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Geotechnical & Environmental Services

GEOTECHNICAL SITE INVESTIGATION

DoH PRODUCTION KITCHEN
BRACKEN ST - CAMBRIDGE

Client:	**JAWS Architects**
Certificate of Title:	**152454/1**
Investigation Date:	**20/08/2024 & 21/08/2024**

Refer to this Report As

Enviro-Tech Consultants Pty. Ltd. 2024. Geotechnical Site Investigation for DoH Production Kitchen, Bracken St - Cambridge. Unpublished report for JAWS Architects by Enviro-Tech Consultants Pty. Ltd., 21/08/2024

Report Distribution

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Limitations of this report

In some cases, variations in actual Site conditions may exist between subsurface investigation boreholes. This report only applies to the tested parts of the Site at the Site of testing, and if not specifically stated otherwise, results should not be interpreted beyond the tested areas.

The Site investigation is based on the observed and tested soil conditions relevant to the inspection date and provided design plans (building footprints presented in Attachment A). Any site works which has been conducted which is not in line with the Site plans will not be assessed. Subsurface conditions may change laterally and vertically between test Sites, so discrepancies may occur between what is described in the reports and what is exposed by subsequent excavations. No responsibility is therefore accepted for any difference in what is reported, and actual Site and soil conditions for parts of the investigation Site which were not assessed at the time of inspection.

This report has been prepared based on provided plans detailed herein. Should there be any significant changes to these plans, then this report should not be used without further consultation which may include drilling new investigation holes to cover the revised building footprint. This report should not be applied to any project other than indicated herein.

No responsibility is accepted for subsequent works carried out which deviate from the Site plans provided or activities onsite or through climate variability including but not limited to placement of fill, uncontrolled earthworks, altered drainage conditions or changes in groundwater levels.

At the time of construction, if conditions exist which differ from those described in this report, it is recommended that the base of all footing excavations be inspected to ensure that the founding medium meets that requirement referenced herein or stipulated by an engineer before any footings are poured.

Site Investigation

The Site investigation is summarised in Table 1.

Table 1 Summary of Site Investigation

Client	**JAWS Architects**
Project Address	Bracken St - Cambridge
Council	Clarence
Planning Scheme	Tasmanian Planning Scheme
Inundation, Erosion or Landslip Overlays	None
Proposed	Production Kitchen
Investigation	Fieldwork was carried out by an Engineering Geologist on the 19/8/2024
Site Topography	The building site has a very gentle slope of approximately 2% (1°) to the southeast
Site Drainage	The site is well drained with windblown sand deposits.
Soil Profiling	A total of 26 core holes were drilled at the Site with depths ranging from 1.5m to 4.2m.
Investigation Depths	All boreholes achieved the target depoth as per scope of works. Borehole logs and photos are presented in Appendix B & C.
Soil moisture and groundwater	Recovered soil at the site was moist at the time of the investigation. Groundwater was encountered at 1.1 to 1.7 m below ground surface.
Geology	According to 1:250,000 Mineral Resources Tasmania geological mapping (accessed through The LIST), the geology comprises: Quaternary Sand gravel and mud of alluvial, lacustrine and littoral origin.

Soil Profiles

The geology of the site has been recorded and described in accordance with Australian Standard AS1726 for Geotechnical Site Investigations which includes the Unified Soil Classification System (USCS). Soil layers and where applicable, bedrock layers are summarised in Table 2.

Table 2 Soil Summary Table

#	Layer	Details	USCS	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10
1	SAND	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal; fill: charcoal, VL-MD	SP	0-0.4 DS@0.2 DS@0.3									0-0.3
2	GRAVEL	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks; sub-rounded gravel; fill: rocks, VD	GC		0-0.3 DS@0.1	0-0.2	0-0.2						
3	Silty GRAVEL	FILL: Silty GRAVEL with sand, with clay, very dark olive brown, well sorted, fill: rocks; sub-angular gravel; 5% MUDSTONE cobbles; fill: rocks, D-VD	GM	0.4-0.7 DS@0.5									
4													
5													
6	SAND	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots, VL-MD	SP					0-0.1 DS@0.0	0-0.1	0-0.5	0-0.3	0-0.3	
7	SAND	SAND, brownish yellow, poorly sorted, fine grained sand, VL-D	SP		0.3-0.5	0.2-0.5			0.1-0.4 DS@0.2	0.5-1	0.3-0.5		0.3-0.5
8	SAND	SAND, pale yellow, well sorted, fine to medium grained sand, VL-VD	SW	0.7-1.5 DS@1.2	0.5-1.5	0.5-1.5	0.2-1.1	0.1-1.5	0.4-1.5	1-2.2	0.5-2.2	0.3-1.4	0.5-1.5
9	SAND	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, MD	SW				1.1-1.5 DS@1.3					1.4-2.1	
10	SAND	SAND, light yellowish brown, well sorted, fine to medium grained sand, D-VD	SW							2.2-3.4	2.2-3.2		
11	SAND	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, D	SW-SM							3.4-3.7 DS@3.5	3.2-3.4		
12	SAND	SAND trace clay, black, poorly sorted, fine grained sand, D-VD	SP							3.7-4.4 DS@4.0	3.4-4.4		

Consistency[1] **VS** Very soft; **S** Soft; **F** Firm; **St** Stiff; **Vst** Very Stiff; **H** Hard.
Density[2] **VL** Very loose; **L** Loose; **MD** Medium dense; **D** Dense; **VD** Very Dense
DS Disturbed sample
PV Pocket vane shear test
FV Downhole field vane shear test
U50 Undisturbed 48mm diameter core sample collected for laboratory testing.
REF Borehole refusal
INF DCP has continued through this layer and the geology has been inferred.

[1] Soil consistencies are derived from a combination of field index, DCP and shear vane readings.
[2] Soil density descriptions presented in engineering logs are derived from the DCP testing.

#	Layer	Details	USCS	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19
1	SAND	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal; fill: charcoal, VL	SP	0-0.5	0-0.3			0-0.2 DS@0.1				
2	GRAVEL	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks; sub-rounded gravel; fill: rocks	GC									
3	Silty GRAVEL	FILL: Silty GRAVEL with sand, with clay, very dark olive brown, well sorted, fill: rocks; sub-angular gravel; 5% MUDSTONE cobbles; fill: rocks	GM									
4	SAND	FILL: SAND with gravel, reddish black, well sorted, fine to medium grained sand, fill: rocks; fill: rocks, VL	SW									
5	SAND	FILL: SAND, light grey, well sorted, fine to medium grained sand, VL	SW									
6	SAND	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots, VL-MD	SP			0-0.3 DS@0.1	0-0.2		0-0.3	0-0.3 DS@0.1	0-0.1	0-0.3
7	SAND	SAND, brownish yellow, poorly sorted, fine grained sand, VL-D	SP	0.5-1	0.3-0.9	0.3-1 DS@0.5	0.2-0.6	0.2-0.9 DS@0.5	0.3-1	0.3-1.1 DS@0.5 DS@1.0	0.1-0.5	0.3-0.5
8	SAND	SAND, pale yellow, well sorted, fine to medium grained sand, L-MD	SW	1-1.5	0.9-1.5	1-2 DS@1.0 DS@1.5	0.6-1.5	0.9-1.3 DS@1.0	1-1.5	1.1-1.5 DS@1.4	0.5-1.5	0.5-1.5
9	SAND	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, VL-D	SW			2-3.3 DS@2.0 DS@2.5 DS@3.0	1.5-2.1 2.1-2.8 INF	1.3-3 DS@1.5 DS@2.0 DS@2.5				
10	SAND	SAND, light yellowish brown, well sorted, fine to medium grained sand, D-VD	SW			3.3-4.4 DS@3.5 DS@4.0	2.8-3 INF	3-4 DS@3.0 DS@3.5				
11	SAND	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, D-VD	SW-SM					4-4.4 DS@4.0				
12	SAND	SAND trace clay, black, poorly sorted, fine grained sand	SP									

Consistency[3] **VS** Very soft; **S** Soft; **F** Firm; **St** Stiff; **Vst** Very Stiff; **H** Hard.
Density[4] **VL** Very loose; **L** Loose; **MD** Medium dense; **D** Dense; **VD** Very Dense
DS Disturbed sample
PV Pocket vane shear test
FV Downhole field vane shear test
U50 Undisturbed 48mm diameter core sample collected for laboratory testing.
REF Borehole refusal
INF DCP has continued through this layer and the geology has been inferred.

[3] Soil consistencies are derived from a combination of field index, DCP and shear vane readings.
[4] Soil density descriptions presented in engineering logs are derived from the DCP testing.

#	Layer	Details	USCS	BH20	BH21	BH22	BH23	BH24	BH25	BH26	BH27	BH28	BH29	BH30
1	SAND	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal; fill: charcoal, VL	SP									0-0.3 DS@0.1	0-0.1	0-0.1 INF
2	GRAVEL	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks; sub-rounded gravel; fill: rocks	GC											
3	Silty GRAVEL	FILL: Silty GRAVEL with sand, with clay, very dark olive brown, well sorted, fill: rocks; sub-angular gravel; 5% MUDSTONE cobbles; fill: rocks	GM											
4	SAND	FILL: SAND with gravel, reddish black, well sorted, fine to medium grained sand, fill: rocks; fill: rocks, VL	SW		0-0.4 DS@0.1									
5	SAND	FILL: SAND, light grey, well sorted, fine to medium grained sand, VL	SW		0.4-0.7 DS@0.5									
6	SAND	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots, VL-MD	SP	0-0.3		0-0.3	0-0.3	0-0.3	0-0.3 DS@0.1	0-0.4	0-0.3 DS@0.1			
7	SAND	SAND, brownish yellow, poorly sorted, fine grained sand, VL-D	SP	0.3-0.7	0.7-1.5 DS@1.0 DS@1.4	0.3-0.5	0.3-0.6	0.3-0.7	0.3-1	0.4-0.7	0.3-1	0.3-0.9 DS@0.5	0.1-0.7	0.1-0.7 INF
8	SAND	SAND, pale yellow, well sorted, fine to medium grained sand, L-MD	SW	0.7-1.2		0.5-1.5	0.6-1.1	0.7-1.9	1-1.3 DS@1.0	0.7-1.2	1-1.6 DS@1.0	0.9-1.5 DS@1.0 DS@1.4	0.7-1.5	0.7-1.5 INF
9	SAND	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, VL-D	SW	1.2-1.5			1.1-1.9	1.9-2.1	1.3-1.7	1.2-1.7	1.6-1.7			1.5-2.1 DS@2.0
10	SAND	SAND, light yellowish brown, well sorted, fine to medium grained sand, D-VD	SW				1.9-2.1		1.7-2.9 DS@2.0	1.7-2.1	1.7-2.7 DS@2.0			
11	SAND	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, D-VD	SW-SM						2.9-3.2 DS@3.0		2.7-3.3 DS@3.0			
12	SAND	SAND trace clay, black, poorly sorted, fine grained sand	SP						3.2-4.4 DS@4.0		3.3-4.4 DS@4.0			

Consistency[5] **VS** Very soft; **S** Soft; **F** Firm; **St** Stiff; **Vst** Very Stiff; **H** Hard.
Density[6] **VL** Very loose; **L** Loose; **MD** Medium dense; **D** Dense; **VD** Very Dense
DS Disturbed sample
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[5] Soil consistencies are derived from a combination of field index, DCP and shear vane readings.
[6] Soil density descriptions presented in engineering logs are derived from the DCP testing.

Soil Testing Results

Dynamic Cone Penetrometer (DCP)

Dynamic cone penetrometer (DCP) testing was conducted according to AS 1289.6.3.2 with the results presented in Appendix D.Depth reduction factors have been applied consistent with deep dynamic cone penetrometer testing methods (eg. Wildcat DCP).

Laboratory Atterberg Limits

No silt or clay soils were encountered at the Site and Atterberg testing was not required.

Laboratory CBR Testing

The CRB results are summarised in Table 3 and the laboratory certificates are presented in Appendix F.

