

GEOTECHNICAL REPORT

1-3 Emerald Street and 6-8 Troy Street, Emu Plains NSW

Midson Group Pty Ltd – February 2023



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GEOTECHNICAL REPORT

1-3 Emerald Street and 6-8 Troy Street,
Emu Plains NSW 2750

PREPARED FOR

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1. INTRODUCTION

Geo-Logix Pty Ltd (Geo-Logix) was engaged by Midson Group Pty Ltd to conduct a geotechnical investigation of the property located at 1-3 Emerald Street and 6-8 Troy Street, Emu Plains NSW (Figure 1). Geo-Logix understands that The Uniting Church in Australia Property Trust plan to construct a proposed aged care facility at the site, with a proposed basement. The proposed basement design is provided in Attachment A. Information requested by NSW Water in relation to site dewatering has been provided in Section 5.2 of this report.

1.1 Objectives and Scope of Work

During a previous investigation by Douglas Partners (DP) in 2022, refusal was encountered on river gravels at 5 to 8 metres below grade (mbg). The objective of Geo-Logix's investigation was to provide additional information on the gravel layer and underlying bedrock. To satisfy the above objectives Geo-Logix completed the following scope of work:

- Visual appraisal of the site conditions and locality;
- Review of the geological maps for the area;
- Review of the previous geotechnical report and groundwater monitoring report by DP;
- Drilling of six test bores, BH201 to BH206, to shale bedrock by sonic core drilling;
- Conversion of one boring to a groundwater monitoring well to 5 mbg;
- Gauging of groundwater levels in the existing groundwater wells and newly installed groundwater well;
- Logging of the borings in accordance with the Unified Soil Classification System (USCS);
- Backfilling of borings with onsite soils and compacted on completion; and
- Provision of this report detailing the results of the above investigation, recommendations for design and construction of the proposed extension.

The Geo-Logix field investigation was conducted in January 2023.

2. SITE INFORMATION

Site Information	Details
Address	1-3 Emerald Street and 6-8 Troy Street, Emu Plains NSW 2750
Lot and Deposited Plan (DP)	Lot 10, DP 1242243
Approximate Area	14,958 m ²
Coordinates	Lat: 33.754007 S Long: 150.658429 E
Site Description	The site is bound by Emerald Street in the east, Great Western Hwy in the north and Troy Street in the west. The site consists of a church and retirement village. There are some residential properties in the east of the site and Darcy Smith Oval further beyond. There is a commercial centre north of the site with the Great Western Highway and residential properties beyond. There is a public school south of the site with residential properties beyond. West of the site are residential properties.
Topography and Elevation	The site topography is slightly sloping towards north-east. Site elevation ranges from 27 to 30 mAHD. Regionally there is a gentle slope east towards Nepean River.
Geology	Cainozoic era, Quaternary period, Cranebrook formation with gravel, sand, silt and clay. (1:100,000 Penrith Geological Map - Geological Survey of NSW, 2000).
Regional Hydrogeology	Groundwater is expected to follow regional topography and flow east towards Nepean River.

3. METHOD OF INVESTIGATION

3.1 Investigation Methods

Geotechnical fieldwork was undertaken on 4 and 10-12 January 2023 by Geo-Logix.

Prior to undertaking the borings, each location was scanned for underground services and utilities by an independent utility locator and cross-checked with the results of a 'Dial Before You Dig' (DBYD) search.

Bores BH201 to BH206 were completed by Geo-Logix utilising a sonic core equipped drill rig. At the completion of drilling, boring BH204 was converted to a groundwater monitoring well in accordance with Minimum Construction Requirements for Water Bores in Australia (NUDLC, 2020). The remaining test bores were reinstated with soil cuttings and compacted.

At location BH204, the groundwater well was constructed of Class 18 50mm PVC pipe with slotted PVC casing 3 m in length installed from the base of the well. A sand filter pack extended from the base of the borings to 0.5 m above the top of the slotted PVC casing and was sealed with 1.0 m of hydrated bentonite pellets above the sand pack. A cement grout was used to seal the borehole annulus to surface. Soil Bore Logs and construction details are presented in the attached boring logs (Attachment B).

The groundwater in BH204 was left to stabilised for 48 hours prior to gauging the water level. Using an oil/water interface probe, stabilised groundwater levels were measured in existing groundwater wells BH100, an unmarked well northeast of the marked location of well BH102, and well BH204. Groundwater well BH102 could not be located during the investigation.

4. SITE GEOLOGY AND HYDROGEOLOGY

As described in the DP report, onsite soils comprise a thin layer of surface fill, typically less than 1 m in thickness with localised areas of deeper fill underlain by alluvial soils. The existing fill is considered uncontrolled.

The underlying alluvial soils are predominantly sandy with clayey/silty interlayers present, and with gravel alluvium with cobbles encountered at a depth of approximately 6 mbg across the site. The alluvial sands and gravels are considered medium dense.

The gravel alluvium extends to a weathered shale bedrock at approximately 19 to 20 mbg.

During drilling, groundwater inflow was typically observed at 7 to 9 m below grade in the gravel layer. Stabilised groundwater was measured in the onsite wells at the following depths by DP and Geo-Logix.

Groundwater Well	Depth to water (mbg)		
	DP, March 2022	DP, 6–10 April	GX, Jan 2023
BH100	1.3	1.5–3.8	3.4
BH102	2.3	1.5–3.8	Not located
Unknown Well	n/a	n/a	3.7
BH204	n/a	n/a	4.2

Based on the encountered geology, the groundwater is considered to exist as an unconfined aquifer. The aquifer level appears to be very susceptible to fluctuations in elevation due to rainfall. DP measured hydraulic conductivity as 1.7×10^{-6} to 5.1×10^{-8} m/s.

5. DISCUSSION

5.1 Excavations

It is expected that onsite soils within the expected depth of excavation will generally be excavatable by excavator. Groundwater management, batter and shoring of excavations are discussed in the following sections. The base elevation of the basement excavation is expected to be approximately 24.050 mAHD.

5.2 Groundwater Inflow

During previous investigations, groundwater has been encountered within the depth of exploration.

As noted by DP, if construction is undertaken during relatively dry weather, it is expected that there will be little to no groundwater infiltration to the basement excavation. However, due to the nature of the unconfined aquifer and potential groundwater fluctuations, it is recommended that the development be designed with a tanked basement, accounting for potential uplift conditions due to elevated groundwater.

The maximum estimated groundwater inflow to the basement excavation is approximately 370 m³/day, though experience indicates that estimated maximum inflows very rarely occur. The use of cut-off walls would also be expected to significantly reduce this figure. Geo-Logix assumes maximum flows might occur 10% of the time during excavation and construction, which is a reasonably conservative assumption.

Geo-Logix understands that approximately 6 months is allowed for construction of the tanked basement. Based on this timeframe, the volume of extracted groundwater is not expected to exceed 6,700 m³.

