

ROCK CORE RECOVERY

TCR=Total Core Recovery (%)

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

RQD = Rock Quality Designation (%)

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

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

FILL

COUBLES or BOULDERS

GRAVEL (GP or GW)

ORGANIC SOILS (OL, OH or Pt)

SILT (ML or MH)

CLAY (CL, CI or CH)

SAND (SP or SW)

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay

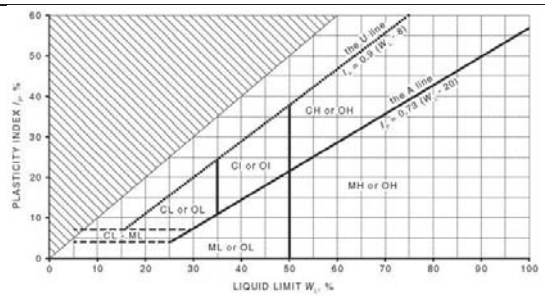
CLASSIFICATION AND INFERRED STRATIGRAPHY

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

PARTICLE SIZE CHARACTERISTICS

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

PLASTICITY PROPERTIES



GROUP SYMBOLS

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

MOISTURE CONDITION

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

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

CONSISTENCY

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

DENSITY

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

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

MINOR COMPONENTS

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

TERMS FOR ROCK MATERIAL STRENGTH AND WEATHERING

CLASSIFICATION AND INFERRED STRATIGRAPHY

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

ROCK MATERIAL STRENGTH CLASSIFICATION

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

 # Rock Strength Test Results

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

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

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

ROCK MATERIAL WEATHERING CLASSIFICATION

Symbol		Term	Field Guide
RS		Residual Soil	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
XW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. In some environments it is convenient to subdivide into Highly Weathered and Moderately Weathered, with the degree of alteration typically less for MW.
	MW		
SW		Slightly Weathered	Rock slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

ABBREVIATIONS AND DESCRIPTIONS FOR ROCK MATERIAL AND DEFECTS

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

DETAILED ROCK DEFECT SPACING

Defect Spacing

Spacing/width (mm)	Descriptor	Symbol
<20	Extremely Close	EC
20-60	Very Close	VC
60-200	Close	C
200-600	Medium	M
600-2000	Wide	W
2000-6000	Very Wide	VW

Bedding Thickness (Stratification)

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT TYPES

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

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT SHAPE AND ROUGHNESS

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

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT COATING

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

DEFECT APERTURE

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

Appendix B – Laboratory Certificates

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel Duffy
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	daniel.duffy@eiaustralia.com.au
Project	**E25829 2 Colo Street, Mittagong NSW**
Order Number	**E25829**
Samples	16

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE248315 R0**
Date Received	30/5/2023
Date Reported	7/6/2023

COMMENTS

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

SIGNATORIES

Shane MCDERMOTT
Inorganic/Metals Chemist

pH in soil (1:5) [AN101] Tested: 5/6/2023

PARAMETER	UOM	LOR	TP1_1.5-1.6 SOIL - 25/5/2023 SE248315.001	TP2_1.5-1.6 SOIL - 25/5/2023 SE248315.002	TP3_1.1-1.2 SOIL - 25/5/2023 SE248315.003	TP4_2.3-2.4 SOIL - 25/5/2023 SE248315.004	TP5_0.5-0.6 SOIL - 25/5/2023 SE248315.005
pH	pH Units	0.1	4.7	5.1	6.9	6.7	7.9

PARAMETER	UOM	LOR	TP7_1.5-1.6 SOIL - 25/5/2023 SE248315.006	TP8_1.3-1.4 SOIL - 25/5/2023 SE248315.007	TP10_1.2-1.3 SOIL - 25/5/2023 SE248315.008	TP12_1.5-1.6 SOIL - 25/5/2023 SE248315.009	TP13_0.5-0.6 SOIL - 25/5/2023 SE248315.010
pH	pH Units	0.1	7.5	6.4	4.9	5.4	4.7

