2 August 2022
Our ref: JOE/S1601

Simon Rowe
Via email: sprowe@y7mail.com

Proposed Basement – 24 Waratah Street, Canterbury, NSW

Site Classification Report

1 Introduction

At the request of Simon Rowe, Fortify Geotech Pty Ltd carried out a geotechnical site classification in accordance with AS2870 “Residential Slabs & Footings”, for the proposed development at 24 Waratah Street, Canterbury, NSW. It is understood the project involves excavations to ~3m depth and the construction of a new two-storey shed with a single-level basement towards the rear of the property.

The site is relatively flat and is currently occupied by an existing single-storey dwelling. The site is bound by Waratah Street to the north, Emu Lane to the south, and existing residential developments to the east and west. Figure 1 shows the site locality.

To establish the site subsurface conditions, a 150mm auger attached to a Yanmar viO55-6b Excavator was used to excavate one borehole designated 1A, terminating at a target depth of 3m. Dynamic Cone Penetrometer (DCP) testing was conducted near the location of borehole 1A. Figure 2 is an aerial photograph showing the approximate borehole and DCP location. The subsurface profile was logged in accordance with the Unified Soil Classification System (USCS) and the borehole logs are attached.

2 Investigation Results

2.1 SUBSURFACE CONDITIONS

The geological information provided by the Department of Regional NSW (Reference 1) indicates the area to be underlain by Triassic age Ashfield Shale. Ashfield Shale consists of Black to light grey shale and laminite. Table 1 summarises the subsurface conditions encountered in borehole 1A.

TABLE 1 – Subsurface Conditions

Geological Profile	Depth Interval	Description
TOPSOIL/ FILL	0m to 0.5m	SILTY to SANDY CLAY; soft, low to medium plasticity, dark brown, fine to coarse grained sand, trace fine sized gravel, w > PL.
ALLUVIUM	0.5m to 1m	SANDY CLAY; firm, medium plasticity, red with pale brown, fine to medium grained sand, trace medium to coarse sized gravel, w ≈ PL.
RESIDUAL	1m to 2.2m	SILTY CLAY, CLAY; Stiff to very stiff, stiff, medium plasticity, low plasticity, grey trace orange, grey mottled red, grey mottled orange, trace fine to coarse sized gravel, fine grained, trace fine to coarse grained sand, w ≈ PL, w < PL.

BEDROCK	Below 2.2m	SILTSTONE; extremely weathered (XW), highly weathered (HW), fine to coarse gravels, pale grey trace red, medium plasticity clay, fine to coarse sand, dry, very dense, high strength.

2.2 DYNAMIC CONE PENETROMETER (DCP) TESTING

To determine the density/relative consistency of the subsurface profile, one Dynamic Cone Penetrometer (DCP) test was conducted on the 27th of July 2022 in accordance with AS1289.6.3.2 “Determination of the penetration resistance of a soil – 9kg dynamic cone penetrometer test”. The DCP results are shown in Table 2 below. The DCP test was taken from existing groundsurface levels. The approximate location of the DCP test is shown in Figure 2.

TABLE 2 - DCP Testing Results

Depth below existing groundsurface (m)	Blows per 100mm penetration DCP 1
0.1	0
0.2	1
0.3	1
0.4	2
0.5	2
0.6	2
0.7	2
0.8	2
0.9	3
1.0	4
1.1	3
1.2	4
1.3	3
1.4	5
1.5	6
1.6	6
1.7	5
1.8	6
1.9	5
2.0	6
2.1	22
2.2	>25

The results for the DCP tests indicate the subsurface profile to comprise firm soils to ~0.9m, over stiff soils to ~2.1m, over extremely weathered rock at ~2.1m depth.

2.3 GROUNDWATER

Groundwater was not encountered within the 3m investigation depth. However, temporary, perched seepages could be encountered at shallower depths following rainfall within the more pervious soils.