Depending on encountered conditions, it is expected that groundwater dewatering may be accomplished by spearpoint or using sump and pump methods. If using spearpoint methods, predrilling may be required for spearpoint installation. Via either method it is expected that groundwater will be pumped to onsite storage. Groundwater may be reinjected to the aquifer on site, outside of the proposed basement excavations.

Where reinsertion is not achievable due to extraction volumes or other reasons, the groundwater may be pumped to an onsite holding tank. Dewatering flows are to be measured using a propeller or mag meter with total dewatering volumes recorded daily.

5.3 Batter Slopes and Shoring

Batter Slopes

Excavations must be designed and constructed in a stable manner. The sides of the excavation should be shored or battered so as to maintain stability of both the excavation sides and bottom. Assuming that excavations are undertaken prior to any other construction works, and provided all surcharge loads, including plant and stockpiled material are kept well clear of the top of the batters, minimum batter slopes are recommended as 1.5H:1V for temporary batters within the dry, natural clays and sands for batters of up to 3 m high and 2H:1V for permanent batters.

Permanent batters should be protected from erosion by vegetation or other measures and designed with adequate surface and subsurface drainage. For batters taller than 3 m, localised assessment of batter slopes is recommended.

Stormwater runoff should be directed away from the tops of batters by use of berm drains. Where runoff must be directed down the face of a batter, the batter drains/chutes should be lined to prevent erosion. A properly installed silt fence should be used at the base of batter slopes to prevent offsite migration of sediment. Scouring of excavation faces due to runoff should be repaired prior to further works within the excavation(s). All permanent batters should be protected from erosion by vegetation or other measures and designed with adequate surface and subsurface drainage.

Earth Retention and Shoring

The contractor is solely responsible for temporary excavation design and should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench depth, exceed those specified in local, state, and national safety regulations.

The following earth pressure coefficients are recommended for use in design of temporary and permanent retaining structures:

Retained Material	Bulk Density (kN/m ³)	Poisson's Ratio, ν	Earth Pressure Coefficients			Cohesion, c' (kPa)	Friction Angle ϕ' (°)	Elastic Modulus, E' (MPa)
			At rest (K_0)	Active (K_a)	Passive (K_p)			
Fill	18	0.3	0.60	0.40	2.4	0	25	10
Onsite Clay (CL)	19	0.4	0.60	0.40	2.4	5	25	18
Alluvial Sand and Gravel (SP, SC, GP, GC)	20	0.2	0.60	0.30	3.0	2	33	30

The 'at rest' earth pressure coefficient (K_0) is suitable for retaining structures where anchors or other methods restrain retaining wall movement or where significant movements cannot be tolerated (rigid wall).

A uniform or trapezoidal earth pressure distribution should be adopted. It should be noted that shoring which is designed for this 'at rest' coefficient will still undergo some lateral movements.

The active earth pressure coefficient (K_a) is suitable for retaining structures allowing movement of the top such as cantilevered pile walls. For these structures the pressure acting on the wall can be estimated on the basis of a triangular earth pressure distribution.

The passive earth pressure coefficient (K_p) is suitable for the calculation of resisting forces at the toe of concrete, reinforced stone, or masonry walls.

Any surcharge affecting the walls (e.g. traffic, construction loads, adjacent footings, inclined backfill surface, etc.) should be allowed in the design using the appropriate earth pressure coefficient from above.

Design of all retaining structures should be undertaken in accordance with AS4678-2002. Furthermore, the design of any retaining structures should make allowance for all applicable surcharge loadings including construction activities around the perimeter of the excavation, traffic loadings and adjacent buildings. Consideration should be given to the possibility of a hydrostatic pressure due to build-up of water behind the wall (e.g. from broken services), unless permanent subsurface drainage can be provided.

Recommended Shoring Methods for the Basement Excavation

It is expected that a cut-off wall shoring method will be desired to limit potential groundwater inflow to the proposed basement excavations.

Appropriate shoring methods for the basement excavation are expected to be limited by the underlying alluvial cobbles. While cobbles were not generally encountered within the expected depth of excavation, approximately 4 mbg, their presence below approximately 6 mbg is expected to limit the use of sheet piles or other driven piles, as well as cased piers. Shoring may either incorporate bracing of shallower piles/piers or may be completed using Continuous Flight Auger (CFA) piles where concrete is pumped as the hollow stem auger is withdrawn.

5.4 Construction Induced Vibrations

Onsite fill, native soils and weathered shale are expected to be readily excavatable using excavators or backhoes; so long as percussive piling or excavation methods are not used, construction induced vibrations are not expected to be an issue.

If percussive piling is used, consideration must be given to possible construction induced ground vibration. Construction induced ground vibration is unlikely to be an issue at the site unless heavy impact tools are required for excavation. The use of other techniques which do not involve impact (e.g. rock saws), although less productive, would reduce or possibly eliminate risks of damage due to vibrations.

If adopting a rock hammer or similar, onsite guidance by a vibration specialist is recommended during the early part of excavation. This should include vibration characterisation trials that are used to define vibration levels for the selected equipment.

Peak Particle Velocity (PPV) is usually the adopted measure of ground vibration and the safe limits depend on the sensitivity of the adjoining structures and services. There are a number of Australian and overseas publications that provide vibration velocity guideline levels (or safe limits) including:

- Australian Standard AS2187.2-2006 Explosives - Storage and use - Use of explosives - Appendix J: Ground Vibrations and Airblast Overpressure;
- DIN 4150 – Part 3 – 1999. Effects of Vibration on Structures;

- Department of Environment and Conservation NSW, 2006. Assessing Vibration: a technical guideline;
- British Standard BS 7385-1:1990. Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings;
- British Standard BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

The most appropriate guidelines levels for the proposed excavation work are provided in AS2187.2-2006, which refers to guideline values from BS7385-2 for the prevention of minor or cosmetic damage occurring in structures from ground vibration. Additionally, the guideline levels provided in DIN 4150 Part 3 is considered an appropriate source for guideline levels.

Ideally, safe limits should be determined by a specialist vibration consultant. However, as a preliminary guide, and considering the above guidelines and the type of adjoining structures present, Geo-Logix recommend a maximum PPV of 10 mm/sec (measured at the foundations of adjoining structures) to prevent cosmetic and structural damage.

Geo-Logix notes human discomfort levels caused by vibration are typically less than the levels that are likely to cause cosmetic or structural damage to structures. Therefore, neighbours may lodge complaints before any cosmetic or structural damage occurs.

Regardless of excavation, retention or foundation methods, Geo-Logix recommends dilapidation surveys be carried out on neighbouring buildings prior to construction to confirm that the construction works are not causing damage. These surveys should be agreed to, and the report signed, by the owners of the adjacent building prior to work commencing.

5.5 Basement Foundations

Geo-Logix recommends that footings be founded on a consistent medium to minimise any potential differential settlements. However, depending on the building loads and whether the structures are designed to be relatively flexible, this may not be significant.

Shallow Foundations

Assuming an allowable settlement of 25 mm high level pad footings for the proposed basement may be designed based on an allowable bearing capacity of 250 kPa.