PARAMETER	UOM	LOR	TP15_0.5-0.6 SOIL - 25/5/2023 SE248315.011	TP15_1.5-1.6 SOIL - 25/5/2023 SE248315.012	TP16_1.5-1.6 SOIL - 25/5/2023 SE248315.013	TP17_2.5-2.6 SOIL - 25/5/2023 SE248315.014	TP18_1.5-1.6 SOIL - 25/5/2023 SE248315.015
pH	pH Units	0.1	4.8	5.2	6.3	6.0	5.5

PARAMETER	UOM	LOR	BH1M_D1_2.0-2.45 SOIL - 25/5/2023 SE248315.016
pH	pH Units	0.1	5.7

Conductivity and TDS by Calculation - Soil [AN106] Tested: 5/6/2023

PARAMETER	UOM	LOR	TP1_1.5-1.6 SOIL - 25/5/2023 SE248315.001	TP2_1.5-1.6 SOIL - 25/5/2023 SE248315.002	TP3_1.1-1.2 SOIL - 25/5/2023 SE248315.003	TP4_2.3-2.4 SOIL - 25/5/2023 SE248315.004	TP5_0.5-0.6 SOIL - 25/5/2023 SE248315.005
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	17	34	61	24	160

PARAMETER	UOM	LOR	TP7_1.5-1.6 SOIL - 25/5/2023 SE248315.006	TP8_1.3-1.4 SOIL - 25/5/2023 SE248315.007	TP10_1.2-1.3 SOIL - 25/5/2023 SE248315.008	TP12_1.5-1.6 SOIL - 25/5/2023 SE248315.009	TP13_0.5-0.6 SOIL - 25/5/2023 SE248315.010
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	44	33	25	43	81

PARAMETER	UOM	LOR	TP15_0.5-0.6 SOIL - 25/5/2023 SE248315.011	TP15_1.5-1.6 SOIL - 25/5/2023 SE248315.012	TP16_1.5-1.6 SOIL - 25/5/2023 SE248315.013	TP17_2.5-2.6 SOIL - 25/5/2023 SE248315.014	TP18_1.5-1.6 SOIL - 25/5/2023 SE248315.015
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	42	28	37	25	29

PARAMETER	UOM	LOR	BH1M_D1_2.0-2.45 SOIL - 25/5/2023 SE248315.016
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	21

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography [AN245] Tested: 6/6/2023

PARAMETER	UOM	LOR	TP1_1.5-1.6 SOIL - 25/5/2023 SE248315.001	TP2_1.5-1.6 SOIL - 25/5/2023 SE248315.002	TP3_1.1-1.2 SOIL - 25/5/2023 SE248315.003	TP4_2.3-2.4 SOIL - 25/5/2023 SE248315.004	TP5_0.5-0.6 SOIL - 25/5/2023 SE248315.005
Chloride	mg/kg	0.25	2.4	0.55	2.9	1.6	4.0
Sulfate	mg/kg	5	23	63	16	14	37

PARAMETER	UOM	LOR	TP7_1.5-1.6 SOIL - 25/5/2023 SE248315.006	TP8_1.3-1.4 SOIL - 25/5/2023 SE248315.007	TP10_1.2-1.3 SOIL - 25/5/2023 SE248315.008	TP12_1.5-1.6 SOIL - 25/5/2023 SE248315.009	TP13_0.5-0.6 SOIL - 25/5/2023 SE248315.010
Chloride	mg/kg	0.25	0.98	6.4	10	65	92
Sulfate	mg/kg	5	15	27	25	<5.0	30

PARAMETER	UOM	LOR	TP15_0.5-0.6 SOIL - 25/5/2023 SE248315.011	TP15_1.5-1.6 SOIL - 25/5/2023 SE248315.012	TP16_1.5-1.6 SOIL - 25/5/2023 SE248315.013	TP17_2.5-2.6 SOIL - 25/5/2023 SE248315.014	TP18_1.5-1.6 SOIL - 25/5/2023 SE248315.015
Chloride	mg/kg	0.25	3.9	9.1	23	3.0	20
Sulfate	mg/kg	5	66	37	23	34	11