Table 3 CBR Testing Results (ADG Laboratories)

Hole ID	Units	BH03	BH05	BH11	BH18
Depth From	m	**0**	**0.1**	**0.1**	**0.1**
Depth To	m	**0.2**	**0.3**	**0.5**	**0.4**
maximum dry density	t/m3	**2.22**	**1.46**	**1.51**	**1.59**
optimum moisture content	%	**7**	**10.5**	**14.5**	**7.5**
field moisture content	%	**7.6**	**5**	**13.5**	**4.8**
compaction details 2					
retained 19mm (not replaced)	%	**6.8**	**0**	**0**	**0**
specimen details before soaking					
dry density ratio	%	**98**	**98**	**98**	**97.5**
moisture ratio	%	**100**	**100**	**99**	**101.5**
test details					
period of soaking	days	**4**	**4**	**4**	**4**
moisture content top 30mm	%	**8.3**	**27.3**	**24.3**	**22.4**
surcharge mass	kgs	**4.5**	**4.5**	**4.5**	**4.5**
swell	%	**0**	**0**	**0**	**0**
C.B.R. VALUE		**70**	**11**	**12**	**11**
penetration	mm	**5**	**5**	**5**	**5**

Plate Load Testing

Static plate load testing results has been conducted on shallow natural sandy soil profiles. The test results are not to be used to characterise soils at the Site for larger structures as the scale of the plate load influence is shallow. Some interpretation may be made for shallow footings with caution. Table 4 presents a summary of the results.

Table 4 Plate Load Testing Results

Test Location and Depth	Ev1	Ev2	Ev2/Ev1
BH06 0.3	8.0	46.8	5.84
BH11 0.3	27.2	108.7	3.99
BH19 0.3	26.7	42.3	1.58
BH27 0.3	4.1	33.2	7.99

Acid Sulphate Soils

Of the nine (9) samples analysed from the Site for actual acid sulphate soils (AASS) and potential acid sulphate soils (PASS), none showed any pH anomaly which would indicate the presence of AASS or PASS reactivity. Chemical reaction in peroxide (pH_{fox}) had only minor effect on soil pH, with the pH drop not exceeding 3 pH units which is one of the four indicators of PASS. Overall pH levels are not consistent with acid sulphate soils, with rates of reactivity being attributed to the presence of organic matter (eg. the shallowest sample also has the most aggressive response to peroxide).

The overall risk of PASS and ASS is considered LOW.

Table 5 Summary of PASS and ASS results

Borehole	Depth	Components (shell, roots, jarosite)	pH_f	pH_{fox}	Reactivity
BH15	0.1	Roots	6.6	6.3	XXX
BH15	0.5		6.8	5.6	X
BH15	1.0		7.2	6.2	X
BH15	1.5		8.1	6.2	X
BH15	2.0	Shells	8.6	7.0	XX
BH15	2.5	Shells	7.9	7.1	XX
BH15	3.0	Shells	7.7	7.1	XX
BH15	3.5	Shells	8.0	7.5	XX
BH15	4.0	Shells	8.0	7.2	XX

Exposure Classification

A footing exposure classification of A1 applies to the Site.

pH_f values are above the threshold limit which would indicate the presence of aggressive soils. There are no specific management measures such as the need to have the concrete to be isolated from the ground, concrete to be of a higher strength or minimum reinforcement covering.

Geotechnical Interpretation

Site Classification

According to AS2870 – 2011 and after considering the known details of the proposed building and works (herein referred to as the Site), the geology, soil conditions, soil properties, and drainage of the Site have been classified as:

CLASS P based on the following problematic ground conditions identified at the site:

- Fill other than SAND was encountered at the site at a thickness greater than 0.4 m
- Loose and low bearing capacity (<100 kPa allowable) sand is encountered to depths of up to 1.8m (BH08) and 2.7m (BH13 & BH15).

Notwithstanding the problematic soil conditions observed at the Site, ordinarily the Soil would be classified as Class A.

Bearing capacities

Soil allowable bearing capacity was calculated from geotechnical parameter correlations with DCP blow counts which are specific to the soil textures with partial size distribution playing an important role at the Site. Soil geotechnical strength parameters are adjusted based on liquefaction modelling with soil bearing capacity limited by layers which are vulnerable to liquefaction.

Although the DCP testing was conducted through the FILL, there is no interpretation of bearing capacities of the FILL, as it is recommended that the FILL material is not used for the support foundations due to risk of differential settlement. Unless there is documented evidence that the fill is engineered or engineering confidence that the fill was suitably compaction controlled, building structures should be founded on underlying natural soils or bedrock with suitable bearing capacity for the design loads.

Given the complex soil layering and highly variable soil density within the individual layers, it was decided that is was best to define soil bearing capacities based on end bearing depths in m AHD. Hypothetical loading scenarios have been run to determine areas of the Site where bearing capacity is limiting. Consideration if given to the application of FILL to 4.5 m AHD which is compaction controlled to a medium dense sand (fine grained sand with a DCP blow count of 5 blows per 100mm travel). In this analysis, no allowance has been made for compaction control of the natural soil, although it is recommended that at least 5 blows per 100 is proven across the Site. Natural topsoils are to be stripped from the Site and may be reapplied following screening and mixing.

Table 6 Bored pier allowable end bearing capacity also applicable for shallow strip footings and pads

Test Location and Depth	Minimum	Maximum	Average	Recommended
4.5 to 3.0m AHD (not stripped or compacted) *	60 kPa	360 kPa	180 kPa	60 kPa
4.5 to 3.0m AHD (stripped and or compacted) *	100 kPa^	^	^	^
2.5 m AHD	120 kPa^	440 kPa	260 kPa	120 kPa^
2.0m AHD	160 kPa	950 kPa	350 kPa	160 kPa

* Top 400mm of existing surface

^ Depending on level of compaction control with consistent 5 blows per 100mm approximating 200kPa allowable bearing capacity

CBR Interpretation from DCP & Laboratory Results

Laboratory soaked CBR testing of sand collected from BH05, BH11, and BH18 indicate relatively consistent values at 11 to 12. No correlation can be drawn with DCP, but the DCP results may prove to be useful to determine compaction requirements to bring the sand up to require specification. Insitu CBR interpretive values areas based on soil type (sand) after Webster (et. al. 1992) are presented in Table 6.

Table 7 CBR values based on DCP correlation with sand type soil from Webster et al. (1992)

Depth from (m)	BH01	BH03	BH04	BH05	BH06	BH07	BH08	BH03	BH10	BH11	BH13	BH14	BH15	BH16	BH17	BH18	BH19	BH21	BH23	BH24	BH25	BH26	BH27	BH28	BH29
0	2	68	68	2	2	2	2	68	2	2	2	2	2	2	2	2	2	<1	2	2	2	2	2	2	
0.1	2	57	68	2	2	2	2	57	2	2	2	2	2	2	2	2	2	<1	2	2	2	2	2	2	
0.2	2	28	43	4	2	2	2	28	8	6	6	6	6	4	6	2	2	<1	2	2	2	2	2	2	2
0.3	4	30	28	4	4	4	4	30	8	8	8	6	8	6	8	6	8	<1	6	4	2	4	4	8	4
0.4	35	28	25	4	4	8	4	28	13	8	8	8	8	8	8	8	8	<1	4	6	4	4	4	10	4
0.5	53	28	21	6	6	8	6	28	10	10	10	8	8	8	6	10	10	<1	4	6	6	4	4	10	4
0.6	50	25	21	6	6	8	4	25	13	10	13	8	8	8	8	8	8	<1	6	6	4	4	6	13	4
0.7	15	18	15	4	6	6	4	18	10	8	8	8	8	8	8	8	10	6	6	6	2	4	6	10	4
0.8	13	15	15	6	6	4	6	15	10	8	8	8	10	10	8	6	8	8	6	8	2	4	4	10	4
0.9	8	15	8	6	6	8	4	15	8	8	8	8	8	8	8	8	8	10	6	8	2	2	4	8	4
1	10	13	10	6	10	8	6	13	8	8	8	8	8	8	6	8	10	21	6	6	2	2	4	8	6
1.1	10	8	8	8	8	6	4	8	6	8	8	8	8	10	6	6	10	21	6	4	4	2	4	8	6
1.2	13	8	8	10	6	4	6	8	6	6	6	6	8	13	6	4	6	21	6	6	4	15	4	6	6
1.3	15	10	10	10	6	6	6	10	13	6	8	4	8	10	6	6	6	8	4	6	6	15	4	6	6
1.4	18	10	8	8	10	6	6	10	13	6	8	6	10	10	6	6	6	8	6	6	10	6	6	6	10
1.5			26	8		6	4				8	6	10						6	6	15	10	6		
1.6			31	8		6	4				8	6	6						6	4	13	15	13		
1.7			REF	5		6	4				6	4	4						8	4	21	28	21		
1.8				8		8	4				4	4	4						13	4	28	30	33		
1.9				REF		8	6				4	6	6						13	8	28	33	30		
2						8	6				4	6	8						25	6	28	38	40		
2.1						10	6				4	4	4												
2.20						21	13				4	8	4												
2.3						30	15				4	8	2												
2.4						33	21				4	8	4												
2.5						46	21				4	8	4												
2.6											6	13	4												
2.7											4	13	4												
2.8											6	28	6												
2.9											4	40	13												
3											6		18												
											8		25												
											10		28												

Soil Geotechnical Properties

Soil geotechnical properties are presented in Table 7.

Table 8 Soil geotechnical properties

Layer	Soil	Cohesion	Internal friction angle	Dry unit weight	Wet unit weight	Poisons ratio	Long- and Short-Term Elastic Modulus
		kPa		kN/m3	kN/m3		MPa
5	SAND	0		14.7	19	0.54	6
6	SAND	0	31	14.1	19	0.31	17
7	SAND	0	36	14.7	19	0.30	36
8	SAND	0	36	15.8	20.	0.30	32
9	SAND	0	33	15.6	20	0.31	41
10	SAND	0	43	18.1	21	0.26	78
11	SAND	5	29	16	19	0.34	17
12	SAND	0	35	15.8	20	0.30	57

Lateral Earth Pressures

Inferred soil lateral earth pressures are presented in Table 9. Given the loose nature of the soil, an over-consolidation ratio (OCR) of one (1) has been applied to the lateral earth pressure calculations. Lateral earth pressure coefficients are estimated based on soil internal friction angles and plasticity index. The values assume level ground behind earth retaining structures.

Table 9 Inferred soil and rock lateral earth pressures based on layer properties

Layer	Soil	Ko	Ka at 0 φ	Ka at 2/3 φ	Ka at φ	Kp 0 φ	Kp 1/3 φ	Kp 1/2 φ
1	SAND	0.27	0.33	0.29	0.28	3.00	4.00	4.80
2	GRAVEL	0.31						
3	Silty GRAVEL	0.28						
4	SAND							
5	SAND							
6	SAND	0.32	0.33	0.29	0.28	3.03	4.06	4.88
7	SAND	0.22	0.28	0.24	0.23	3.54	5.08	6.40
8	SAND	0.21	0.28	0.24	0.23	3.52	5.03	6.32
9	SAND	0.26	0.29	0.25	0.24	3.39	4.78	5.95
10	SAND	0.16	0.17	0.16	0.15	5.22	9.53	12.63
11	SAND	0.32	0.34	0.30	0.29	2.89	3.77	4.49
12	SAND	0.23	0.27	0.23	0.22	3.70	5.40	6.90

Recommendations – Design Considerations

Filling Works

It is proposed that the Site will be predominantly infilled and brought up to 4.5m AHD elevation allowing for floodwater mitigation. In the case where filling works are proposed at the Site:

- Before placing fill for landscaping, all topsoil (Layer 6) should be removed from the filled area.
- Any proposed filling works must be in accordance with AS3798 'Earthworks for Residential and Commercial Developments'.
- Soil beneath the topsoil is to be compacted prior to placing fill.
- It is recommended that existing natural sand other than topsoil is levelled (in even lifts) across the Site and compacted in place with several passes using a medium weight vibrating roller. Soil on the southwestern side of the Site has been partially compacted, and it is recommended that compaction begins parallel with Grueber Avenue and continues in a north-westward direction.

- It is recommended that sand and or similar granular soil (not clay or silt) is used to infill the Site.
- Compacted fill should be checked by a suitably qualified person to ensure consistent DCP blow counts or at least 5 blows per 100mm to a depth of 1.5m (3.0 m AHD) for sand.