3 DISCUSSION & RECOMMENDATIONS

3.1 SITE CLASSIFICATION

Due to the presence of uncontrolled fill material to 0.5m depth, the site is designated as Class “P” (problem) site in accordance with AS2870 “Residential Slabs & Footings”. If the fill is removed, and replaced with controlled fill, or if footings are founded in the natural soil below the fill, a Class “M” (moderately reactive) category can be used in design of new footings (Ys is estimated to be between 20mm and 40mm).

Deemed-to-comply footing designs provided by AS2870 are applicable specifically to residential-style one and two-storey structures, or buildings with similar loads and superstructure stiffness.

3.2 STRUCTURE FOOTINGS

AS2870 provides “deemed-to-comply” footing/slab designs, which for a class “M” site includes stiffened rafts, stiffened footing slabs, waffle rafts, and strip and/or pad footings with above ground floors. Footings and slabs should be in accordance with the principles of AS2870.

Footings including thickened sections of slabs forming footings should be taken below the topsoil and any firm or moisture affected alluvial soil and founded in the stiff residual soils. A footing depth of ~1.0m depth below existing surface levels may be required. Alternatively, bored piers founded in natural soils or weathered bedrock below the fill material could be used.

Recommended allowable end-bearing pressures and shaft adhesion values for various footing systems and likely foundation materials are provided in Table 3.

TABLE 3 – Recommended Allowable End-Bearing Pressures for Footings

Foundation Material Type	Depth Below Existing Surface Level	Allowable End-Bearing Pressure			Allowable Shaft Adhesion on Bored Piers and Anchors	
		Strips	Pads	Bored Piers	Downward Loading	Uplift
Newly Placed Controlled Fill	-	100kPa	125kPa	N/A	N/A	N/A
Stiff Residual Soils	~1.0m	100kPa	125kPa	150kPa	15kPa	7kPa
XW/HW or less weathered Bedrock (Class V Bedrock)	~2.5m	500kPa	600kPa	700kPa	70kPa	35kPa

It is recommended that footings are inspected by a geotechnical engineer prior to the pouring of concrete to ensure that footings are founded in adequate material.

3.3 EXCAVATION CONDITIONS & USE OF EXCAVATED MATERIAL

It is understood that excavations to ~3m are required for the proposed development. The excavations are expected to be through existing topsoil, alluvial/residual soils and into weathered bedrock. The topsoil, alluvial/residual soils and highly weathered bedrock are readily diggable by backhoe and medium sized excavator to at least ~3m depth. Moderately weathered and less weathered bedrock may be encountered below 3m depth and would require heavy excavator, bulldozer ripping and rock hammering.

Any low/medium plasticity natural soils can be used in controlled fill construction of building platforms, provided any rock particles are broken down to <75mm size and the fill is environmentally suitable for re-use on site. Topsoil and existing uncontrolled fill material should not be used in controlled fill construction; however, it can be used for landscaping.

If imported fill is required, a suitable select fill material would include a low or medium plasticity soil such as clayey sand or gravelly clayey sand, containing between 25% and 50% fines less than 0.075mm size (silt and clay), and no particles greater than 75mm size.