PARAMETER	UOM	LOR	BH1M_D1_2.0-2.45 SOIL - 25/5/2023 SE248315.016
Chloride	mg/kg	0.25	4.8
Sulfate	mg/kg	5	29

Moisture Content [AN002] Tested: 2/6/2023

PARAMETER	UOM	LOR	TP1_1.5-1.6 SOIL - 25/5/2023 SE248315.001	TP2_1.5-1.6 SOIL - 25/5/2023 SE248315.002	TP3_1.1-1.2 SOIL - 25/5/2023 SE248315.003	TP4_2.3-2.4 SOIL - 25/5/2023 SE248315.004	TP5_0.5-0.6 SOIL - 25/5/2023 SE248315.005
% Moisture	%w/w	1	14.9	17.8	21.5	14.5	13.2

PARAMETER	UOM	LOR	TP7_1.5-1.6 SOIL - 25/5/2023 SE248315.006	TP8_1.3-1.4 SOIL - 25/5/2023 SE248315.007	TP10_1.2-1.3 SOIL - 25/5/2023 SE248315.008	TP12_1.5-1.6 SOIL - 25/5/2023 SE248315.009	TP13_0.5-0.6 SOIL - 25/5/2023 SE248315.010
% Moisture	%w/w	1	13.3	13.2	10.2	17.6	16.2

PARAMETER	UOM	LOR	TP15_0.5-0.6 SOIL - 25/5/2023 SE248315.011	TP15_1.5-1.6 SOIL - 25/5/2023 SE248315.012	TP16_1.5-1.6 SOIL - 25/5/2023 SE248315.013	TP17_2.5-2.6 SOIL - 25/5/2023 SE248315.014	TP18_1.5-1.6 SOIL - 25/5/2023 SE248315.015
% Moisture	%w/w	1	13.1	16.2	20.4	23.9	16.0

PARAMETER	UOM	LOR	BH1M_D1_2.0-2.45 SOIL - 25/5/2023 SE248315.016
% Moisture	%w/w	1	14.9

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

FOOTNOTES

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

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

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

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

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

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

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

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

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

STS Geotechnics Pty Ltd
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Accredited for Compliance with ISO/IEC 17025 - Testing No. 2750

Atterberg Limits and Linear Shrinkage Report

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380

Client: EI AUSTRALIA — Report No.: 23/1741

Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023

Test Method: AS1289.3.1.2,3.2.1,3.4.1,2.1.1 — Page: 1 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/1	7692D-L/2	7692D-L/3	7692D-L/4	7692D-L/5	7692D-L/6
Sample Location	Test Pit 1	Test Pit 2	Test Pit 3	Test Pit 4	Test Pit 5	Test Pit 6
Material Description	Silty Clay, grey brown, trace of gravel	Sandy Clay, grey	Sandy Clay, grey	Sandy Clay, yellow grey	Silty Sandy Clay, brown grey	Sandy Clay, grey
Depth (m)	0.5 - 0.6	1.5 - 1.6	1.1 - 1.2	1.5 - 1.6	1.7 - 1.8	1.5 - 1.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Sample History	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried
Method of Preparation	Dry Seived	Dry Seived	Dry Seived	Dry Seived	Dry Seived	Dry Seived
Liquid Limit (%)	**37**	**39**	**34**	**30**	**33**	**21**
Plastic Limit (%)	**20**	**18**	**22**	**15**	**16**	**17**
Plasticity Index	**17**	**21**	**12**	**15**	**17**	**4**
Linear Shrinkage (%)	**10.0**	**12.0**	**9.0**	**8.0**	**10.0**	**3.0**
Mould Size (mm)	250	250	250	250	250	127
Crumbing	N	Y	N	N	N	N
Curling	N	N	N	N	N	N

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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Atterberg Limits and Linear Shrinkage Report