Bored Pier – Production Kitchen (250 kN working)

Hypothetical modelling has been conducted with the following concluded:

- 600mm diameter piers will not be sufficient for the required bearing capacity, with:
  - 25% of the tests indicating insufficient allowable bearing capacity at all (deep or shallow) for the service loads
  - For 50% of the bores, drilling deep is not acceptable given settlement and liquefaction risks associated with Layer 9 and 11.
- The required bearing capacity may be achieved with 900mm diameter bored piers founded at (see Appendix B):
  - 1.5 m depth below 4.5m AHD FGL (3.0 m AHD) into Layer 8 – Zone A
  - 2.5 m depth below 4.5 m AHD FGL (2.0 m AHD) into Layer 10 – Zone B
- Bored piers should not extend any deeper or shallower than the depths indicated above
- No greater then 10mm of settlement is estimated based on the above calculations
- The base of bored piers holes must comprise natural soil and be free from loose soil or sand which may have collapsed into the bore. If there is concern about loosened soil in the base of the bore, DCP testing is advised to ensure that sand in the base of bores have sufficient density.

Strip Footings & Earth Retention – Production Kitchen (25kN/m)

- An allowable bearing capacity of 100 kPa is confirmed for the strip footings supporting the retaining wall with minimal settlement (<5mm).
- Proposed filling works within the production kitchen footing will result in minor settlement (<5mm), given sand fill compaction of 5 blows per 100 mm is proven.

Office Footings

- An allowable bearing capacity of 100 kPa is confirmed for the proposed office building (rafted slab design) with minimal settlement (<5mm).

Groundwater

Preliminary findings indicate that groundwater will be encountered at approximately 2.2 to 2.3 m AHD (2.2 to 2.3m below proposed finished ground level. It is estimated that dewatering may be required in Zone B to ensure bored piers reach the target elevation of 2.0 m AHD.

Site Seismic Factor

Based on the subsurface conditions encountered and the location of the site, it is considered that a site subsoil classification of Class De – Deep soil site and a Site Hazard Factor (Z) of 0.03 is applicable in accordance with Section 4 of AS1170.4-2007 "Structural Design Actions Part:4 Earthquake actions in Australia".

Kris Taylor, BSc (hons)

Environmental & Engineering Geologist

Appendix A Scope of Works

Melbourne Office
321/838 Collins Street
Docklands VIC 3008

1300 657 402 www.adgce.com

9 July 2024

Attention: Timothy Ives
Jaws Architects
The Ordnance Store
21 Castray Esplanade
Battery Point TAS 7004

Dear Timothy,

Re: Hospitals South Production Kitchen
GEOTECHNICAL INVESTIGATION
Lot 1 Grueber Avenue
Cambridge TAS 7170
27536.001 M002, HOBART

This consultant memorandum summarizes the geotechnical requirements for the civil and structural design on the project site. The Geotechnical Engineer in their response is considered the expert qualified in this field and shall include for all necessary testing and resources to provide the necessary reporting to present the engineering data and recommendations required. Alternative methods, limitations, local knowledge, and normal practices may all be submitted to the benefit of the project. Further to the engineering brief the client will require an assessment of fill and material for contamination, in particular acid sulphate soils and PFAS contamination.

PROJECT DESCRIPTION

The project site is shown on the attached map with the development consist of single-storey factory. The structure will be steel framed with a concrete ground slab. The proposed main building, access roads and car parking area will cover the majority of the plan area.

Figure 1: Site aerial image (LIST)

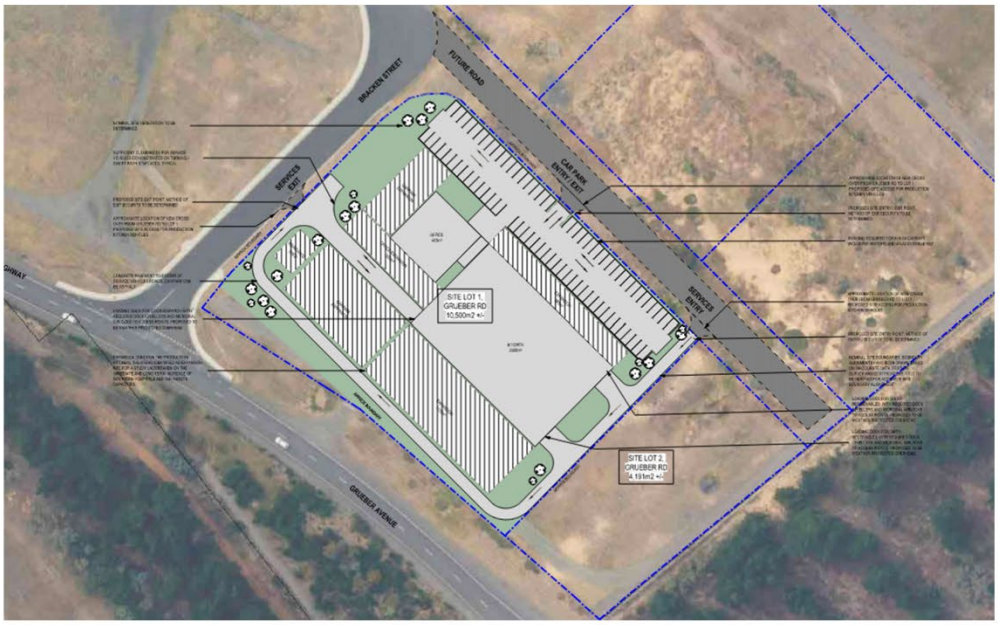

Figure 2: Preliminary architectural site plan (Jaws Architects)

SCOPE OF WORKS

The scope of works of the geotechnical investigation required on this site will be to:

a) Carry out a geotechnical investigation of the site, including drilling of boreholes across the site, and testing of soils found to;

- Sufficiently identify the site soil profile, and
- Identify suitable founding material for the proposal development.

Borehole logs shall include standing groundwater levels, ground surface levels and depths of each soil regime.

b) Carry out suitable laboratory testing to assist in the recommendations for foundation design and soil foundation settlement estimates, retaining wall and shoring design and earthworks conditions.

c) Prepare a detailed report which shall include the borehole logs, site soil test results and laboratory testing results, and which shall advise the following:

- Suitable foundation options and allowable bearing pressures for foundation design.
- Design parameters and estimates of pile load capacities for a range of pile sizes and types for piled foundations for compression piles.
- Potential settlement characteristics of a raft foundation if appropriate and allowable bearing capacity of the foundation material.
- Site excavation, shoring requirements, and other relevant construction matters.
- Assessment of dewatering requirements for the site and any potential draw down issues with adjacent properties and roadways, if applicable.
- Liquefaction / earthquake considerations.
- Classification of the site for any possible contaminants (acid sulphates, PFAS, etc).
- Site management recommendations and any other geotechnical matters pertinent to the proposed works.
- Earthquake site classification as per AS1170.4

d) Requirements for chemical testing and reuse of site materials, hazardous materials assessment. It is likely that the client will engage these works under as a specific brief to assess uncontrolled fill and unsuitable materials.

e) Provide the soil properties adequate for civil design:

- Design CBR value (4-day soaked CBR tests), modulus of subgrade reaction value, long and short-term Young's Moduli etc. for ground bearing pavement design.
- Water infiltration rate.
- Depth to water table.
- Reactivity of subgrade.
- Liquid and plastic limits.
- Soil dispersibility.
- Suitability of reuse excavated and site materials and recommendations.

f) Provide ongoing advice, clarification on expansion on details of the report during the design phase of the development.

DESIGN LOADS

The maximum design loads expected for various elements of the project are estimated to be as follows:

- Anticipated allowable columns loads will be approximate 550kN working loads, depending on grids and maximum clear spans.
- The working capacity of internal ground floor slab on ground will be approximate 5.0kPa (factory), 15kPa (cold rooms) and 12kPa (server room floor mounted rack) - TBC
- The working capacity of external paving slab will be approximate 24kPa or axle loads from trucks.

BOREHOLES

We proposed the following boreholes numbers and locations:

BH1 – 9 Main Building; BH10 – 11 Office Building); BH12 – 15 Future Road (if required); BH16 – 23 Access roads; B24 - 29 Car parking and Maintenance shed.

The proposal shall nominate the expected depths such that the appropriate design parameters for the foundation systems can be assessed. This includes any variation in fill, fluvial deposits and founding materials depth.

We trust the above geotechnical brief is adequate for your purposes.

Should you wish to discuss any further, please do not hesitate to contact us.

Kind regards,

D. Sowter

Damian Sowter
Senior Engineer - Structural
ADG ENGINEERS (AUST) PTY LTD

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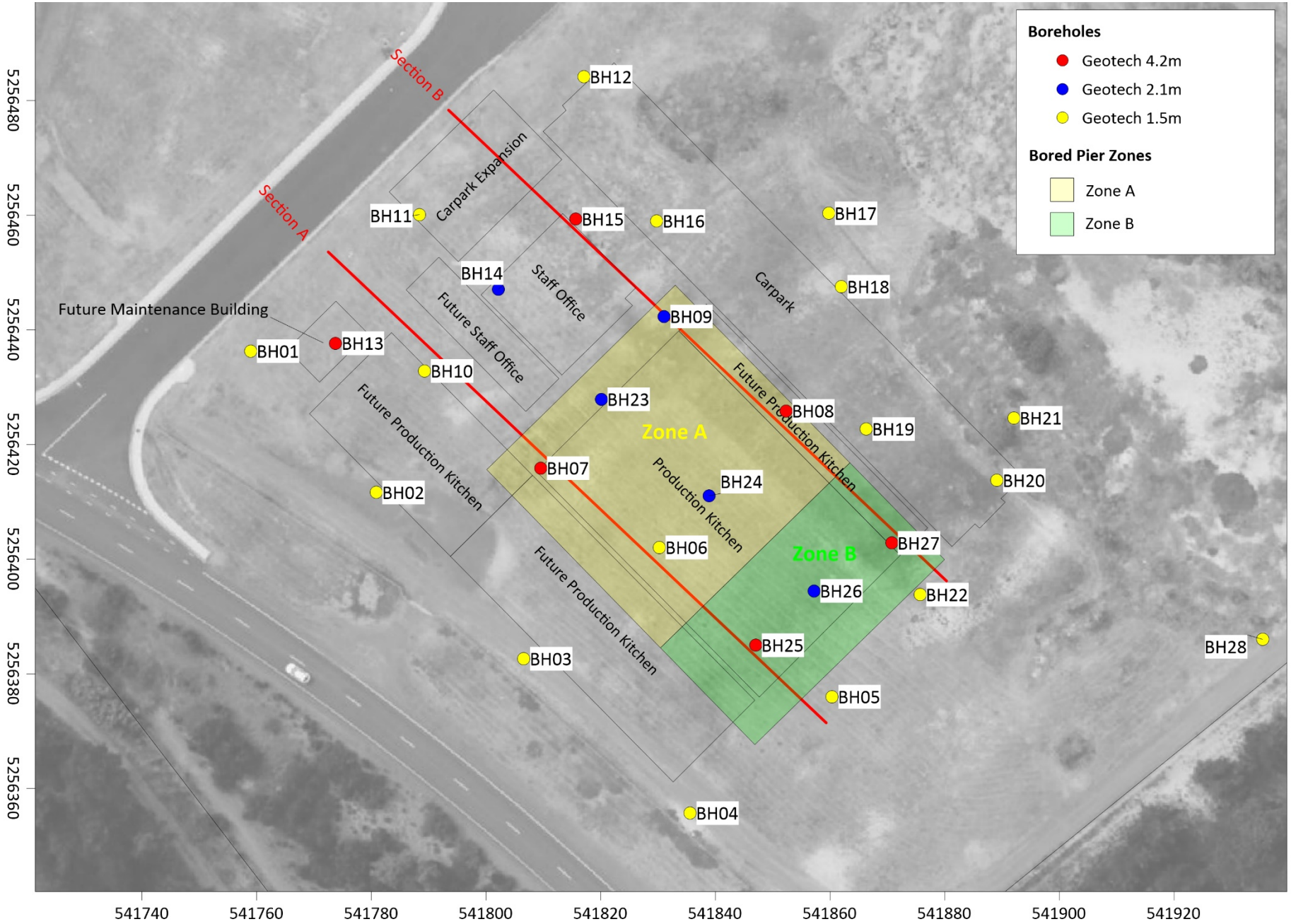
Kind regards,