Geo-Logix recommend that foundation subgrade surfaces be observed and tested by a geotechnical engineer using Dynamic Cone Penetrometer (DCP) testing equipment or other satisfactory methods prior to steel or concrete placement. Any unsatisfactory soil detected during this evaluation should be undercut as directed by the geotechnical engineer. Footing excavations should be protected from surface water run-off; if water is allowed to accumulate within a footing excavation and soften the bearing soils, the deficient soils should be removed from the excavation prior to concrete placement.

Deep Foundations

Allowable bearing pressure and adhesion for deep foundations including cased bored or CFA piles are summarised in the following table.

Bearing Stratum	Top of Strata (mbg)	Allowable Bearing Pressure (MPa)*	Allowable Adhesion/Skin Friction (kPa)**	Young's Modulus, Es (MPa)	Estimated Settlement
Alluvial Clays/Sands	--	--	20	--	--
Alluvial Gravels	8	1,000	20	15	1% of Footing Width or Pier Base
Weathered Shale (Class IV-V)	19	700	35	50	1% of Footing Width or Pier Base
Fresh Shale (Class III+)	21	2,000	35	200	1% of Footing Width or Pier Base

*To assure bearing capacity, piers should be embedded a minimum of 1.5 pier diameters into the bearing stratum.

**For pier foundations only, not applicable for footings. Shaft resistance should be ignored for the top 1.5 pile diameters. Adhesion in shale assumes a clean socket of roughness R2 or better.

The bearing stratum should be verified prior to the placement of rebar or concrete. Pier borings should be filled on the same day as drilling. Pier borings should be dewatered immediately prior to placement of concrete. If required dewatering for pier borings may be accomplished by sump pump. Uncased bored piers are not recommend due to expected borehole collapse.

All footing systems should be designed and constructed in accordance with the recommendations contained in AS 2870-2011 and/or AS 2159-2009 by a suitably qualified and experienced structural engineer.

5.6 Earthquake Design

Structural design for earthquake loads should be carried out in accordance with the relevant provisions in AS1170.4–2007. Based on the subsurface profile encountered at the base elevation of the proposed excavation, and with reference to Tables 3.2 and 4.1 of AS1170.4, the site subsoil class is considered to be C_e (shallow soil site) with a hazard factor (Z) of 0.08.

6. LIMITATIONS

This report should be read in full, and no executive summary, conclusion or other section of the report may be used or relied on in isolation or taken as representative of the report as a whole. No responsibility is accepted by Geo-Logix, and any duty of care that may arise but for this statement is excluded, in relation to any use of any part of this report other than on this basis.

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This report is based on the available project information and the subsurface information obtained by Geo-Logix. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Geo-Logix should be notified immediately to determine if there are consequences to the recommendations provided in this report. If Geo-Logix is not retained to perform these functions, Geo-Logix cannot be responsible for the impact of those conditions on the performance of the project.

Unless otherwise expressly stated, Geo-Logix has assumed that the information and data contained in previous reports carried out by others and reviewed in preparation of this report are completely accurate and has not sought independently to verify the accuracy of the information or data.

Where laboratory tests have been carried out by others on Geo-Logix' behalf, the tests are reproduced in this report on the assumption that the tests are accurate. Geo-Logix has not sought independently to verify the accuracy of those tests and assumes no responsibility in respect of them.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area at the time of this report. No other warranties are implied or expressed.

This report has been prepared for the specific application to the proposed development as described in the report. After the plans and specifications for the project are more complete the geotechnical engineer should be provided with the opportunity to review the final design plans and specifications to assess whether our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations.

7. REFERENCES

Australian Standard (2007) AS1170.4–2007 Structural design actions – Earthquake actions in Australia, Standards Australia.

Australian Standard (2007) AS3798–2007 Guidelines on earthworks for commercial and residential developments, Standards Australia.

Australian Standard (2009) *AS2159–2009 Piling Design and Installation*, Standards Australia.

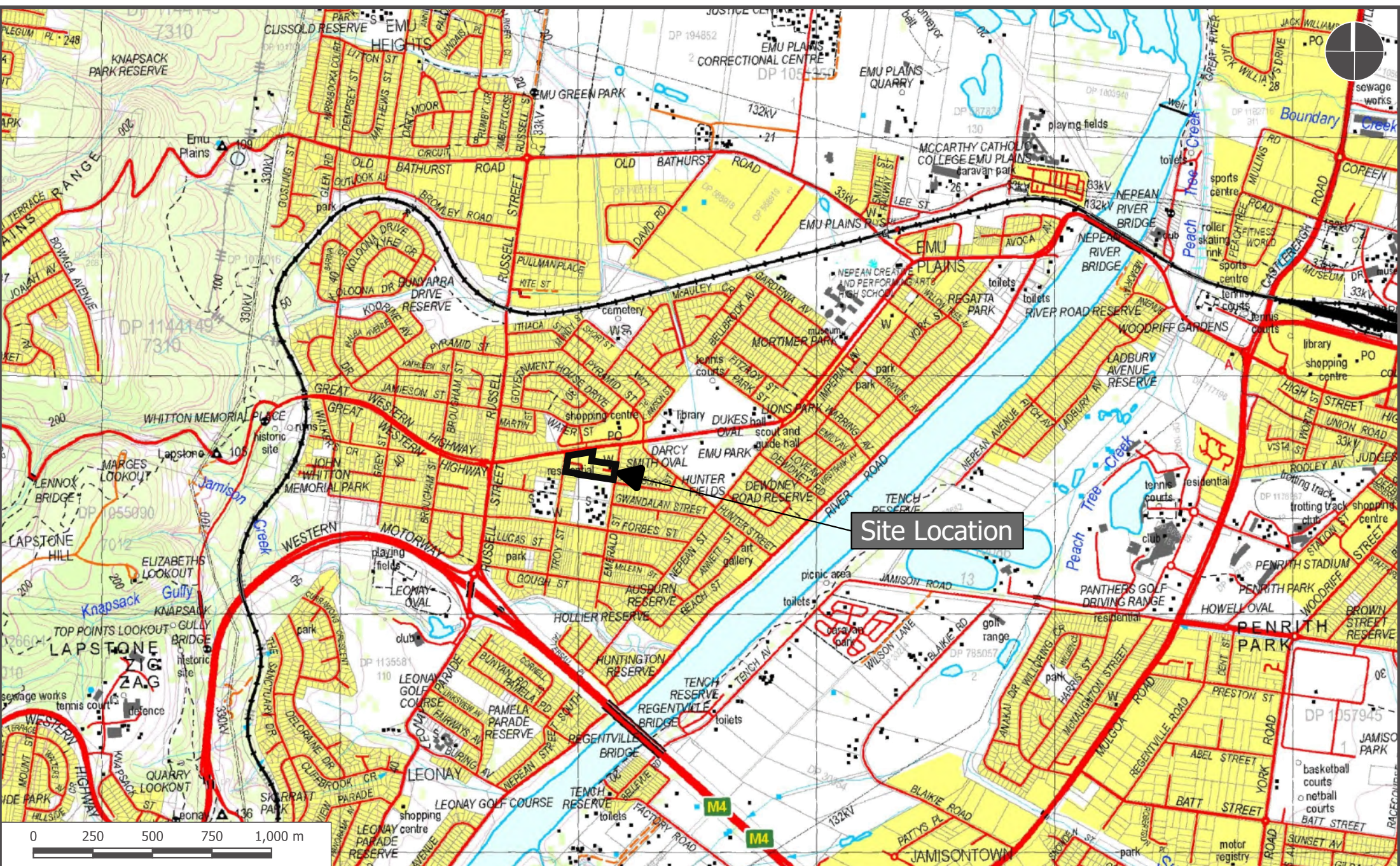
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Bowles, J. E. (1996) *Foundation Analysis and Design, 5th Edition*, Mc-Graw Hill, Inc. New York.