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380
Client: EI AUSTRALIA — Report No.: 23/1741
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023
Test Method: AS1289.3.1.2,3.2.1,3.4.1,2.1.1 — Page: 2 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/7	7692D-L/8	7692D-L/9	7692D-L/10	7692D-L/11	7692D-L/12
Sample Location	Test Pit 8	Test Pit 10	Test Pit 12	Test Pit 13	Test Pit 15	Test Pit 16
Material Description	Silty Clay, brown	Sandy Clay, yellow brown	Silty Clay, brown grey	Silty Clay, brown	Silty Clay, brown grey	Silty Clay, grey brown
Depth (m)	2.5 - 2.6	1.2 - 1.3	0.5 - 0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Sample History	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried
Method of Preparation	Dry Seived	Dry Seived	Dry Seived	Dry Seived	Dry Seived	Dry Seived
Liquid Limit (%)	**37**	**27**	**45**	**65**	**57**	**54**
Plastic Limit (%)	**17**	**15**	**20**	**26**	**19**	**23**
Plasticity Index	**20**	**12**	**25**	**39**	**38**	**31**
Linear Shrinkage (%)	**10**	**8.0**	**14.0**	**15.0**	**15.0**	**15.0**
Mould Size (mm)	254	250	250	250	250	127
Crumbing	Y	N	N	Y	N	N
Curling	N	N	N	N	N	N

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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Accredited for Compliance with ISO/IEC 17025 - Testing No. 2750

Atterberg Limits and Linear Shrinkage Report

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380

Client: EI AUSTRALIA — Report No.: 23/1741

Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023

Test Method: AS1289.3.1.2,3.2.1,3.4.1,2.1.1 — Page: 3 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/13	7692D-L/14	7692D-L/15	7692D-L/16		
Sample Location	Test Pit 17	Test Pit 18	Borehole 2M	Borehole 3		
Material Description	Silty Clay, brown	Sandy Clay, grey	Sandy Clay, brown grey	Silty Clay, brown grey		
Depth (m)	1.5 - 1.6	2.5 - 2.6	2.0 - 2.2	1.5 - 1.95		
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023		
Sample History	Oven Dried	Oven Dried	Oven Dried	Oven Dried		
Method of Preparation	Dry Seived	Dry Seived	Dry Seived	Dry Seived		
Liquid Limit (%)	**45**	**35**	**52**	**50**		
Plastic Limit (%)	**23**	**20**	**18**	**23**		
Plasticity Index	**22**	**15**	**34**	**27**		
Linear Shrinkage (%)	**9.0**	**8.0**	**17**	**12.0**		
Mould Size (mm)	127	250	127	127		
Crumbing	N	N	N	N		
Curling	N	N	N	N		

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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Accredited for Compliance with ISO/IEC 17025 - Testing No. 2750

Moisture Content of Soil and Aggregate Samples

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380

Client: EI AUSTRALIA — Report No.: 23/1745

Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023

Test Method: AS1289.2.1.1 — Page: 1 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/1	7692D-L/2	7692D-L/3	7692D-L/4	7692D-L/5	7692D-L/6
Sample Location	Test Pit 1	Test Pit 2	Test Pit 3	Test Pit 4	Test Pit 5	Test Pit 6
Material Description	Silty Clay, grey brown, trace of gravel	Sandy Clay, grey	Sandy Clay, grey	Sandy Clay, yellow grey	Silty Sandy Clay, brown grey	Sandy Clay, grey
Depth (mm)	0.5 - 0.6	1.5 - 1.6	1.1 - 1.2	1.5 - 1.6	1.7 - 1.8	1.5 - 1.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Moisture Content (%)	**19.8**	**20.4**	**26.9**	**17.4**	**21.1**	**28.6**

Remarks:

Approved Signatory.....