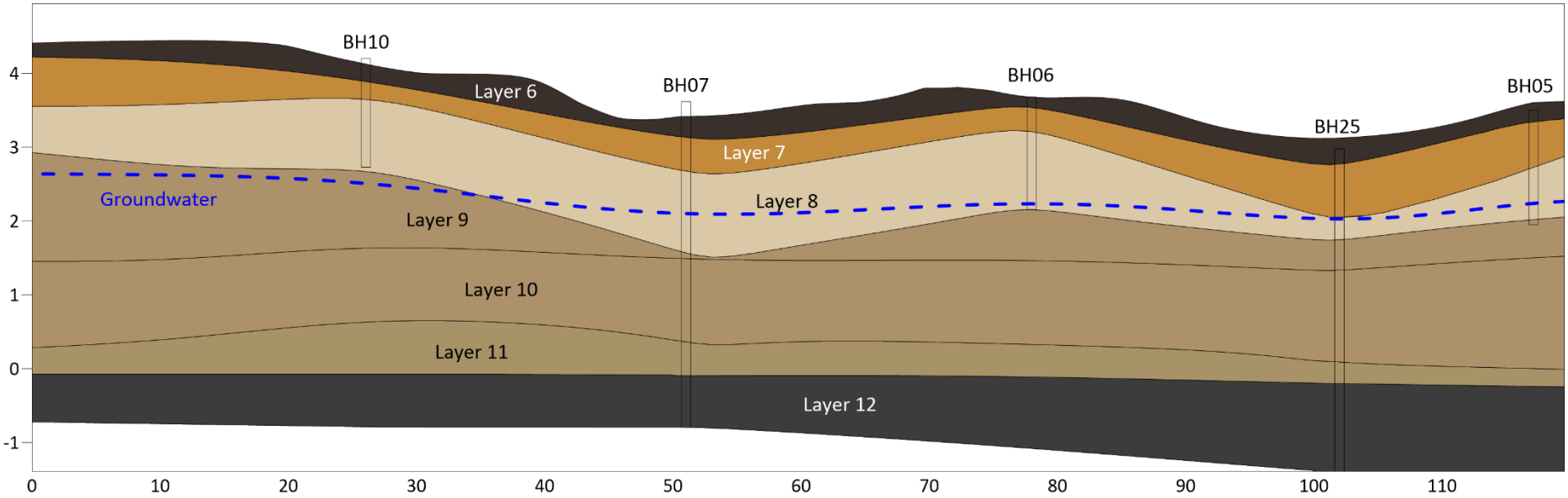
D. Sowter

Damian Sowter
Senior Engineer - Structural
ADG ENGINEERS (AUST) PTY LTD

Appendix B Actual Borehole Locations

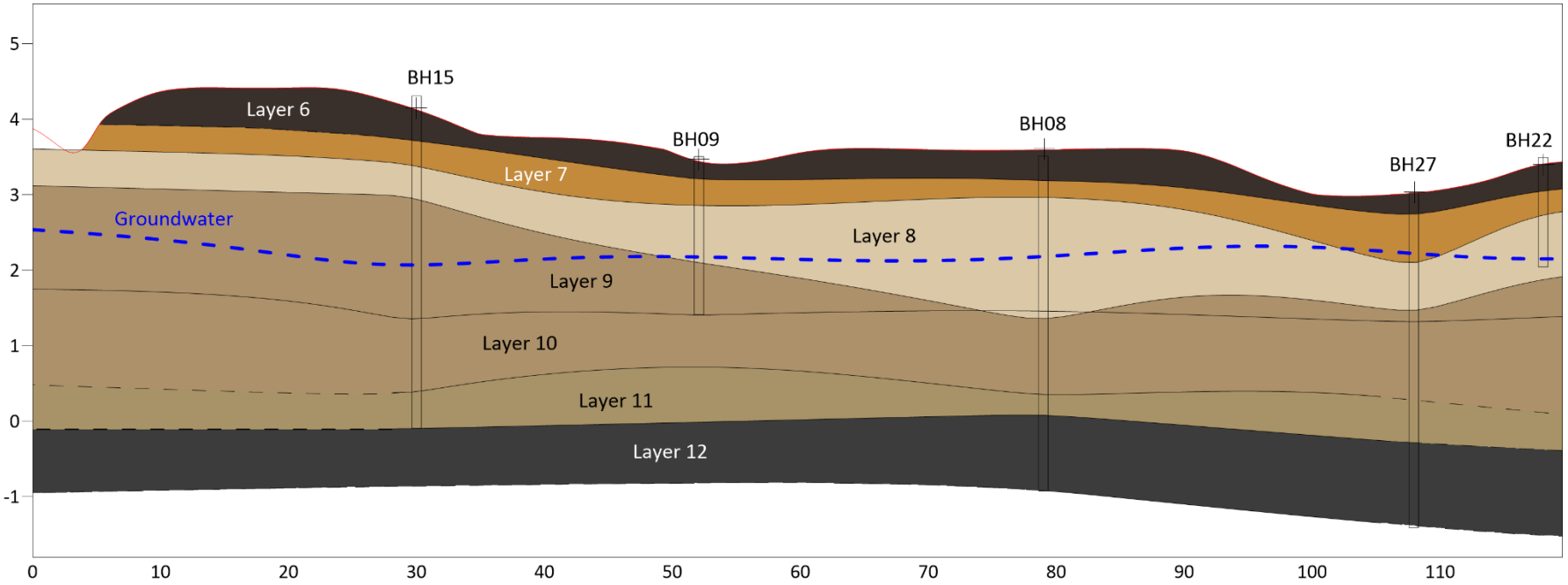


Appendix C Cross Sections– Section A



#	Layer	Details	USCS
6	SAND	TOPSOIL: SAND, black, well sorted, fine grained sand, trace roots, 5 % roots, VL-L	SW
7	SAND	SAND, brownish yellow, well sorted, fine grained sand, VL-MD	SW
8	SAND	SAND, pale yellow, well sorted, fine to medium grained sand, VL-MD	SW
9	SAND	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, MD-D	SW
10	SAND	SAND, light yellowish brown, well sorted, fine to medium grained sand, D-VD	SW
11	SAND	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand	SW-SM
12	SAND	SAND trace clay, black, well sorted, fine grained sand, D-VD	SW

Appendix B Cross Sections– Section B



#	Layer	Details	USCS
6	SAND	TOPSOIL: SAND, black, well sorted, fine grained sand, trace roots, 5 % roots, VL-L	SW
7	SAND	SAND, brownish yellow, well sorted, fine grained sand, VL-MD	SW
8	SAND	SAND, pale yellow, well sorted, fine to medium grained sand, VL-MD	SW
9	SAND	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, MD-D	SW
10	SAND	SAND, light yellowish brown, well sorted, fine to medium grained sand, D-VD	SW
11	SAND	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand	SW-SM
12	SAND	SAND trace clay, black, well sorted, fine grained sand, D-VD	SW

Appendix D Borehole Logs

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation
STRUCTURE: Production Kitchen
EASTING: 541759
NORTHING: 5256436
ACCURACY
HORIZ: 1m **VERT:** ~0.1m

Borehole : BH01
DATE TESTED: 19/08/2024
LOGGED BY: M. Scalisi
ELEVATION: 4.6

LOCATION: Bracken St - Cambridge
CLIENT: JAWS Architects
EQUIPMENT: Core & Auger
ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose to loose	1	4.5 / 4.3				DS DS				1.0 1.0 1.0 2.0	
0.5	GM	FILL: Silty GRAVEL with sand, with clay, very dark olive brown, well sorted, fill: rocks, gravel 50%, medium to coarse grained, sub-angular; 5% MUDSTONE cobbles; fill: rocks	dense to very dense	3	4.1 / 3.9				DS				14.0 20.0 19.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	medium dense to dense	8	3.7 / 3.5 / 3.3	Moist			DS				7.0 6.0 4.0 5.0 5.0 6.0 7.0 8.0	
1.5		Refusal in medium dense to dense, pale yellow SAND End of borehole at 1.5m depth.			3.1									

GROUNDWATER: Not Encountered

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541781 **ACCURACY**

NORTHING: 5256412 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH02

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.8

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	GC	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks, gravel 80%, fine to medium grained, sub-rounded; fill: rocks		2	3.7				DS					
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	very loose to dense	7	3.5									
0.5					3.3									
					3.1	Moist								
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to very dense	8	2.9									
					2.7									
					2.5									
1.5		Refusal in very loose to very dense, pale yellow SAND End of borehole at 1.5m depth.			2.3									

GROUNDWATER: Not Encountered

TESTING:

PAGE 1 of 1

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541807 **NORTHING:** 5256383

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH03

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.6

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	GC	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks, gravel 80%, fine to medium grained, sub-rounded; fill: rocks	very dense	2	3.5									
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	dense	7	3.3									
0.5					3.1									
					2.9	Moist								
					2.7									
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	medium dense to dense	8	2.5									
					2.3									
1.5					2.1									

Refusal in medium dense to dense, pale yellow SAND

End of borehole at 1.5m depth.

GROUNDWATER: Not Encountered

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541836 **NORTHING:** 5256356

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH04

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	GC	FILL: GRAVEL with clay, trace sand, trace silt, black, well sorted, fill: rocks, gravel 80%, fine to medium grained, sub-rounded; fill: rocks	very dense	2	3.4	Dry							24.0	
					3.2								24.0	
0.5	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	medium dense to very dense	8	3.0	Slightly Moist							17.0	
					2.8								11.0	
					2.6								10.0	
1.0					2.4								9.0	
	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	2.2	Wet			DS				9.0	
													7.0	
1.5					2.0								7.0	
													4.0	
													5.0	
													4.0	
													4.0	
													5.0	
													4.0	

Refusal in medium dense, light yellowish brown SAND trace silt

End of borehole at 1.5m depth.

GROUNDWATER: Encountered at 1.2 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541860 **ACCURACY**

NORTHING: 5256376 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH05

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.4	Moist			DS				1.0	
					3.2								1.0	
0.5					3.0								2.0	
					2.8								2.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to medium dense	8		Wet							2.0	
1.0					2.6								3.0	
					2.4								3.0	
					2.2								3.0	
1.5					2.0								4.0	
													5.0	
													5.0	
													4.0	

Refusal in very loose to medium dense, pale yellow SAND
End of borehole at 1.5m depth.

GROUNDWATER: Encountered at 1.2 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541830 **ACCURACY**

NORTHING: 5256402 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH06

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.7

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.6	Slightly Moist							1.0	
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	very loose to loose	7	3.4				DS				1.0	
0.5					3.2								2.0	
					3.0								2.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.8	Wet							3.0	
1.0					2.6		▶						3.0	
					2.4								3.0	
													3.0	
													3.0	
													3.0	
													5.0	
													4.0	
													3.0	
													3.0	
1.5					2.2								5.0	
		Refusal in loose to medium dense, pale yellow SAND												
		End of borehole at 1.5m depth.												