3.4 SITE DRAINAGE

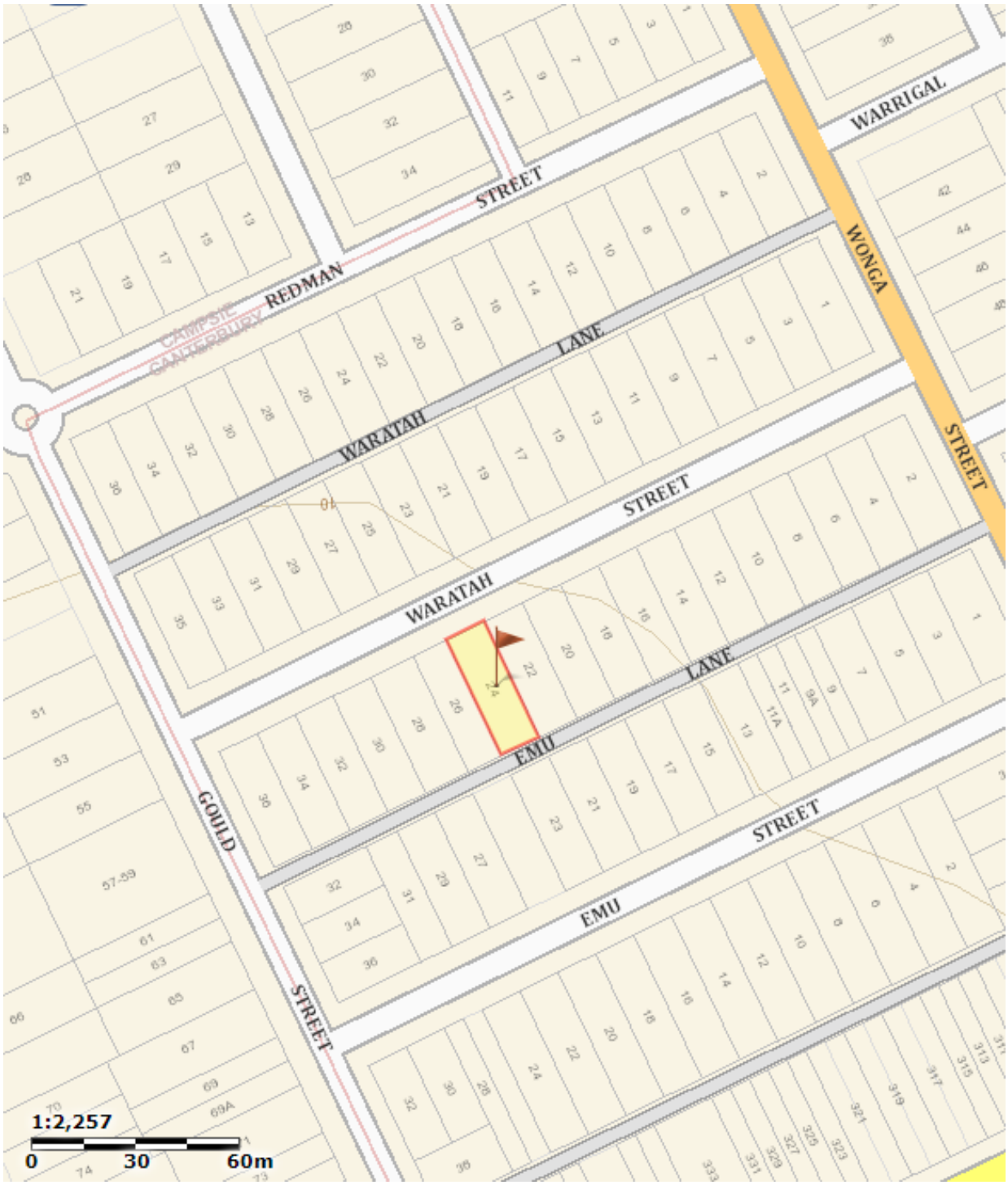
Permanent groundwater was not encountered within the investigation depth, and the encountered soils were dry and dry to moist. The permanent groundwater table is expected to be below the proposed excavations. However, temporary, perched seepages may be present following rain but should be readily controllable with the use of pumps during construction.

Suitable surface drainage should be provided to ensure rainfall run-off or other surface water cannot pond against buildings or pavements. Drainage should be provided behind all retaining walls, and subsoil drains should be installed along the upslope sides of access roads and carparks.

Should you require any further information, please contact our office.

Yours faithfully,
Fortify Geotech Pty Ltd

Mitchell Mack
Geotechnical Engineer



SITE LOCALITY	S1601	FIGURE 1

LEGEND:

Borehole/DCP Locations - ⊗

AERIAL PHOTOGRAPH AND BOREHOLE/DCP LOCATIONS	S1601	FIGURE 2

REFERENCES

Reference 1. Department of Regional NSW, NSW Seamless Geology - https://data.nsw.gov.au/data/dataset/nsw-seamless-geology - Accessed on 27/07/2022