Pells et al (1998) *Foundations on Sandstone and Shale in the Sydney Region*, Australian Geomechanics Society, 1998.

FIGURES





KEY

- Site Boundary
- Existing Monitoring Well Locations
- Borehole Locations

0 10 20 30 40 50 m



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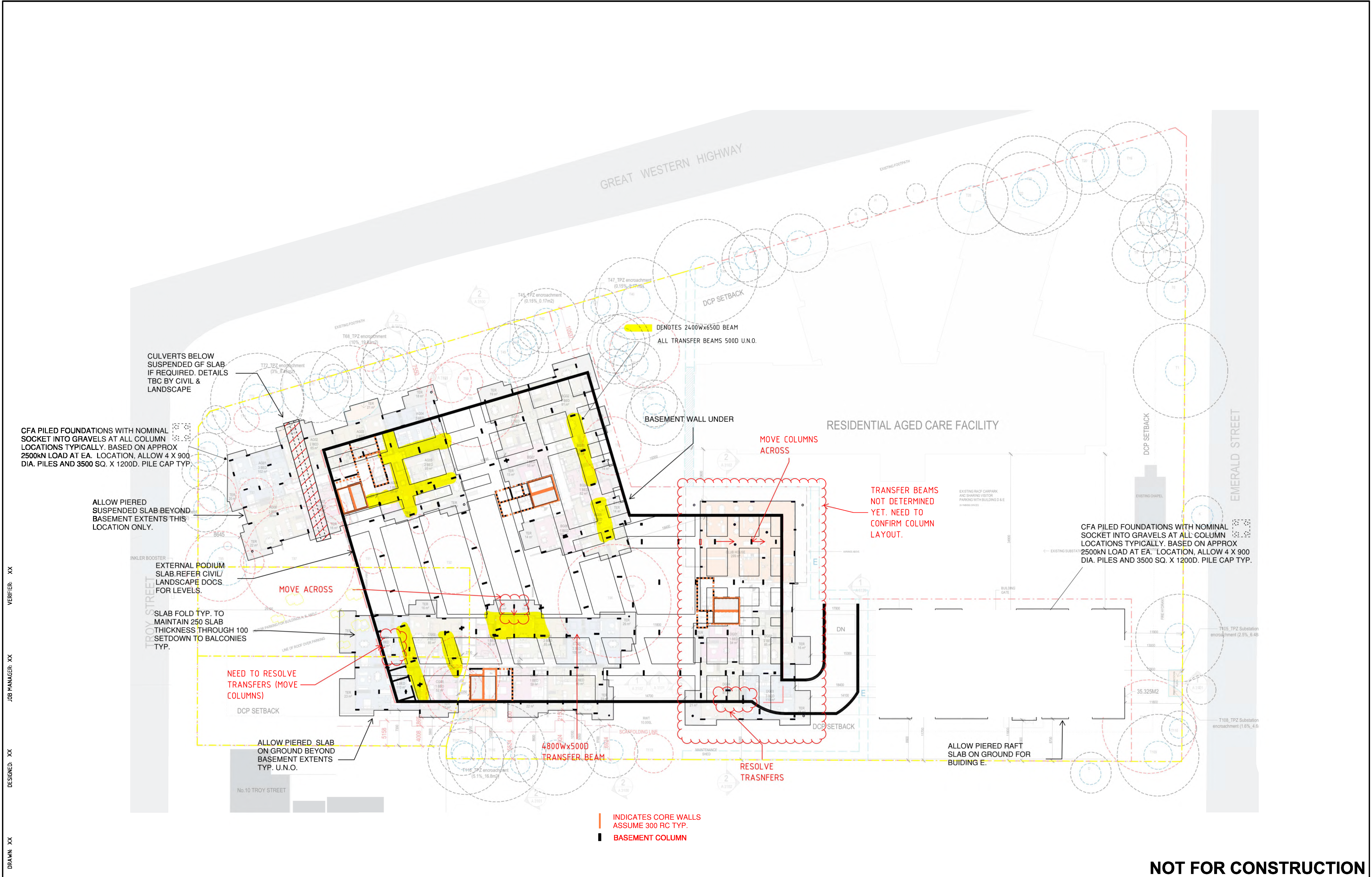
SITE MAP