GROUNDWATER: Encountered at 1.1 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541810 **ACCURACY**

NORTHING: 5256416 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH07

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.6

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	3.4	Slightly Moist							1.0	
					3.2								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7	3.0								1.0	
					2.8								2.0	
1.0					2.6								4.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.4								4.0	
					2.2								4.0	
1.5					2.0								3.0	
					1.8								2.0	
2.0					1.6								3.0	
					1.4								3.0	
	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	1.2								3.0	
2.5					1.0								3.0	
					0.8								4.0	
3.0					0.6	Wet							4.0	
					0.4								4.0	
					0.2								5.0	
3.5	SW	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, littoral		11	0.0				DS				9.0	
					-0.2								12.0	
	SP	SAND trace clay, black, poorly sorted, fine grained sand, littoral	dense	12	-0.4				DS				13.0	
4.0					-0.6								18.0	
					-0.8								7.0	
		Borehole Ended At Target Depth End of borehole at 4.4m depth.			-1.0								6.0	
													6.0	
													6.0	

GROUNDWATER: Encountered at 1.7 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541852 **ACCURACY**

NORTHING: 5256426 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH08

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.4	Slightly Moist							1.0	
													1.0	
													1.0	
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	loose	7	3.2	Dry							2.0	
0.5					3.0								2.0	
													3.0	
					2.8								2.0	
													2.0	
					2.6								3.0	
1.0													2.0	
					2.4								3.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.2	Slightly Moist							2.0	
													3.0	
1.5					2.0								3.0	
													3.0	
					1.8								2.0	
													2.0	
					1.6								2.0	
2.0													2.0	
					1.4								3.0	
													3.0	
													3.0	
					1.2								6.0	
2.5													7.0	
					1.0								9.0	
	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	0.8								9.0	
													9.0	
3.0					0.6								11.0	
													9.0	
					0.4								9.0	
													9.0	
													8.0	
	SW	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, littoral	dense	11	0.2	Wet							8.0	
													9.0	
3.5					0.0								9.0	
													8.0	
					-0.2								9.0	
	SP	SAND trace clay, black, poorly sorted, fine grained sand, littoral	dense to very dense	12	-0.4								11.0	
4.0													12.0	
					-0.6								15.0	
													15.0	
					-0.8								16.0	
		Borehole Ended At Target Depth End of borehole at 4.4m depth.			-1.0									

GROUNDWATER: Encountered at 1.7 m Below Ground Surface

TESTING: Penetrometer: AS 1289.6.3.2; Shear Vane: 0; Soil Shrinkage: 0

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541831 **ACCURACY**

NORTHING: 5256442 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH09

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	3.3	Slightly Moist								
0.5	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to very dense	8	3.1 2.9 2.7 2.5 2.3	Wet	▶							
1.0					2.1									
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	1.9 1.7 1.5									
2.0		Borehole Ended At Target Depth End of borehole at 2.1m depth.			1.3									

GROUNDWATER: Encountered at 1.2 m Below Ground Surface

PAGE 1 of 1

TESTING:

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541789 **ACCURACY**

NORTHING: 5256433 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH10

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.2

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose to medium dense	1	4.1	Moist							1.0	
													1.0	
													4.0	
					3.9								4.0	
	SP			7									6.0	
0.5		SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand			3.7								5.0	
													6.0	
					3.5								5.0	
		SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	medium dense		3.3								5.0	
1.0	SW			8		Slightly Moist							4.0	
					3.1								4.0	
													3.0	
					2.9								3.0	
													6.0	
1.5					2.7								6.0	

Refusal in medium dense, SAND

End of borehole at 1.5m depth.

GROUNDWATER: Not Encountered

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541788 **NORTHING:** 5256460

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH11

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose to medium dense	1	4.4	Slightly Moist							1.0	
					4.2								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	4.0								3.0	
					3.8								4.0	
					3.6								4.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	3.4	Moist							5.0	
					3.2								5.0	
1.5		Refusal in medium dense, SAND End of borehole at 1.5m depth.			3.0								4.0	
													4.0	
													4.0	
													4.0	
													4.0	
													4.0	
													4.0	
													3.0	
													3.0	
													3.0	

GROUNDWATER: Not Encountered

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2; Shear Vane: 0; Soil Shrinkage: 0

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541817 **ACCURACY**

NORTHING: 5256484 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH12

DATE TESTED: 19/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal		1	4.4									
					4.2									
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	very loose to dense	7	4.0	Slightly Moist								
					3.8									
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to very dense	8	3.6	Moist								
					3.4									
					3.2									
1.5		Refusal in very loose to very dense, SAND End of borehole at 1.5m depth.			3.0									

GROUNDWATER: Not Encountered

TESTING:

PAGE 1 of 1

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541774 **ACCURACY**

NORTHING: 5256438 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH13

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	4.4	Slightly Moist	▶		DS				1.0	
					4.2								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	4.0				DS				3.0	
					3.8								4.0	
1.0					3.6								4.0	
					3.4								5.0	
1.5	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	3.2				DS				6.0	
					3.0								4.0	
					2.8								4.0	
2.0					2.6								4.0	
					2.4								4.0	
2.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	loose to dense	9	2.2				DS				4.0	
					2.0								3.0	
					1.8								4.0	
3.0					1.6								4.0	
					1.4								4.0	
3.5	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	1.2	Wet			DS				3.0	
					1.0								2.0	
					0.8								2.0	
4.0					0.6								2.0	
					0.4								2.0	
					0.2								2.0	
		Borehole Ended At Target Depth End of borehole at 4.4m depth.			0.0								2.0	
													2.0	
													2.0	
													2.0	
													2.0	
													2.0	
													3.0	
													2.0	
													3.0	
													2.0	
													3.0	
													4.0	
													5.0	
													10.0	
													12.0	
													12.0	
													16.0	
													18.0	

GROUNDWATER: Encountered at 1.9 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541802 **ACCURACY**

NORTHING: 5256447 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH14

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.2

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	4.0	Slightly Moist								
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	3.8									
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	3.6 3.4 3.2 3.0 2.8	Moist								
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	2.6 2.4 2.2	Wet								
2.0	SW	INFERRED SAND trace silt, littoral	medium dense to dense	9	2.0 1.8 1.6									
2.5	SW	INFERRED SAND, littoral	dense to very dense	10	1.4 1.2									
3.0														

Direct Push Sampler Ended at Target Depth at 2.1 m in medium dense light yellowish brown SAND trace silt
End of borehole at 2.1m depth.

GROUNDWATER: Encountered at 1.5 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541816 **NORTHING:** 5256459

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH15

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose	1	4.2				DS				1.0	
					4.0								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	3.8	Moist			DS				3.0	
					3.6								4.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	3.4				DS				4.0	
					3.2								4.0	
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	very loose to dense	9	3.0				DS				4.0	
					2.8								4.0	
2.0					2.6				DS				5.0	
					2.4								5.0	
2.5					2.2				DS				3.0	
					2.0								2.0	
3.0					1.8				DS				2.0	
					1.6								3.0	
3.5	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	1.4	Wet			DS				4.0	
					1.2								2.0	
4.0					1.0				DS				2.0	
					0.8								1.0	
	SW	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, littoral		11	0.6				DS				2.0	
					0.4								2.0	
					0.2								2.0	
					0.0								2.0	
		Borehole Ended At Target Depth End of borehole at 4.4m depth.			-0.2								3.0	
													6.0	
													8.0	
													10.0	
													11.0	
													11.0	
													9.0	
													13.0	
													16.0	
													16.0	

GROUNDWATER: Encountered at 2.5 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541830 **NORTHING:** 5256459

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH16

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.8

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to loose	6	3.7								1.0	
					3.5								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	3.3	Moist							2.0	
					3.1								3.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	2.9								4.0	
					2.7								4.0	
1.5		Refusal in medium dense, pale yellow SAND End of borehole at 1.5m depth.			2.5								4.0	
					2.3								4.0	
													5.0	
													4.0	
													4.0	
													4.0	
													5.0	
													6.0	
													5.0	
													5.0	

GROUNDWATER: Not Encountered

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541860 **NORTHING:** 5256460

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH17

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	3.4				DS				1.0	
					3.2								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	3.0	Moist			DS				3.0	
					2.8								4.0	
					2.6								4.0	
1.0					2.4		▶		DS				3.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	2.2	Wet							4.0	
													4.0	
													4.0	
													4.0	
1.5					2.0				DS				3.0	
													3.0	
													3.0	
													3.0	
													3.0	
		Refusal in medium dense, pale yellow SAND												
		End of borehole at 1.5m depth.												

GROUNDWATER: Encountered at 1.1 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541862 **NORTHING:** 5256448

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH18

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.7

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.6								1.0	
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	very loose to medium dense	7	3.4								1.0	
0.5					3.2								1.0	
					3.0	Moist							3.0	
					2.8								4.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.6								5.0	
					2.4								4.0	
1.5		Refusal in loose to medium dense, pale yellow SAND End of borehole at 1.5m depth.			2.2								4.0	
													3.0	
													4.0	
													4.0	
													3.0	
													4.0	
													4.0	
													3.0	
													2.0	
													3.0	
													3.0	

GROUNDWATER: Not Encountered

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541866 **ACCURACY**

NORTHING: 5256423 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH19

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.6

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.5	Moist							1.0	
													1.0	
					3.3								1.0	
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7									4.0	
0.5					3.1								4.0	
													5.0	
					2.9								4.0	
			medium dense										5.0	
					2.7								4.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8		Wet							4.0	
					2.5								5.0	
													5.0	
					2.3								3.0	
													3.0	
1.5					2.1								3.0	
		Refusal in medium dense, pale yellow SAND												
		End of borehole at 1.5m depth.												

GROUNDWATER: Encountered at 0.5 m Below Ground Surface

TESTING: Penetrometer: AS 1289.6.3.2; Shear Vane: 0; Soil Shrinkage: 0

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541889 **ACCURACY**

NORTHING: 5256414 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH20

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	2.9	Slightly Moist								
					2.7									
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7	2.5	Moist								
					2.3									
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.1	Wet								
1.0					1.9									
	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	1.7									
1.5					1.5									

Refusal in medium dense, SAND trace silt

End of borehole at 1.5m depth.

GROUNDWATER: Encountered at 0.7 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541892 **NORTHING:** 5256425

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH21

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SW	FILL: SAND with gravel, reddish black, well sorted, fine to medium grained sand, fill: rocks, fill: rocks	very loose	4	3.9				DS				3.0	
					3.7								4.0	
0.5	SW	FILL: SAND, light grey, well sorted, fine to medium grained sand		5	3.5				DS				5.0	
					3.3	Moist							9.0	
1.0	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense to dense	7	3.1				DS				9.0	
					2.9								9.0	
					2.7								4.0	
1.5		Refusal in medium dense to dense, SAND End of borehole at 1.5m depth.			2.5								4.0	

GROUNDWATER: Not Encountered

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541876 **ACCURACY**

NORTHING: 5256394 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH22

DATE TESTED: 20/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to medium dense	6	3.4	Moist								
	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7	3.2									
0.5					3.0									
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	2.8	Wet								
1.0					2.6									
					2.4									
					2.2									
1.5					2.0									
		Refusal in loose to medium dense, SAND End of borehole at 1.5m depth.												

GROUNDWATER: Not Encountered

TESTING: Shear Vane: 0; Soil Shrinkage: 0

PAGE 1 of 1

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541820 **ACCURACY**

NORTHING: 5256428 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH23

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.2	Slightly Moist							1.0	
													1.0	
													1.0	
					3.0								3.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	loose to medium dense	7	2.8								2.0	
													2.0	
					2.6	Moist							3.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	medium dense	8									3.0	
1.0					2.4								3.0	
													3.0	
					2.2								3.0	
													3.0	
					2.0								2.0	
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	loose to medium dense	9		Wet							3.0	
					1.8								3.0	
													3.0	
					1.6								4.0	
													6.0	
					1.4								6.0	
2.0	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense	10									10.0	
					1.2									

Borehole Ended At Target Depth

End of borehole at 2.1m depth.

GROUNDWATER: Not Encountered

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TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541839 **ACCURACY**

NORTHING: 5256411 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH24

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.6

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	3.5									
					3.3									
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7	3.1									
					2.9									
					2.7									
1.0			loose to medium dense		2.5	Moist								
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	2.3									
1.5					2.1									
					1.9									
					1.7		▶							
2.0	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	1.5	Wet								

Borehole Ended At Target Depth
End of borehole at 2.1m depth.

GROUNDWATER: Encountered at 1.9 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541847 **ACCURACY**

NORTHING: 5256385 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH25

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	2.8	Slightly Moist			DS				1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	very loose to medium dense	7	2.6 2.4 2.2	Moist							1.0 1.0 1.0 1.0 2.0 3.0 2.0 1.0 1.0 1.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to loose	8	2.0 1.8				DS				1.0 2.0 2.0	
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense to dense	9	1.6 1.4								3.0 5.0 7.0 6.0	
2.0	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	1.2 1.0 0.8 0.6 0.4 0.2	Wet			DS				9.0 11.0 11.0 11.0 10.0	
2.5													12.0 15.0 16.0 18.0	
3.0	SW	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, littoral		11	0.0 -0.2				DS					
3.5	SP	SAND trace clay, black, poorly sorted, fine grained sand, littoral		12	-0.4 -0.6 -0.8									
4.0					-1.0 -1.2 -1.4 -1.6				DS					
		Borehole Ended At Target Depth End of borehole at 4.4m depth.												