Technician: AW — Orlando Mendoza - Laboratory Manager

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Accredited for Compliance with ISO/IEC 17025 - Testing No. 2750

Moisture Content of Soil and Aggregate Samples

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380

Client: EI AUSTRALIA — Report No.: 23/1745

Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023

Test Method: AS1289.2.1.1 — Page: 2 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/7	7692D-L/8	7692D-L/9	7692D-L/10	7692D-L/11	7692D-L/12
Sample Location	Test Pit 8	Test Pit 10	Test Pit 12	Test Pit 13	Test Pit 15	Test Pit 16
Material Description	Silty Clay, brown	Sandy Clay, yellow brown	Silty Clay, brown grey	Silty Clay, brown	Silty Clay, brown grey	Silty Clay, grey brown
Depth (mm)	2.5 - 2.6	1.2 - 1.3	0.5 - 0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Moisture Content (%)	**24.6**	**8.8**	**18.5**	**22.6**	**19.1**	**22.9**

Remarks:

Approved Signatory.....

Technician: AW — Orlando Mendoza - Laboratory Manager

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Moisture Content of Soil and Aggregate Samples

Project: E22801.1 - 2 COLO STREET MITTAGONG — Project No.: 31380

Client: EI AUSTRALIA — Report No.: 23/1745

Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009 — Report Date: 15/06/2023

Test Method: AS1289.2.1.1 — Page: 3 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/13	7692D-L/14	7692D-L/15	7692D-L/16		
Sample Location	Test Pit 17	Test Pit 18	Borehole 2M	Borehole 3		
Material Description	Silty Clay, brown	Sandy Clay, grey	Sandy Clay, brown grey	Silty Clay, brown grey		
Depth (mm)	1.5 - 1.6	2.5 - 2.6	2.0 - 2.2	1.5 - 1.95		
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023		
Moisture Content (%)	**24.3**	**17.1**	**22.8**	**88.8**		

Remarks:

Approved Signatory.....

Technician: AW — Orlando Mendoza - Laboratory Manager

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Emerson Class No.

Project: E22801.1 - 2 COLO STREET MITTAGONG
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS1289.3.8.1

Project No.: 31380
Report No.: 23/1742
Report Date: 15/06/2023

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/1	7692D-L/2	7692D-L/3	7692D-L/4	7692D-L/5	7692D-L/6
Sample Location	Test Pit 1	Test Pit 2	Test Pit 4	Test Pit 6	Test Pit 7	Test Pit 10
Material Description	Silty Clay, grey brown, trace of gravel	Sandy Clay, grey	Silty Clay, brown grey/orange	Silty Clay, grey brown/orange	Silty Sandy Clay, brown	Silty Clay, grey/orange
Depth (mm)	0.5 - 0.6	0.5 - 0.6	0.5 - 0.6	0.5 - 0.6	1.5 - 1.6	2.5 - 2.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Date Tested	13/06/2023	13/06/2023	13/6/2023	13/6/2023	13/6/2023	15/6/2023
Source of Material	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
Water Temperature (°)	21	21	21	21	21	21
Emerson Class No.	**5**	**4**	**5**	**2**	**2**	**6**

Emerson Classification

Class 1: Slaking and complete dispersion before remoulding

Class 2: Slaking and some dispersion before remoulding

Class 3: Slaking and no dispersion before remoulding, dispersion after remoulding

Class 4: Slaking and no despersion before remoulding, no dispersion after remoulding, calcite or gypsum present

Class 5: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, dispersion after slaking in a 1:5 soil / water suspension

Class 6: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, flocculation after shaking in a 1:5 soil / water suspension

Class 7: No slaking, swelling occurs

Class 8: No slaking, swelling does not occur

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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Emerson Class No.

Project: E22801.1 - 2 COLO STREET MITTAGONG
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS1289.3.8.1

Project No.: 31380
Report No.: 23/1742
Report Date: 15/06/2023

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/7	7692D-L/8	7692D-L/9	7692D-L/10	7692D-L/11	7692D-L/12
Sample Location	Test Pit 12	Test Pit 13	Test Pit 14	Test Pit 16	Test Pit 17	Test Pit 18
Material Description	Silty Clay, grey/orange	Silty Clay, grey brown	Silty Clay, grey/orange	Silty Clay, grey brown	Silty Clay, grey brown	Silty Clay, grey/orange brown
Depth (mm)	1.5 - 1.6	1.5 - 1.6	0.5 - 0.9	0.5 - 0.6	0.5 - 0.6	0.5 - 0.6
Sample Date	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Date Tested	15/06/2023	15/06/2023	15/6/2023	15/6/2023	15/6/2023	15/6/2023
Source of Material	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
Water Temperature (°)	21	21	21	21	21	21
Emerson Class No.	**6**	**6**	**5**	**5**	**5**	**6**