Fortify Geotech

U2/538 Gardeners Road, Alexandria NSW 2015
Phone: 02 9188 4033

Engineering Log - Borehole

Borehole No: 1A

UTM	:	**Driller Rig**	: Excavator	**Job Number**	: S1601
Easting	: 0.0	**Driller Supplier**	: MJ Excavations	**Client**	: Simon Rowe
Northing	: 0.0	**Logged By**	: Joe Stuart	**Project**	: S1601 - Proposed Basement
RL	: N/A	**Reviewed By**	:	**Location**	: 24 Waratah Street, Canterbury NSW
Total Depth	: 3m	**Date**	: 27/07/2022		

Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency	Testing: PP	Testing: DCP	Samples
	0	Topsoil		CL-Cl	Silty to sandy CLAY (CL-Cl) : Soft, low to medium plasticity, dark brown, fine to coarse grained sand, trace fine sized gravel, w > PL.	w > PL	S		0	
									1	
									1	
									2	
	0.5								2	
	0.5	Alluvial		Cl	Sandy CLAY (Cl) : Firm, medium plasticity, red with pale brown, fine to medium grained sand, trace medium to coarse sized gravel, w ≈ PL.	w ≈ PL	F		2	
									2	
									2	
									3	
	1								4	
	1	Residual		Cl	CLAY (Cl) : Stiff to very stiff, medium plasticity, grey mottled red, w ≈ PL.	w ≈ PL	St-VSt		3	
									4	
									3	
									5	
								150	6	
	1.5								6	
	1.6	Residual		Cl	AS ABOVE:Stiff, grey mottled orange,	w ≈ PL	St		5	
	1.8								6	
		Residual		CL	Silty CLAY (CL) : Stiff to very stiff, low plasticity, grey trace orange, with fine to coarse sized gravel, trace fine to coarse grained sand, w < PL.	w < PL	St-VSt		5	
	2								6	
									22	
	2.2								>25	
		Rock		SLT	SILTSTONE : Extremely weathered, Very dense, fine to coarse sized, sub-angular, pale grey trace red, medium plasticity clay, with fine to coarse grained sand, Dry.	D	VD			
	2.5									
	2.5	Rock		SLT	SILTSTONE : Highly weathered, high strength, fine grained, pale grey trace red, indistinct lamination fabric, Dry.	D	VD-HS			
	2.8									
		Rock		SLT	AS ABOVE: pale brown and grey trace orange,	D	VD-HS			
	3									

1A Terminated at 3m (at Target)

Limitations in the Use and Interpretation of this Geotechnical Report

Our Professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

The geotechnical report was prepared for the use of the Owner in the design of the subject facility and should be made available to potential contractors and/or the Contractor for information on factual data only. This report should not be used for contractual purposes as a warranty of interpreted subsurface conditions such as those indicated by the interpretive boring and test pit logs, cross- sections, or discussion of subsurface conditions contained herein.

The analyses, conclusions and recommendations contained in the report are based on site conditions as they presently exist and assume that the exploratory borings, test pits, and/or probes are representative of the subsurface conditions of the site. If, during construction, subsurface conditions are found which are significantly different from those observes in the exploratory borings and test pits, or assumed to exist in the excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, this report should be reviewed to determine the applicability of the conclusions and the recommendations considering the changed conditions and time lapse.

The Summary Boring Logs are our opinion of the subsurface conditions revealed by periodic sampling of the ground as the borings progressed. The soil descriptions and interfaces between strata are interpretive and actual changes may be gradual.

The boring logs and related information depict subsurface conditions only at the specific locations and at the particular time designated on the logs. Soil conditions at the other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the soil conditions at these boring locations.

Groundwater levels often vary seasonally. Groundwater levels reported on the boring logs or in the body of the report are factual data only for the dates shown.

Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples, borings or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. It is recommended that the Owner consider providing a contingency fund to accommodate such potential extra costs.

This firm cannot be responsible for any deviation from the intent of this report including, but not restricted to, any changes to the scheduled time of construction, the nature of the project or the specific construction methods or means indicated in this report: nor can our firm be responsible for any construction activity on sites other than the specific site referred to in this report.