GROUNDWATER: Encountered at 1.2 m Below Ground Surface

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TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541857 **NORTHING:** 5256394

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH26

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose to loose	6	2.8	Slightly Moist							1.0	
					2.6								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	loose	7	2.4	Moist							1.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	very loose to loose	8	2.2								2.0	
1.0					2.0								2.0	
					1.8								2.0	
	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense to dense	9	1.6	Wet							2.0	
1.5					1.4								2.0	
					1.2								2.0	
	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral	dense to very dense	10	1.0								1.0	
2.0					0.8								1.0	
													1.0	
													1.0	
													7.0	
													7.0	
													3.0	
													5.0	
													7.0	
													11.0	
													12.0	
													13.0	
													15.0	

Borehole Ended At Target Depth
End of borehole at 2.1m depth.

GROUNDWATER: Encountered at 0.7 m Below Ground Surface

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541871 **NORTHING:** 5256403

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH27

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	TOPSOIL: SAND, black, poorly sorted, fine grained sand, trace roots, 5 % roots	very loose	6	2.8	Moist			DS				1.0	
					2.6								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	loose to medium dense	7	2.4								1.0	
					2.2								2.0	
1.0					2.0								2.0	
	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	1.8				DS				2.0	
1.5					1.6								2.0	
	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	1.4								2.0	
					1.2								2.0	
2.0	SW	SAND, light yellowish brown, well sorted, fine to medium grained sand, littoral		10	1.0				DS				2.0	
					0.8								3.0	
2.5					0.6								3.0	
					0.4								6.0	
					0.2	Wet							9.0	
3.0	SW	SAND trace gravel, trace silt/clay, pale olive, well sorted, fine grained sand, littoral	dense to very dense	11	0.0				DS				13.0	
					-0.2								12.0	
3.5					-0.4								16.0	
					-0.6								19.0	
	SP	SAND trace clay, black, poorly sorted, fine grained sand, littoral		12	-0.8									
4.0					-1.0				DS					
					-1.2								7.0	
					-1.4								9.0	
					-1.6								10.0	
		Borehole Ended At Target Depth End of borehole at 4.4m depth.												

GROUNDWATER: Encountered at 1 m Below Ground Surface

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TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541935 **NORTHING:** 5256386

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH28

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 3.8

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose	1	3.7				DS				1.0	
					3.5								1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand	medium dense	7	3.3	Moist			DS				1.0	
					3.1								4.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand		8	2.9				DS				4.0	
					2.7								5.0	
1.5		Refusal in medium dense, pale yellow SAND End of borehole at 1.5m depth.			2.5								5.0	
					2.3				DS				6.0	
													5.0	
													5.0	
													4.0	
													4.0	
													4.0	
													3.0	
													3.0	
													3.0	

GROUNDWATER: Not Encountered

PAGE 1 of 1

TESTING: Penetrometer: AS 1289.6.3.2

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541827 **ACCURACY**

NORTHING: 5256498 **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH29

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: 50mm Christie Post Driver

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows
0.0	SP	FILL: SAND, black, mottled pale yellow, poorly sorted, fine to medium grained sand, trace roots, fill: charcoal, 5 % roots and charcoal, charcoal; fill: charcoal	very loose to loose	1	4.4	Slightly Moist							1.0	
0.5	SP	SAND, brownish yellow, poorly sorted, fine grained sand, aeolian sheet sand		7	4.2								2.0	
1.0	SW	SAND, pale yellow, well sorted, fine to medium grained sand, aeolian sheet sand	loose to medium dense	8	4.0								2.0	
1.5		Refusal in loose to medium dense, pale yellow SAND End of borehole at 1.5m depth.			3.8								2.0	
					3.6								2.0	
					3.4								2.0	
					3.2								2.0	
					3.0								2.0	
													3.0	
													3.0	
													3.0	
													3.0	
													5.0	

DCP blows: 0 5 10 15 20

GROUNDWATER: Not Encountered

TESTING: Penetrometer: AS 1289.6.3.2; Shear Vane: 0; Soil Shrinkage: 0

DCP Blows per 100mm. For penetrometer blows per 100mm <1, distance travelled per blow is measured and converted back to blows per 100mm

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

enviro·tech CONSULTANTS

Positioning: GDA94 & mAHD

ASSESSMENT: Geotechnical Site Investigation

STRUCTURE: Production Kitchen

EASTING: 541840 **NORTHING:** 5256482

ACCURACY **HORIZ:** 1m **VERT:** ~0.1m

Borehole : BH30

DATE TESTED: 21/08/2024

LOGGED BY: M. Scalisi

ELEVATION: 4.5

LOCATION: Bracken St - Cambridge

CLIENT: JAWS Architects

EQUIPMENT: AMS Powerprobe 9120 RAP

ESTIMATED GROUND m (m AHD):

DEPTH (m)	GRAPHIC	DESCRIPTION	DENSITY CONSIST. STRENGTH	LAYER	ELEVATION (mAHD)	MOISTURE Index	MOISTURE %	MOISTURE Well	SAMPLE	TEST	Cu (kPa)	UCS (kg/cm²)	BLOW COUNT	DCP blows 0 5 10 15 20
0.0	SP	INFERRED FILL: SAND, charcoal; fill: charcoal		1										
	SP		very loose to medium dense	7	4.3 4.1 3.9									
0.5														
	SW	INFERRED SAND, aeolian sheet sand	loose to medium dense	8	3.7 3.5 3.3 3.1		▶							
1.0														
1.5	SW	SAND trace silt, light yellowish brown, well sorted, fine to medium grained sand, littoral	medium dense	9	2.9 2.7 2.5	Wet			DS					
2.0					2.3									
		Borehole Ended At Target Depth End of borehole at 2.1m depth.												

GROUNDWATER: Encountered at 1.5 m Below Ground Surface

TESTING:

PAGE 1 of 1

DS: disturbed sample; PV: pocket vane; PP: pocket penotrometer; FV: downhole field vane; U50: undisturbed 50mm sample; REF: DCP refusal

Appendix E Core Photographs

BH01

BH02

BH03

*** 1 metre core tray length**

BH04

BH05

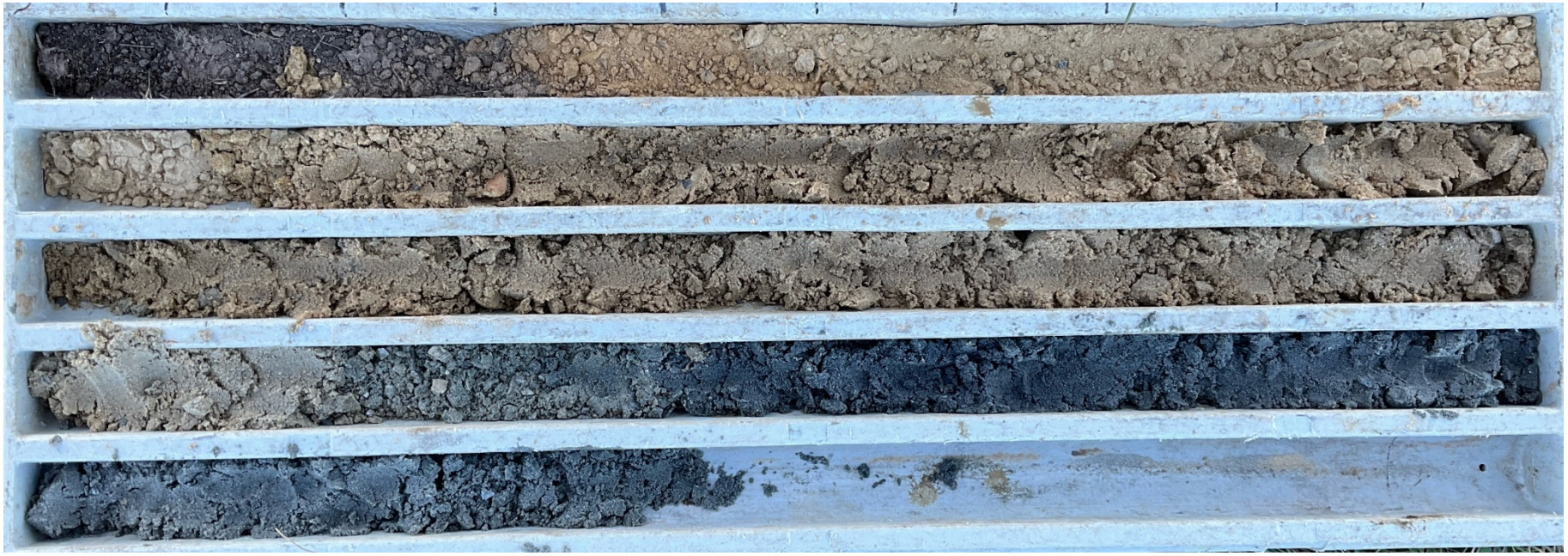
BH06

*** 1 metre core tray length**

BH07

*** 1 metre core tray length**

BH08



BH09

*** 1 metre core tray length**

BH10

BH11

BH12

*** 1 metre core tray length**

BH13

BH14

*** 1 metre core tray length**

BH15

BH16

*** 1 metre core tray length**

BH17

BH18

BH19

*** 1 metre core tray length**

BH20

BH21

BH22

*** 1 metre core tray length**

BH23

BH24

*** 1 metre core tray length**

BH25

BH26

*** 1 metre core tray length**

BH27

BH28

*** 1 metre core tray length**

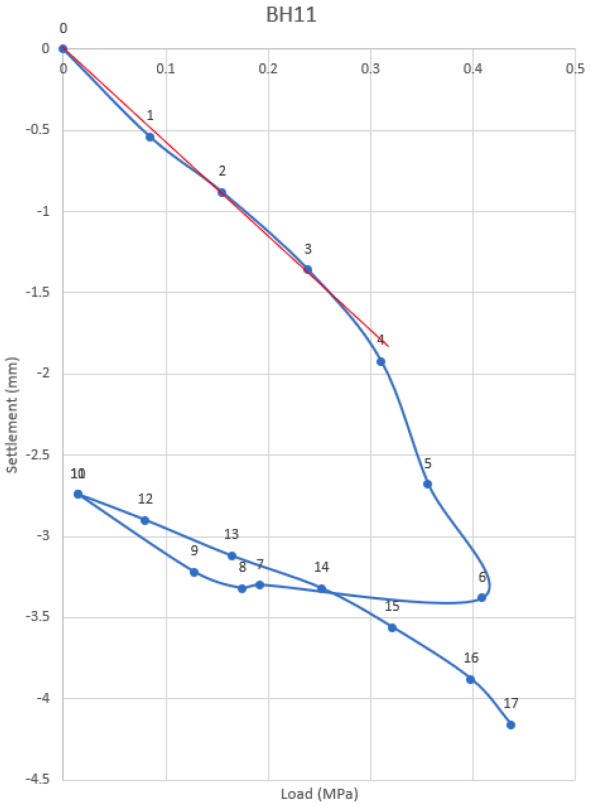
BH29

* 1 metre core tray length

Ev2 Static Deformation Modulus Testing Report

Test date: 29/08/24	Tester: M Scalisi
Project name: Production Kitchen	Instrument number:416
Test ID: BH11	Instrument name:
Test Depth: 0.3m	Test number:2
Packing type:	Leverage ratio:2
Filling thickness:	Test elevation:
Test mileage:	Weather:

NO.	Stress (MPa)	Settlement (mm)
First loading		
0	0	0
1	0.077	0.54
2	0.155	0.88
3	0.239	1.36
4	0.310	1.92
5	0.356	2.68
6	0.409	3.38
7	0.192	3.30
Unload		
8	0.175	3.32
9	0.128	3.22
10	0.014	2.74
Second loading		
11	0.014	2.74
12	0.080	2.90
13	0.164	3.12
14	0.252	3.32
15	0.321	3.56
16	0.398	3.88
17	0.437	4.16