Geotechnical Investigaiton
1-3 Emerald St and 6-8 Troy St, Emu Plains NSW

Project No. 2201080

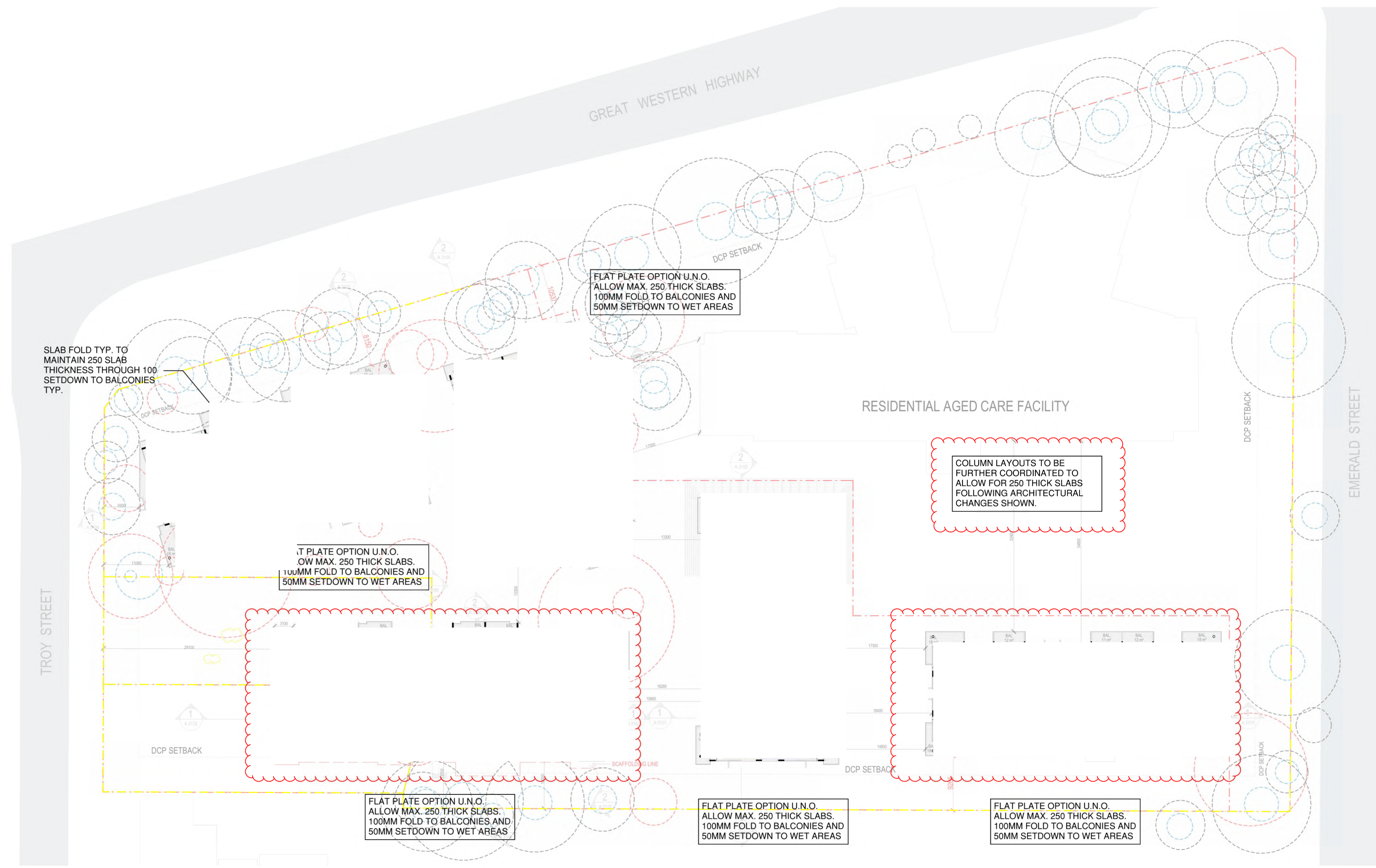
Figure 2

ATTACHMENT A



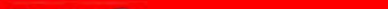
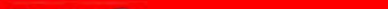
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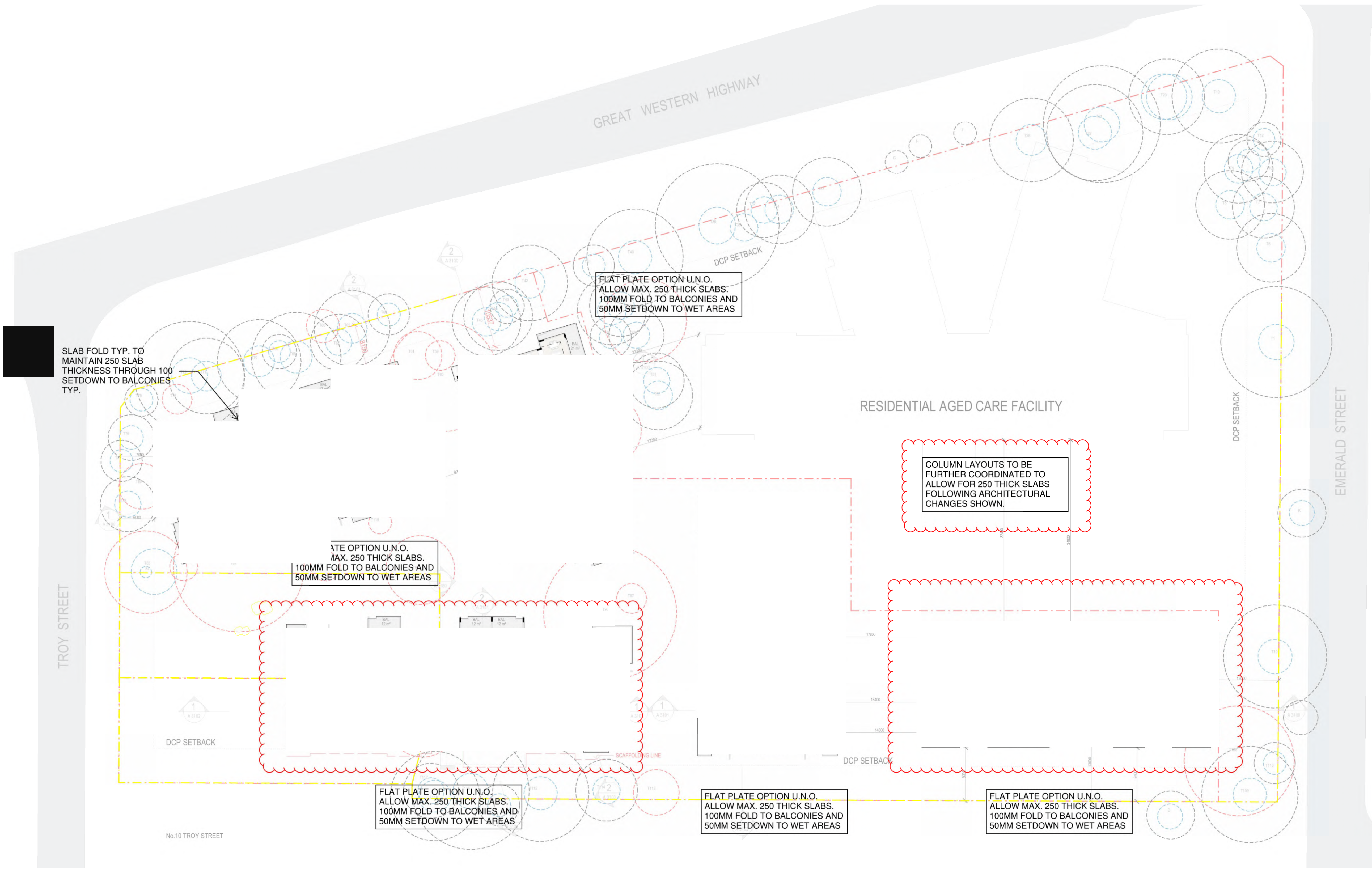


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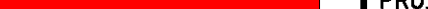
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REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	CLIENT	ARCHITECT	ALL SETOUT TO ARCHITECT'S DRAWINGS. DIMENSIONS TO BE VERIFIED WITH ARCHITECT AND BUILDER BEFORE COMMENCING SHOP DRAWINGS OR SITE WORK. NORTHROP ACCEPTS NO RESPONSIBILITY FOR THE USABILITY, COMPLETENESS OR SCALE OF DRAWINGS TRANSFERRED ELECTRONICALLY.		PROJECT	DRAWING TITLE	JOB NUMBER	
10	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	20.02.23		 www.groupusa.com	 Wollongong Level 1, 57 kembla street, Wollongong, NSW 2500 Email: southcoast@northrop.com.au Ph: (02) 4226 3333 Fax: (02) 4226 3666 P.O. Box 863 Wollongong, NSW 2500 ABN 61 094 433 100		UNITING EDINGLASSIE ILLU	LEVEL 4 - ROOF PLAN	212181	
11	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	22.02.23							DRAWING NUMBER	REVISION
12	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	20.02.23							SK25	15
12	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	20.02.23								
12	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	20.02.23								
12	REVISED BASEMENT CONSTRUCTION OPTIONS	MH	MH	MH	20.02.23								
13	GENERAL UPDATE	MH	MH	MH	08.09.23	DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFIED WITH SIGNATURE HAS BEEN TRANSFERRED	THE COPYRIGHT OF THIS DRAWING REMAINS WITH NORTHROP CONSULTING ENGINEERS PTY LTD					DRAWING SHEET SIZE = A1	
14	GENERAL UPDATE	MH	MH	MH	05.09.23								