Emerson Classification

Class 1: Slaking and complete dispersion before remoulding

Class 2: Slaking and some dispersion before remoulding

Class 3: Slaking and no dispersion before remoulding, dispersion after remoulding

Class 4: Slaking and no despersion before remoulding, no dispersion after remoulding, calcite or gypsum present

Class 5: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, dispersion after slaking in a 1:5 soil / water suspension

Class 6: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, flocculation after shaking in a 1:5 soil / water suspension

Class 7: No slaking, swelling occurs

Class 8: No slaking, swelling does not occur

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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Emerson Class No.

Project: E22801.1 - 2 COLO STREET MITTAGONG
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS1289.3.8.1

Project No.: 31380
Report No.: 23/1742
Report Date: 15/06/2023
Page: 3 OF 3

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7692D-L/13	7692D-L/14				
Sample Location	Borehole 2M	Borehole 5M				
Material Description	Silty Clay, brown	Gravelly Clay, grey				
Depth (mm)	1.5 - 1.95	1.5 - 1.95				
Sample Date	26/05/2023	26/05/2023				
Date Tested	13/06/2023	13/06/2023				
Source of Material	Disturbed	Disturbed				
Water Temperature (°)	21	21				
Emerson Class No.	**6**	**8**				

Emerson Classification

Class 1: Slaking and complete dispersion before remoulding

Class 2: Slaking and some dispersion before remoulding

Class 3: Slaking and no dispersion before remoulding, dispersion after remoulding

Class 4: Slaking and no despersion before remoulding, no dispersion after remoulding, calcite or gypsum present

Class 5: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, dispersion after slaking in a 1:5 soil / water suspension

Class 6: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, flocculation after shaking in a 1:5 soil / water suspension

Class 7: No slaking, swelling occurs

Class 8: No slaking, swelling does not occur

Remarks:

Approved Signatory.....

Technician: AW

Orlando Mendoza - Laboratory Manager

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California Bearing Ratio Determination Report

Project: E22801.1 - 2 COLO STREET MITTAGONG
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS1289.5.1.1,6.1.1,2.1.1
No. of Days Soaked: 4

Project No.: 31380
Report No.: 23/1727
Report Date: 15/06/2023
Page: 1 of 2
Compactive Effort: Standard
Target Compaction (%): 100
Surcharge (Kg): 9

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.		7692D-L/1	7692D-L/2	7692D-L/3	7692D-L/4	7692D-L/5	7692D-L/6
Sample Location		Test Pit 6	Test Pit	Test Pit 9	Test Pit 10	Test Pit 11	Test Pit 13
Material Description		Gravelly Silty Clay, yellow brown	Gravelly Sand, brown, trace of clay	Gravelly Sand, brown, trace of clay	Gravelly Sand, brown, trace of clay	Gravelly Sand, dark brown, trace of clay	Gravelly Silty Clay, brown
Depth of Sample (m)		Sampled by Client	Sampled by Client	Sampled by Client	Sampled by Client	Sampled by Client	Sampled by Client
Sample Date		26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Oversize on Wet Basis +19mm (%)		4.6	6.6	18.3	2.7	3.4	0.4
Field Moisture Content (%)		13.2	18.5	13.8	6.0	11.6	17.5
Optimum Moisture Content (%)		13.4	20.5	17.0	10.3	13.3	20.1
Maximum Dry Density (t/m^3)		1.909	1.531	1.684	1.961	1.745	1.662
Dry Density (t/m^3)	Before Soaking	1.91	1.527	1.681	1.965	1.743	1.659
	After Soaking	1.899	1.527	1.675	1.964	1.741	1.654
Relative Compaction (%)	Before Soaking	100	99.8	99.8	100.2	99.9	99.8
	After Soaking	99.5	99.8	99.5	100.1	99.7	99.5
Moisture Content (%)	Before Soaking	13.6	20.8	17.2	10.3	13.4	20.4
	After Soaking	14.9	21.6	18	11.2	16.1	22.8
Moisture Ratio Before Soaking (%)		101.5	101.5	101.5	100.0	101.0	101.5
Moisture Content after test (%)	Top 30mm	14.2	20.9	17.4	11.3	15.6	22.6
	Entire Depth	14.2	20.3	17.2	10.9	15.3	21.5
Swell after Soaking (%)		0.6	0.0	0.4	0.1	0.1	0.3
CBR Value (%)		**8.0**	**8.0**	**8.0**	**14.0**	**15.0**	**8.0**
Penetration (mm)		**2.5**	**5.0**	**5.0**	**5.0**	**5.0**	**2.5**