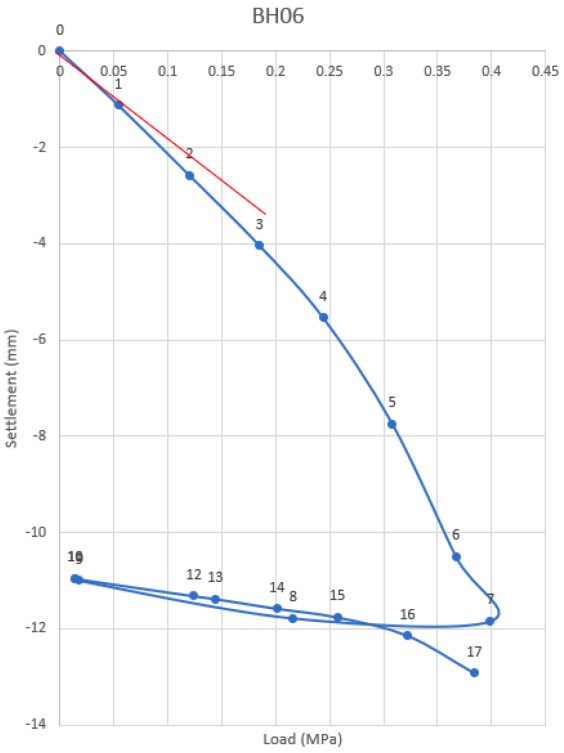


NO.	Maximun stress	a0	a1	a2	Evi	Ev2/Ev1
First loading	0.192	0.065	9.079	-4.233	27.22	3.99
Second loading	0.437	2.751	1.257	4.238	108.66	

Ev2 Static Deformation Modulus Testing Report

Test date: 29/08/24	Tester: M Scalisi
Project name: Production Kitchen	Instrument number:416
Test ID: BH06	Instrument name:
Test Depth: 0.3m	Test number:3
Packing type:	Leverage ratio:2
Filling thickness:	Test elevation:
Test mileage:	Weather:

NO.	Stress (MPa)	Settlement (mm)
First loading		
0	0	0
1	0.054	1.12
2	0.120	2.58
3	0.185	4.04
4	0.244	5.54
5	0.308	7.74
6	0.367	10.50
7	0.399	11.84
Unload		
8	0.216	11.78
9	0.018	11.00
10	0.014	10.96
Second loading		
11	0.014	10.96
12	0.124	11.32
13	0.144	11.38
14	0.201	11.58
15	0.257	11.76
16	0.322	12.14
17	0.384	12.92

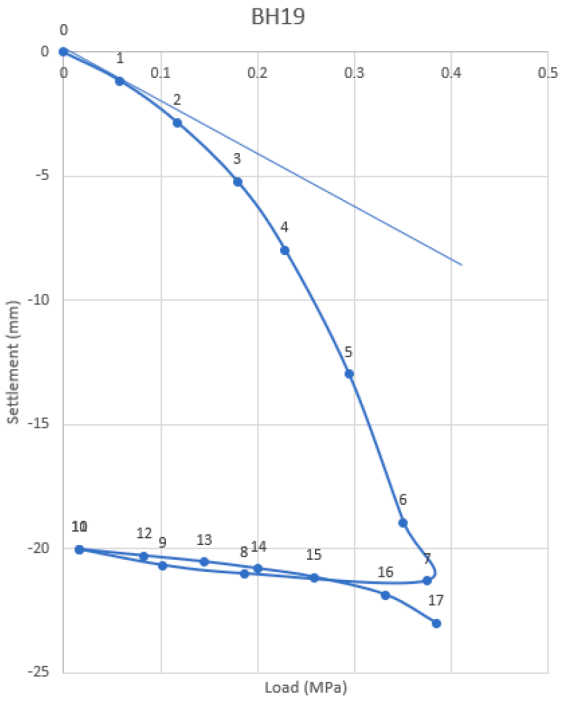


NO.	Maximun stress	a0	a1	a2	Evi	Ev2/Ev1
First loading	0.399	0.629	8.925	47.991	8.01	5.84
Second loading	0.384	11.016	0.442	10.944	46.79	

Ev2 Static Deformation Modulus Testing Report

Test date: 29/08/24	Tester: M Scalisi
Project name: Production Kitchen	Instrument number:416
Test ID: BH19	Instrument name:
Test Depth: 0.3m	Test number:4
Packing type:	Leverage ratio:2
Filling thickness:	Test elevation:
Test mileage:	Weather:

NO.	Stress (MPa)	Settlement (mm)
First loading		
0	0	0
1	0.063	0.52
2	0.125	0.92
3	0.203	1.36
4	0.252	1.68
5	0.342	2.60
6	0.384	3.48
7	0.422	4.58
Unload		
8	0.084	3.84
9	0.093	3.84
10	0.015	3.30
Second loading		
11	0.015	3.30
12	0.077	3.56
13	0.142	3.86
14	0.195	4.04
15	0.255	4.28
16	0.323	4.62
17	0.400	5.50

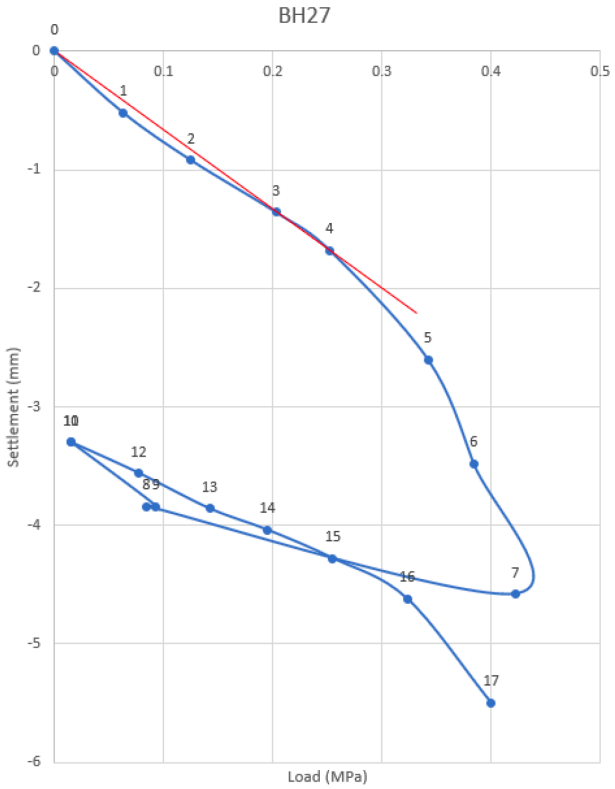


NO.	Maximun stress	a0	a1	a2	Evi	Ev2/Ev1
First loading	0.422	0.793	-3.833	29.028	26.73	1.58
Second loading	0.400	3.344	1.666	8.658	42.29	

Ev2 Static Deformation Modulus Testing Report

Test date: 29/08/2429/08/24	Tester: M Scalisi
Project name: Production Kitchen	Instrument number:416
Test ID: BH27	Instrument name:
Test Depth: 0.3	Test number:5
Packing type:	Leverage ratio:2
Filling thickness:	Test elevation:
Test mileage:	Weather:

NO.	Stress (MPa)	Settlement (mm)
First loading		
0	0	0
1	0.058	1.14
2	0.117	2.82
3	0.179	5.20
4	0.228	7.96
5	0.294	12.98
6	0.350	18.94
7	0.375	21.30
Unload		
8	0.186	21.02
9	0.102	20.68
10	0.016	20.04
Second loading		
11	0.016	20.04
12	0.083	20.30
13	0.145	20.54
14	0.201	20.82
15	0.258	21.16
16	0.332	21.88
17	0.384	23.02



NO.	Maximun stress	a0	a1	a2	Evi	Ev2/Ev1
First loading	0.375	1.087	-5.993	160.500	4.15	7.99
Second loading	0.384	20.159	-1.235	21.376	33.18	

Material Test Report

Rare Earth CMT Laboratories Pty Ltd
Launceston Laboratory
23/16 - 18 Goodman Court Invermay Tasmania 7248
Phone: 0439 351 452
Email: arlen@rareearthcmt.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

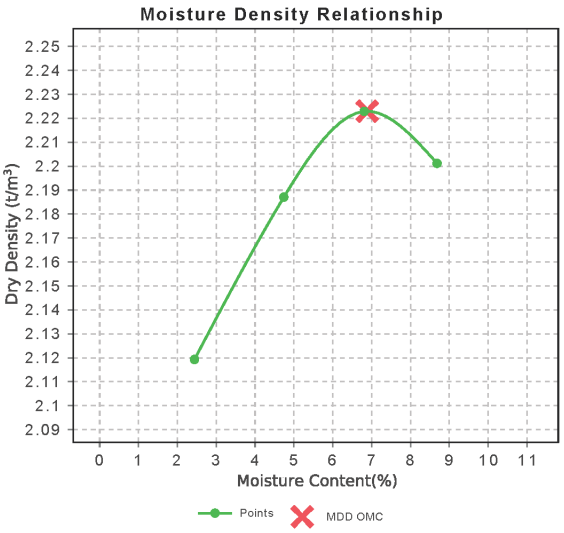
Approved Signatory: Arlen Thompson
Quality Manager
NATA Accredited Laboratory Number: 20328

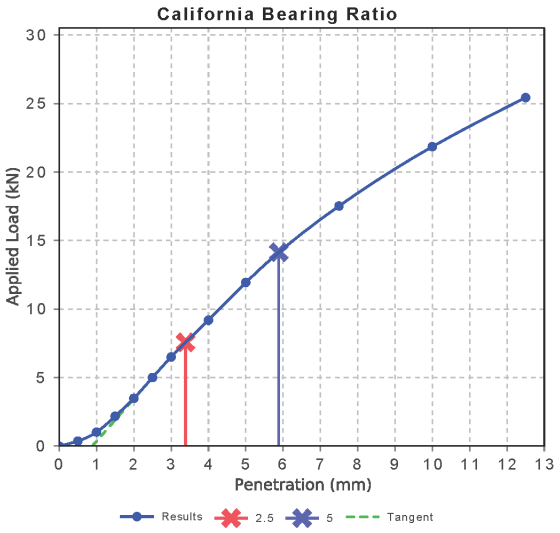
Report Number:	**RE24/373-1**
Issue Number:	1
Date Issued:	16/09/2024
Client:	Enviro-Tech Consultants Pty Ltd
	162 Macquarie Street, Hobart Tas 7000
Contact:	Marco Scalisi
Project Number:	RE24/373
Project Name:	Material Evaluation
Project Location:	Hobart Airport
Client Reference:	J0790
Work Request:	2055
Sample Number:	S2055A
Date Sampled:	04/09/2024
Dates Tested:	04/09/2024 - 13/09/2024
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	In accordance with the test method
Sample Location:	**BH 03, Depth: 0.0-0.2m**
Material:	Dark Brown Silty Sandy Gravel

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	2.22		
Optimum Moisture Content (%)	7.0		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	7		
Method used to Determine Plasticity	Visual Assessment		
Curing Hours (h)	4.3		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	7.6

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**70**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	2.22		
Optimum Moisture Content (%)	7.0		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	2.18		
Field Moisture Content (%)	7.6		
Moisture Content at Placement (%)	6.9		
Moisture Content Top 30mm (%)	8.3		
Moisture Content Rest of Sample (%)	8.1		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	2.1		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	6.8		





Material Test Report

Rare Earth CMT Laboratories Pty Ltd
Launceston Laboratory
23/16 - 18 Goodman Court Invermay Tasmania 7248
Phone: 0439 351 452
Email: arlen@rareearthcmt.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

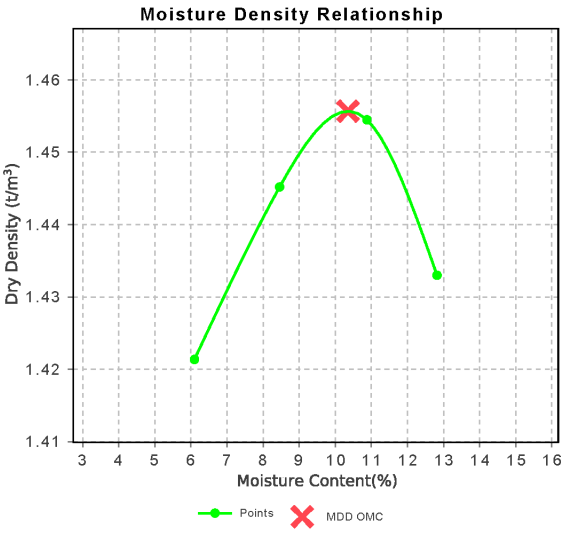
Approved Signatory: Arlen Thompson
Quality Manager
NATA Accredited Laboratory Number: 20328