ATTACHMENT B



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www.geo-logix.com.au

Project Number: **2201080**
Hole Depth: **21.00 m**
Date Started: **12/01/2023**
Date Completed: **12/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
CC		0.15				CONCRETE.		
			Fill	F		FILL- pink / moderate orange pink (5YR 8/4), 40% clay, 20% sand, 10% gravel, moderately compacted.	dry	
		1.00						
						Clayey SAND- brownish yellow / dark yellowish orange (10YR 6/6), 40% clay, 60% sand, medium dense.	damp	
		2		SC				
		3.00						
						Clayey SAND with Gravel- yellowish brown / moderate yellowish brown (10YR 5/4), 20% clay, 45% sand, 35% gravel, medium dense, cobbles (60-100mm).	moist	
		4.00		SC				
						Sandy GRAVEL with Clay- white / yellowish grey (5Y 8/1), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-200mm).	moist	
		5.00		GP				
						Sandy CLAY with Gravel- pale olive / dusky yellow (5Y 6/4), 40% clay, 35% sand, 25% gravel, medium plasticity, firm, cobbles (60-200mm).	moist	
		6.00		CL				
						Clayey SAND- very pale brown / greyish orange (10YR 7/4), 40% clay, 60% sand, medium dense.	moist	
		7		SC				
		8						

Abbreviations:

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type

D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing

SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels

Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:21 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: **Laurie White**
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **12/01/2023**
Date: **09/02/2023**



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Project Number: **2201080**
Hole Depth: **21.00 m**
Date Started: **12/01/2023**
Date Completed: **12/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		9.00		SC		Clayey SAND - very pale brown / greyish orange (10YR 7/4), 40% clay, 60% sand, medium dense.	moist	
		10.00		SP		Gravelly SAND with Clay - pinkish grey / greyish orange pink (5YR 7/2), 10% clay, 60% sand, 30% gravel, medium dense, cobbles (60-200mm).	wet	
		11.50		GC		Clayey Sandy GRAVEL - greyish red (5R 4/2), 20% clay, 30% sand, 50% gravel, loose, cobbles (80-200mm).	wet	
		12				Sandy GRAVEL with Clay - medium grey (N5), 10% clay, 40% sand, 60% gravel, loose, cobbles (60-200mm).	wet	
		13				Sandy layer at 12-13m.		
		14		GP				
		15						
		16						

Abbreviations:
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Strength Testing

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PP Pocket Penetrometer

Water Levels

Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:22 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: **Laurie White**
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **12/01/2023**
Date: **09/02/2023**



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Project Number: **2201080**
Hole Depth: **21.00 m**
Date Started: **12/01/2023**
Date Completed: **12/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Sonic Drilling		17	Natural	GP		Sandy GRAVEL with Clay- medium grey (N5), 10% clay, 40% sand, 60% gravel, loose, cobbles (60-200mm).	wet	
		18						
		19						
		20.00				Weathered SHALE.		Top of rock at 20m based on drilling resistance. Rock between 20 & 21m, presence of shale.
		21				Terminated at 21.000 m on rock.		
		22						
		23						
		24						

Abbreviations:
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Water Levels

Encountered Groundwater
 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:22 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: Thara Polassery
Checked By: Alyson Bannister

Date: 12/01/2023
Date: 09/02/2023



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Project Number: **2201080**
Hole Depth: **19.00 m**
Date Started: **11/01/2023**
Date Completed: **11/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		0.50	Fill	F		FILL - light reddish brown / light brown (5YR 6/4), 10% clay, 60% sand, 30% gravel, well compacted.	damp	
		1	Fill	F		FILL - very dark brown / dusky yellowish brown (10YR 2/2) and very light grey (N8), 20% clay, 40% sand, 40% gravel, well compacted.	damp	Crushed pavement material (60-100mm).
		2.00						
		3.00		CL		CLAY with Sand - red / moderate reddish brown (10R 4/6), 80% clay, 20% sand, medium plasticity, very stiff.	damp	
		4.00		CL		CLAY with Sand - light red / moderate reddish orange (10R 6/6), 80% clay, 20% sand, medium plasticity, very stiff.	damp	
		5.00		SC		Clayey SAND with Gravel - reddish grey / pale brown (5YR 5/2), 30% clay, 40% sand, 30% gravel, medium dense.	damp	
		6.00		GC		Clayey Sandy GRAVEL - white (N9) and yellowish red / light brown (5YR 5/6), 20% clay, 30% sand, 50% gravel, loose, cobbles (60-90mm).	damp	
		7		GP		Sandy GRAVEL with Clay - light reddish brown / light brown (5YR 6/4), 10% clay, 40% sand, 50% gravel, loose.	damp	
		8.00						

Abbreviations:

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Strength Testing
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DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: Thara Polassery
Checked By: Alyson Bannister

Date: 11/01/2023
Date: 09/02/2023

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:24 AM - drawn by laurie white at www.reumad.com.au



Project Name: **Geotechnical Investigation**

Location / Site: **1-3 Emerald Street, Emu Plains NSW**

Client: **Midson Group Pty Ltd**

Contractor: **Numac Drilling**

Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Sonic Drilling		9.00	CL			Sandy CLAY with Gravel- dark greyish brown / dark yellowish brown (10YR 4/2), 40% clay, 35% sand, 25% gravel, medium plasticity, very stiff, cobbles (60-100mm), boulders (<400mm).	moist	
		10.00	GP			Sandy GRAVEL with Clay- very pale brown / greyish orange (10YR 7/4), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
		11.00	GP			Sandy GRAVEL with Clay- medium grey (N5), 10% clay, 40% sand, 50% gravel, loose, clay lense 11-11.2m, cobbles (60mm).	wet	
		12.00	SC			Clayey SAND with Gravel- pinkish grey / greyish orange pink (5YR 7/2), 20% clay, 70% sand, 10% gravel, medium dense.	wet	
		13.50	GP			Sandy GRAVEL with Clay- medium light grey (N6), 10% clay, 40% sand, 50% gravel, loose, clay lense 11-11.2m, cobbles (60mm).	wet	
		14.00						
		15.00						
		16.00						

Abbreviations:
Hydrocarbon Odour

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Sample Type
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Asb Asbestos

Strength Testing

SPT	Standard Penetration Test
DCP	Dynamic Cone Penetrometer
PP	Pocket Penetrometer

Water Levels

 Encountered Groundwater

 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:



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www.geo-logix.com.au

Project Number: **2201080**
Hole Depth: **19.00 m**
Date Started: **11/01/2023**
Date Completed: **11/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Sonic Drilling		17	Natural	GP		Sandy GRAVEL with Clay- medium light grey (N6), 10% clay, 40% sand, 50% gravel, loose, clay lense 11-11.2m, cobbles (60mm). Sandy lenses 16.4-16.7m, pebbles & cobbles. Light brownish gray / pale yellowish brown (10YR 6/2) from 17.5m.	wet	
		18						
		19						
		20				Terminated at 19.000 m on rock.		
		21						
		22						
		23						
		24						

Abbreviations:
Hydrocarbon Odour

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Sample Type

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Strength Testing

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DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels

Encountered Groundwater
 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:25 AM - drawn by Laurie White at www.reumad.com.au



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **11/01/2023**
Date: **09/02/2023**



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Project Number: **2201080**
Hole Depth: **19.30 m**
Date Started: **11/01/2023**
Date Completed: **11/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		0.50		F		FILL - greyish red (5R 4/2), 40% clay, 60% sand, moderately compacted.	damp	
		1		F		FILL - brownish yellow (10YR 6/8), 60% clay, 40% sand, medium plasticity, moderately compacted.	damp	
		2.00		CL		Sandy CLAY - light red / moderate reddish orange (10R 6/6), 60% clay, 40% sand, medium plasticity, very stiff.	damp	
		3.00		GC		Clayey GRAVEL with Sand - pale olive / dusky yellow (5Y 6/4), 40% clay, 20% sand, 40% gravel, dense.	damp	
		4		GP		Sandy GRAVEL with Clay - very pale brown / greyish orange (10YR 7/4), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	damp	
		5.00		SC		Clayey SAND with Gravel - yellow / pale yellowish orange (10YR 8/6), 30% clay, 50% sand, 20% gravel, medium dense, cobbles (60-100mm).	wet	
		6.00						
		7						
		8.00						

Abbreviations:

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Strength Testing
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DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
▽ Encountered Groundwater
▽ Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:27 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: **Laurie White**
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **11/01/2023**
Date: **09/02/2023**



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Project Number: **2201080**
Hole Depth: **19.30 m**
Date Started: **11/01/2023**
Date Completed: **11/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		9.00		GP		Sandy GRAVEL with Clay - reddish grey / pale brown (5YR 5/2), 10% clay, 40% sand, 50% gravel, medium dense, cobbles (60-100mm).	wet	
		10		GC		Clayey SAND & GRAVEL - very pale brown / greyish orange (10YR 7/4), 20% clay, 40% sand, 40% gravel, loose.	wet	
		10.50		CL		Sandy CLAY - brownish yellow / dark yellowish orange (10YR 6/6), 50% clay, 40% sand, 10% gravel, firm.	wet	
		11.00		GP		Sandy GRAVEL with Clay - pale olive / dusky yellow (5Y 6/4), 10% clay, 40% sand, 50% gravel, loose, cobbles / boulders (100-300mm).	wet	
		12.00	Natural			no recovery.		
		13						
		14						
		15.00		SP		SAND with Clay & Gravel - brownish yellow / dark yellowish orange (10YR 6/6), 10% clay, 80% sand, 10% gravel, medium dense.	wet	
		15.50		GP		Sandy GRAVEL with Clay - pinkish grey / greyish orange pink (5YR 7/2), 10% clay, 20% sand, 70% gravel, loose.	wet	
		16						

Abbreviations:

Hydrocarbon Odour
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Strength Testing
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DCP Dynamic Cone Penetrometer
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Water Levels
 Encountered Groundwater
 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **11/01/2023**
Date: **09/02/2023**

GLLOG2023 2201080 EMU PLAINS V2.GPJ GL.GDT 2/10/23 11:48:27 AM - drawn by laurie white at www.reumad.com.au



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Project Number: **2201080**
Hole Depth: **19.30 m**
Date Started: **11/01/2023**
Date Completed: **11/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Sonic Drilling		16.50		GP		Sandy GRAVEL with Clay - pinkish grey / greyish orange pink (5YR 7/2), 10% clay, 20% sand, 70% gravel, loose.	wet	
		17		GP		Sandy GRAVEL with Clay - medium grey (N5), 10% clay, 40% sand, 50% gravel, loose, cobbles / boulders (100-400mm).	wet	
		17.50	Natural					
		18		GC		Clayey Sandy GRAVEL - yellowish red / light brown (5YR 5/6), 30% clay, 35% sand, 45% gravel, loose, rock pieces present.	wet	
		19.00		CL		Weathered Shale sampled as CLAY with Sand & Gravel - light grey (N7), 60% clay, 20% sand, 20% gravel, medium plasticity, hard.	wet	
		20				Terminated at 19.300 m due to collapsing cobbles.		
		21						
		22						
		23						
		24						

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Water Levels

Encountered Groundwater
 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.

Additional Comments:

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Log Drawn By: **Laurie White**
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **11/01/2023**
Date: **09/02/2023**



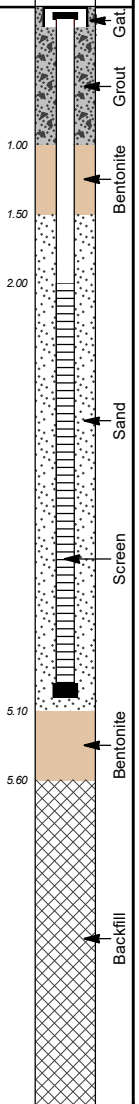
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Warriewood NSW 2102
www.geo-logix.com.au

Project Number: **2201080**
Hole Depth: **19.50 m**
Date Started: **10/01/2023**
Date Completed: **10/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments	Well Details	Well Construction
			Fill	F		FILL - light grey / yellowish grey (5Y 7/2), 10% clay, 30% sand, 60% gravel, well compacted.	damp			
		1.40								
		2.00		SC		Clayey SAND - yellow / pale yellowish orange (10YR 8/6), 40% clay, 60% sand, medium dense.	damp			
		2.70								
		3.00				CLAY with Sand - yellow / pale yellowish orange (10YR 8/6), mottled light grey (N7), 70% clay, 30% sand, medium plasticity, stiff.	damp			
		4.00		CL		Sand at 3.5m, pale yellow / greyish yellow (5Y 8/4).				
		5.00				Very stiff at 4m, fine gravel.				
		6.00		SC		Clayey SAND - yellowish brown / moderate yellowish brown (10YR 5/4), 20% clay, 80% sand, medium dense, coarse sand.	wet			
		6.50								
		7.00		SC		Clayey SAND - brownish yellow / dark yellowish orange (10YR 6/6), 40% clay, 60% sand, medium dense.	moist			
		8.00				Clayey SAND - light grey (N7), 20% clay, 80% sand, medium dense.	wet			
				SC		Cobbles from 7.5m.				