Remarks: +19mm material excluded from test

Approved Signatory.....

Technician: DC/JC

Orlando Mendoza - Laboratory Manager

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California Bearing Ratio Determination Report

Project: E22801.1 - 2 COLO STREET MITTAGONG
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Test Method: AS1289.5.1.1,6.1.1,2.1.1
No. of Days Soaked: 4

Project No.: 31380
Report No.: 23/1727
Report Date: 15/06/2023
Page: 2 of 2
Compactive Effort: Standard
Target Compaction (%): 100
Surcharge (Kg): 9

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.		7692D-L/7					
Sample Location		Test Pit 15					
Material Description		Silty Clay, red brown, trace of gravel					
Depth of Sample (m)		Sampled by Client					
Sample Date		26/05/2023					
Oversize on Wet Basis +19mm (%)		0.2					
Field Moisture Content (%)		19.8					
Optimum Moisture Content (%)		17.8					
Maximum Dry Density (t/m³)		1.759					
Dry Density (t/m³)	Before Soaking	1.758					
	After Soaking	1.73					
Relative Compaction (%)	Before Soaking	100					
	After Soaking	98.4					
Moisture Content (%)	Before Soaking	17.8					
	After Soaking	20.3					
Moisture Ratio Before Soaking (%)		100.0					
Moisture Content after test (%)	Top 30mm	21.2					
	Entire Depth	19.6					
Swell after Soaking (%)		1.6					
CBR Value (%)		**5.0**					
Penetration (mm)		**2.5**					

Remarks: +19mm material excluded from test

Approved Signatory.....

Technician: DC/JC

Orlando Mendoza - Laboratory Manager

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Point Load Strength Index Report

Project: E22801.1, 2 Colo St, Mittagong, NSW
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller St PYRMONT, 2009 NSW
Test Method: AS4133.4.1
Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Project No.: 31380 /7692D-L
Report No.: 23/1790
Report Date: 20/06/2023