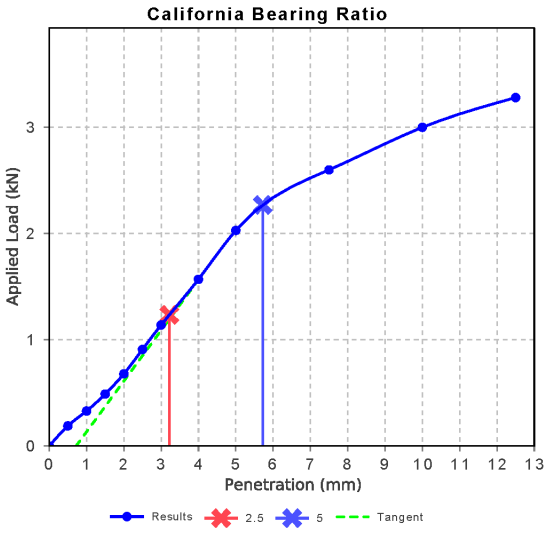
Report Number:	**RE24/373-1**
Issue Number:	1
Date Issued:	16/09/2024
Client:	Enviro-Tech Consultants Pty Ltd
	162 Macquarie Street, Hobart Tas 7000
Contact:	Marco Scalisi
Project Number:	RE24/373
Project Name:	Material Evaluation
Project Location:	Hobart Airport
Client Reference:	J0790
Work Request:	2055
Sample Number:	S2055B
Date Sampled:	04/09/2024
Dates Tested:	04/09/2024 - 13/09/2024
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	In accordance with the test method
Sample Location:	**BH 05, Depth: 0.1-0.3m**
Material:	Light Brown Silty Sand, Some Organics

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	1.46		
Optimum Moisture Content (%)	10.5		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	0		
Method used to Determine Plasticity	Visual Assessment		
Curing Hours (h)	4.1		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	5.0

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**11**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.46		
Optimum Moisture Content (%)	10.5		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.42		
Field Moisture Content (%)	5.0		
Moisture Content at Placement (%)	10.4		
Moisture Content Top 30mm (%)	27.3		
Moisture Content Rest of Sample (%)	29.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	2.0		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		





Material Test Report

Rare Earth CMT Laboratories Pty Ltd
Launceston Laboratory
23/16 - 18 Goodman Court Invermay Tasmania 7248
Phone: 0439 351 452
Email: arlen@rareearthcmt.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

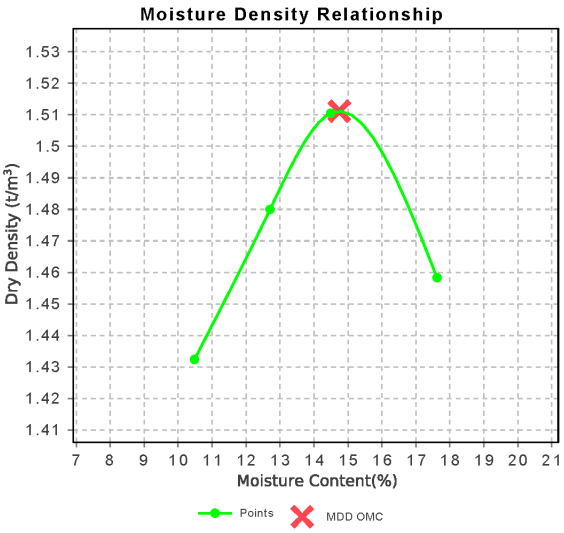
Approved Signatory: Arlen Thompson
Quality Manager
NATA Accredited Laboratory Number: 20328

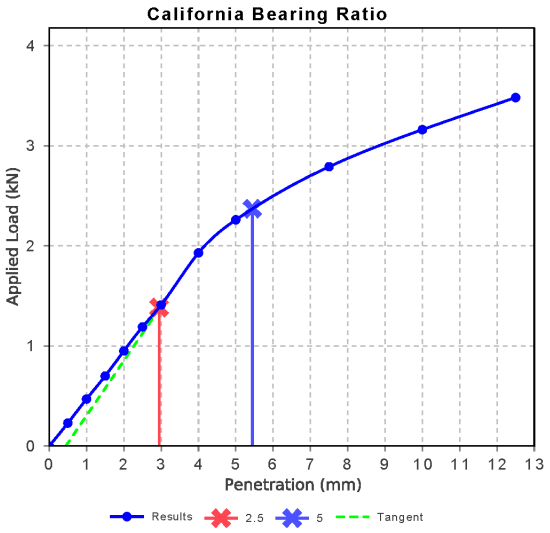
Report Number:	**RE24/373-1**
Issue Number:	1
Date Issued:	16/09/2024
Client:	Enviro-Tech Consultants Pty Ltd
	162 Macquarie Street, Hobart Tas 7000
Contact:	Marco Scalisi
Project Number:	RE24/373
Project Name:	Material Evaluation
Project Location:	Hobart Airport
Client Reference:	J0790
Work Request:	2055
Sample Number:	S2055C
Date Sampled:	04/09/2024
Dates Tested:	04/09/2024 - 13/09/2024
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	In accordance with the test method
Sample Location:	**BH 11, Depth: 0.1-0.5m**
Material:	Dark Brown Silty Sand, Some Organics

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	1.51		
Optimum Moisture Content (%)	14.5		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	0		
Method used to Determine Plasticity	Visual Assessment		
Curing Hours (h)	2.5		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	13.5

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**12**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.51		
Optimum Moisture Content (%)	14.5		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	99.0		
Dry Density after Soaking (t/m^3)	1.48		
Field Moisture Content (%)	13.5		
Moisture Content at Placement (%)	14.6		
Moisture Content Top 30mm (%)	24.3		
Moisture Content Rest of Sample (%)	26.7		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	2.7		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		





Material Test Report

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Phone: 0439 351 452
Email: arlen@rareearthcmt.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

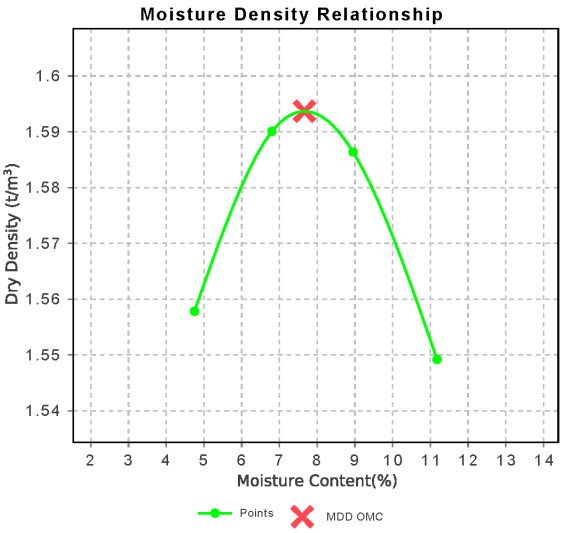
Approved Signatory: Arlen Thompson
Quality Manager
NATA Accredited Laboratory Number: 20328

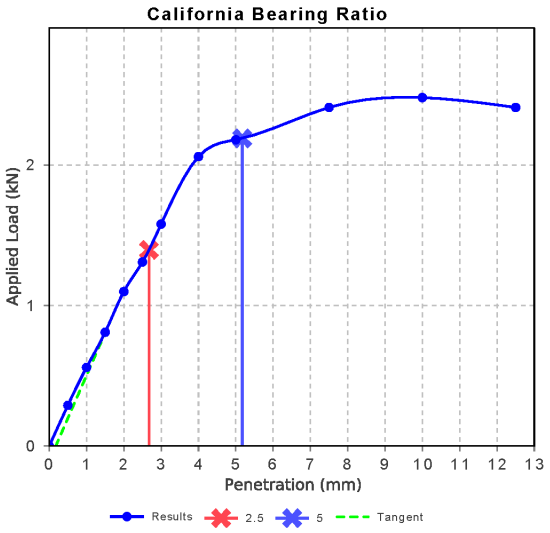
Report Number:	**RE24/373-1**
Issue Number:	1
Date Issued:	16/09/2024
Client:	Enviro-Tech Consultants Pty Ltd
	162 Macquarie Street, Hobart Tas 7000
Contact:	Marco Scalisi
Project Number:	RE24/373
Project Name:	Material Evaluation
Project Location:	Hobart Airport
Client Reference:	J0790
Work Request:	2055
Sample Number:	S2055D
Date Sampled:	04/09/2024
Dates Tested:	04/09/2024 - 13/09/2024
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	In accordance with the test method
Sample Location:	**BH 18, Depth: 0.1-0.4m**
Material:	Brown Sand

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	1.59		
Optimum Moisture Content (%)	7.5		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	0		
Method used to Determine Plasticity	Visual Assessment		
Curing Hours (h)	2.2		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	4.8

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**11**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.59		
Optimum Moisture Content (%)	7.5		
Laboratory Density Ratio (%)	97.5		
Laboratory Moisture Ratio (%)	101.5		
Dry Density after Soaking (t/m^3)	1.56		
Field Moisture Content (%)	4.8		
Moisture Content at Placement (%)	7.8		
Moisture Content Top 30mm (%)	22.4		
Moisture Content Rest of Sample (%)	24.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	2.9		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		





CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form 55

To: JAWS Architects *Owner /Agent*

The Ordnance Store Level 1 21 Castray *Address*

Battery Point TAS 7004 *Suburb/postcode*

Qualified person details:

Qualified person: Kris Taylor

Address: 162 Macquarie Street

Hobart 7000

Phone No: 036224 9197

Fax No:

Licence No: NA

Email address: office@envirotechtas.com.au

Qualifications and Insurance details: Bachelor of Science with Honours in Geology. Lloyd's Underwriters: soil and rock mechanics, soil and rock testing

(description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items

Speciality area of expertise: Geo-technical Reports

(description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Details of work: Geotechnical Site Investigation

Address: Bracken St

Cambridge

Lot No: 1

Certificate of title No: 152454/1

The assessable item related to this certificate: Geotechnical Site Investigation written in accordance with AS1726 by a geotechncial practitioner with appropriate experience, training and qualifications.*

(description of the assessable item being certified)
Assessable item includes –
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

Certificate details:

Certificate type: Geotechnical including landslide risk assessment in accordance with "Practice Note Guidelines for Landslide Risk Management 2007" published by the Australian Geomechanics Society.*

(description from Column 1 of Schedule 1 of the Director's Determination - Certificates by Qualified Persons for Assessable Items n)

This certificate is in relation to the above assessable items, at any stage, as part of – *(tick one)*

- (•) building work, plumbing work or plumbing installation or demolition work

OR

- ( ) a building, temporary structure or plumbing installation

In issuing this certificate the following matters are relevant –

Documents:	Enviro-Tech Consultants Pty. Ltd. 2024. Geotechnical Site Investigation for a Proposed Production Kitchen, Bracken St - Cambridge. Unpublished report for JAWS Architects by Enviro-Tech Consultants Pty. Ltd., 21/08/2024
Relevant calculations:	
References:	- AS1726-2017 Geotechnical Site Investigations

Substance of Certificate: *(what it is that is being certified)*

- An assessment of:
- Foundations for proposed building structures.*

Scope and/or Limitations

The Geotechnical Site Investigation applies to the Site and Project Area as inspected and does not account for future alteration to foundation conditions as a result of earth works, drainage condition changes or variations in site maintenance which are not included within the provided plans.

***This report contains soil classification information prepared in accordance with AS2870 as well as AS2870 extracts which may be used as general guidance for plumbing design. The hydraulic designer is to use their own judgment in the application of this information and this report must be read in in conjunction with hydraulic plans for the proposed development.**

I certify the matters described in this certificate.

	Signed:	*Certificate No:*	*Date:*
Qualified person:			21/08/2024