Abbreviations:

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Water Levels
Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: Thara Polassery
Checked By: Alyson Bannister

Date: 10/01/2023
Date: 09/02/2023



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Building Q2, Level 3
Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number: **2201080**
Hole Depth: **19.50 m**
Date Started: **10/01/2023**
Date Completed: **10/01/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **1-3 Emerald Street, Emu Plains NSW**
Client: **Midson Group Pty Ltd**
Contractor: **Numac Drilling**
Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments	Well Details	Well Construction
		8.50		GC		Clayey SAND & GRAVEL - yellowish brown / moderate yellowish brown (10YR 5/4), 20% clay, 40% sand, 40% gravel, medium dense.	wet			
		9		GP		Sandy GRAVEL - greyish red (5R 4/2), 40% sand, 60% gravel, loose.	wet			
		9.30								
		9.50		SP		Gravelly SAND - very pale brown / greyish orange (10YR 7/4), 60% sand, 40% gravel, medium dense.	wet			
		10				Gravelly SAND with Clay - greyish black (N2), 10% clay, 60% sand, 30% gravel, medium dense.	wet			
		11		SP						
		12.00								
		13.00		SC		Clayey SAND - weak red / greyish red (10R 4/2), 20% clay, 80% sand, medium dense.	wet			
		14								
		15		GP		Sandy GRAVEL with Clay - light grey (N7), 10% clay, 40% sand, 50% gravel, loose.	wet			
		16								

Abbreviations:

Hydrocarbon Odour
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R Representative
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J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
 Encountered Groundwater
 Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:



Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery**
Checked By: **Alyson Bannister**

Date: **10/01/2023**
Date: **09/02/2023**



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Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments	Well Details	Well Construction
Sonic Drilling		17	Natural	GP		Sandy GRAVEL with Clay- light grey (N7), 10% clay, 40% sand, 50% gravel, loose.	wet			
		18								
		19								
		20				Terminated at 19.500 m on rock.				
		21								
		22								
		23								
		24								

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Additional Comments:

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Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		1	Fill	F		FILL - very pale brown / greyish orange (10YR 7/4), 10% clay, 60% sand, 30% gravel, well compacted.	damp	
		1.50						
		2		CL		CLAY with Sand - red / moderate reddish brown (10R 4/6), 70% clay, 30% sand, medium plasticity, very stiff.	damp	
		3.00						
		3.70		CL		CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, firm.	damp	
		4						
		4.50		SC		Clayey SAND - yellow / pale yellowish orange (10YR 8/6), 20% clay, 80% sand, medium dense.	damp	
		5	Natural					
		6.00		CL		CLAY with Sand - yellowish brown / moderate yellowish brown (10YR 5/4), 80% clay, 20% sand, medium plasticity, firm.	damp	
		7.00		SC		SAND with Clay - yellow / pale yellowish orange (10YR 8/6), 10% clay, 90% sand, medium dense.	moist	
		7.50		SP		Gravelly SAND with Clay - very pale brown / greyish orange (10YR 7/4), 10% clay, 50% sand, 40% gravel, medium dense, cobbles.	moist	
		8		SC		SAND with Clay - yellow / pale yellowish orange (10YR 8/6), 10% clay, 90% sand, medium dense.	moist	

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Method: **Track mounted sonic coring equipped drilling**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		8.50		SC		SAND with Clay - yellow / pale yellowish orange (10YR 8/6), 10% clay, 90% sand, medium dense.	moist	
		9						
		10		GP		Sandy GRAVEL with Clay - weak red / greyish red (10R 4/2), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
		11.00						
		11.70		SP		Gravelly SAND with Clay - brownish yellow (10YR 6/8), 10% clay, 50% sand, 40% gravel, medium dense, cobbles (60-100mm).	wet	
		12						
		13		SP		Gravelly SAND with Clay - light grey (N7), 10% clay, 50% sand, 40% gravel, medium dense.	wet	
		14						
		14.50						
		15.00		SP		Clayey Gravelly SAND - reddish grey / pale brown (5YR 5/2), 20% clay, 50% sand, 30% gravel, medium dense.	wet	
		16		SP		Gravelly SAND with Clay - brownish yellow / dark yellowish orange (10YR 6/6), 10% clay, 50% sand, 40% gravel, medium dense, pebbles, cobbles (60-100mm).	wet	

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Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Sonic Drilling								
		17.00	Natural	SP		Gravelly SAND with Clay - brownish yellow / dark yellowish orange (10YR 6/6), 10% clay, 50% sand, 40% gravel, medium dense, pebbles, cobbles (60-100mm).	wet	
		18.00	Natural	SP		Gravelly SAND with Clay - light reddish brown / light brown (5YR 6/4), 10% clay, 50% sand, 40% gravel, medium dense, cobbles / boulders (100-300mm).	wet	
		19		SP		Weathered Shale sampled as Clayey Gravelly SAND - medium dark grey (N4), 20% clay, 50% sand, 30% gravel, medium dense.	moist	
		20				Terminated at 19.200 m on rock.		
		21						
		22						
		23						
		24						

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Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		0.80	F			FILL - 60% clay, 30% sand, 10% gravel, medium plasticity, moderately compacted.	damp	
		1	F			FILL - light reddish brown / light brown (5YR 6/4), 50% clay, 20% sand, 30% gravel, medium plasticity, moderately compacted.	damp	
		2.00	F					
		3.00	CL			CLAY with Sand - moderate red (5R 4/6), 80% clay, 20% sand, medium plasticity, firm.	damp	
		4	CL			CLAY with Sand - light red / moderate reddish orange (10R 6/6), 80% clay, 20% sand, medium plasticity, firm.	moist	
		5	CL					
		6.00						
		7.00	SC			Clayey SAND - light red / moderate reddish orange (10R 6/6), 40% clay, 60% sand, medium dense. Sand layers at 6.5mm (200mm).	wet	
		7.50	GP			Sandy GRAVEL with Clay - yellowish brown / moderate yellowish brown (10YR 5/4), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
		8	GP			Sandy GRAVEL with Clay - very pale brown / very pale orange (10YR 8/2), 10% clay, 30% sand, 60% gravel, loose, cobbles.	moist	

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Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		9		GP		Sandy GRAVEL with Clay - very pale brown / very pale orange (10YR 8/2), 10% clay, 30% sand, 60% gravel, loose, cobbles.	moist	
		10						
		10.50						
		11		GP		Sandy GRAVEL with Clay - very pale brown / greyish orange (10YR 7/4), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
		12.00						
		13		SP		Gravelly SAND with Clay - very pale brown / greyish orange (10YR 7/4), 10% clay, 50% sand, 40% gravel, medium dense, cobbles (60-100mm).	wet	
		14						
		14.50						
		15		GP		Sandy GRAVEL with Clay - medium grey (N5), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
		16						

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Sonic Drilling		17.00	Natural	GP		Sandy GRAVEL with Clay - medium grey (N5), 10% clay, 40% sand, 50% gravel, loose, cobbles (60-100mm).	wet	
				CL		Sandy CLAY - dark grey / brownish grey (5YR 4/1), 60% clay, 40% sand, medium plasticity, very stiff. Weathered Shale at 17.5m.	moist	
		18				Terminated at 17.800 m on rock.		
		19						
		20						
		21						
		22						
		23						
		24						

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