Borehole / Sample No.	Depth (m)	Date Sampled	Date Tested	Test Type	Is (MPa)	$Is_{(50)}$ (MPa)	Rock Type	Failure Type	Moisture
BH1M	3.48	26/05/2023	20/06/2023	A	**1.7**	**1.7**	SS	3	M
BH1M	4.73	26/05/2023	20/06/2023	A	**1.3**	**1.3**	SS	3	M
BH1M	5.56	26/05/2023	20/06/2023	A	**3.9**	**3.9**	SS	3	M
BH1M	6.27	26/05/2023	20/06/2023	A	**1.7**	**1.7**	SS	3	M
BH1M	7.07	26/05/2023	20/06/2023	A	**4.2**	**4.1**	SH	3	M
BH1M	7.93	26/05/2023	20/06/2023	A	**2.8**	**2.8**	SS	3	M
BH2M	3.23	26/05/2023	20/06/2023	A	**1.1**	**1.2**	SS	3	M
BH2M	4.65	26/05/2023	20/06/2023	A	**1.2**	**1.2**	SS	3	M
BH2M	5.59	26/05/2023	20/06/2023	A	**1.5**	**1.4**	SS	3	M
BH2M	6.13	26/05/2023	20/06/2023	A	**1.4**	**1.5**	SS	3	M
BH2M	7.61	26/05/2023	20/06/2023	A	**0.51**	**0.49**	SS	3	M
BH3	3.69	26/05/2023	20/06/2023	A	**0.53**	**0.55**	SS	3	M
BH3	4.70	26/05/2023	20/06/2023	A	**4.7**	**4.6**	ST	3	M
BH3	5.73	26/05/2023	20/06/2023	A	**4.4**	**4.5**	ST	3	M
BH3	6.14	26/05/2023	20/06/2023	A	**2.2**	**2.2**	ST	3	M
BH3	7.52	26/05/2023	20/06/2023	A	**2.2**	**2.2**	SS	3	M
BH4M	3.63	26/05/2023	20/06/2023	A	**0.045**	**0.046**	SH	3	M
BH4M	4.24	26/05/2023	20/06/2023	A	**0.12**	**0.12**	SH	4	M
BH4M	5.43	26/05/2023	20/06/2023	A	**0.15**	**0.16**	SH	4	M
BH4M	5.65	26/05/2023	20/06/2023	A	**0.21**	**0.2**	SH	4	M
BH4M	6.50	26/05/2023	20/06/2023	A	**2.6**	**2.5**	SS	3	M
BH4M	7.75	26/05/2023	20/06/2023	A	**2.6**	**2.7**	SS	3	M
BH4M	8.22	26/05/2023	20/06/2023	A	**3.3**	**3.4**	SS	3	M

Failure Type	Test Type	Moisure Condition	Rock Type
1 = Fracture through bedding or weak plane	A = Axial	W = Wet	SS = Sandstone
2 = Fracture along bedding	D = Diametrial	M = Moist	ST = Siltstone
3 = Fracture through rock mass	I = Irregular	D = Dry	SH = Shale
4 = Fracture influenced by natural defect or drilling	C = Cube		YS = Claystone
5 = Partial fracture or chip (invalid result)			IG = Igneous

Remarks:

Approved Signatory.....

Technician: FV

Orlando Mendoza - Laboratory Manager

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Point Load Strength Index Report

Project: E22801.1, 2 Colo St, Mittagong, NSW
Client: EI AUSTRALIA
Address: Suite 6.01, 55 Miller St PYRMONT, 2009 NSW
Test Method: AS4133.4.1
Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Project No.: 31380 /7692D-L
Report No.: 23/1790
Report Date: 20/06/2023
Page: 2 OF 2

Borehole / Sample No.	Depth (m)	Date Sampled	Date Tested	Test Type	Is (MPa)	$Is_{(50)}$ (MPa)	Rock Type	Failure Type	Moisture
BH5M	4.13	26/05/2023	20/06/2023	A	**0.12**	**0.12**	ST	3	M
BH5M	5.51	26/05/2023	20/06/2023	A	**3.8**	**3.8**	ST	3	M
BH5M	6.21	26/05/2023	20/06/2023	A	**3.8**	**3.9**	ST	3	M
BH5M	6.79	26/05/2023	20/06/2023	A	**2.5**	**2.5**	ST	3	M
BH5M	7.95	26/05/2023	20/06/2023	A	**1.4**	**1.4**	SS	3	M

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

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

Moisure Condition
W = Wet
M = Moist
D = Dry

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

Remarks:

Approved Signatory.....

Technician: FV

Orlando Mendoza - Laboratory Manager

Appendix C – Vibration Limits

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

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

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

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

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

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

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

Appendix D – Important Information

Important Information

SCOPE OF SERVICES

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

RELIANCE ON DATA

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

GEOTECHNICAL ENGINEERING

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

LIMITATIONS OF SITE INVESTIGATION

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

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

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

VERIFICATION OF SITE CONDITIONS

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

REPRODUCTION OF REPORTS

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

REPORT FOR BENEFIT OF CLIENT

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

OTHER LIMITATIONS

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