

Our Ref: PSM3589-003L

13 June 2019

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Attention: Michael Robinson

Dear Michael

**RE: 167-201 ALDINGTON ROAD, KEMPS CREEK
RESULTS OF DUE DILIGENCE GEOTECHNICAL INVESTIGATIONS**

1. Introduction

This letter presents the factual results of geotechnical investigations undertaken by Pells Sullivan Meynink (PSM) for the proposed development at 167-201 Aldington Road, Kemps Creek NSW. The work has been undertaken as part of due diligence study for the site. It is in accordance with the PSM proposal PSM3859-001L dated 23 May 2019 and approved on 23 May 2019 by Michael Robinson.

2. Background

Prior to undertaking the work, we were provided with the following documents:

- Frasers Property drawing MP - MRE - FS – 001 “Site Concept Plan – Kemps Creek” dated 16 April 2019.

Based on these documents we note the following about the site:

- The site has an approximate area of 43 Ha
- The proposed development is intended for industrial development subdivisions comprising eleven (11) warehouse facilities and two (2) 20 m wide driveways.

At this stage, details of the proposed development including the earthworks are not known to PSM.

3. Fieldwork

The fieldwork was undertaken from 28 May 2019 to 31 May 2019 under the fulltime supervision of a PSM geotechnical engineer, who undertook the following tasks:

- Setting out investigation locations
- Preparing engineering logs
- Collection of disturbed soil samples.

The investigation locations were recorded with a hand-held GPS unit with a horizontal accuracy of approximately ± 5 m.

Figure 1 presents the locality plan and the investigation locations. Appendix A presents the tabulation of test pits and borehole logs.

3.1 Test Pits and Auger Holes

A total of 49 test pits and auger holes were excavated using a 15-tonne excavator with an excavator bucket or a pendulum auger attachment to a maximum depth of 5 m or prior practical refusal.

Appendix A presents tabulated test pit and auger hole logs and Appendix B presents photographs for the test pits and auger holes. Site photographs including photos of typical landmarks and observed material are included in Figures 2 to 6.

At the completion of the fieldwork, the test pits and auger holes were backfilled with excavated spoil and lightly compacted with the excavator bucket.

3.2 Geotechnical Laboratory Testing

3.2.1 California Bearing Ratio (CBR) Testing

Four (4) bulk soil samples were recovered for the California Bearing Ratio (CBR) testing and were forwarded to a geotechnical laboratory for testing. The following sample preparation was undertaken prior to CBR testing:

- Compact to 98% standard MDD, at optimum moisture content (OMC)
- Four (4) day-soaked sample
- 4.5 kg surcharge.

The test reports are presented in Appendix C. Table 1 presents the summary.

Table 1 – CBR Test Results

Sample ID (depth)	Material Description	Soaked CBR (%)	OMC (%)	Standard Maximum Dry Density (t/m ³)	Swell (%)
TP23 (0.5 -1.1 m)	Clay	1.0	20.3	1.66	4.0
TP27 (0.3 – 1.8 m)	Clay	2.0	19.8	1.73	1.5
TP29 (0.2 – 0.4 m)	Clay	0.5	17.8	1.69	6.0
TP35 (0.4 – 1.1 m)	Clay	0.5	22.3	1.56	3.5

3.2.2 Salinity Assessment

Analytical laboratory testing for soil aggressivity and salinity was carried out on nine (9) samples. The results are presented in Appendix D and summarised in Table 2

Table 2 – Summary of Aggressivity Testing Results

Sample ID & Depth	Exchangeable Cations [meq/100g]					Exchange Sodium [%]	pH	Electrical Conductivity [μS/cm]	Sulfate [mg/kg]	Chloride [mg/kg]	Resistivity [ohm cm]
	Ca	Mg	K	Na	CEC						
TP02 1.0 m	11.3	5.0	0.2	0.4	17.0	2.4	7.3	18	10	20	6580
TP05 0.3 m	18.3	4.6	0.6	0.4	24.0	1.9	7.2	30	40	<200	3510
TP15 0.6 m	7.2	10.4	0.3	1.0	19.2	5.5	5.3	167	180	<200	1510
TP24 0.5 m	1.4	10.6	0.2	2.0	14.5	13.7	5.6	88	90	<200	2100
TP36 0.5 m	5.1	6.6	0.2	1.1	20.8	8.6	5.6	78	10	60	3950
TP41 0.5 m	2.0	13.4	0.2	1.6	17.3	9.3	4.9	863	530	1240	280
TP44 1.5 m	3.4	12.8	0.3	4.7	24.0	22.0	5.2	297	170	340	560
TP49 1.0 m	5.7	12.8	0.1	2.5	21.2	11.8	5.8	593	230	1020	250

4. Site Conditions

4.1 Geological Setting

The 1:100,000 Penrith Geological map (1991) indicates:

- The proposed site is underlain by Bringelly Shale (Rwb) comprising carbonaceous claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

4.2 Surface Conditions

At the time of fieldwork, the site comprises:

- Grassed and vegetated areas
- Some trees
- Some dams with standing water
- Some residential houses.

The approximate site boundary is highlighted in blue in the following insets.

Inset 1 to Inset 3 present a series of aerial photos of the site in 2010, 2015 and 2019.



Inset 1: Nearmap Aerial Image in 2010, Showing Surface Conditions



Inset 2: Nearmap Aerial Image in 2015, Showing Surface Conditions



Inset 3: Nearmap Aerial Image in 2019, Showing Surface Conditions

4.3 Subsurface Conditions

The subsurface conditions encountered within the test pits and auger holes are summarised in Table 3.

Table 3 – Summary of Inferred Subsurface Conditions Encountered in Test Pits and Auger holes

Inferred Unit	Inferred Top of Unit Depth Below Ground Surface (m)	Description
TOPSOIL	0.0	Silty CLAY, low plasticity, pale brown and grey, firm to stiff consistency, dry, rootlets and organics observed. Silty CLAY with gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry to moist, rootlets and barks observed.
FILL	0.0 to 0.17	FILL; roadbase and gravel; grey and black, sub-angular gravel size up to 30 mm, dry, with rootlets and organics. CLAY with some filled sandstone; low plasticity, pale grey and red, stiff consistency, dry to moist. Silty CLAY; medium plasticity, black, stiff consistency, moist to wet.
RESIDUAL	0.1 to 1.2	CLAY; medium to high plasticity, dark brown and red, very stiff consistency, dry to moist, trace of rootlets. Silty CLAY; medium plasticity, pale grey, brown and yellow, very stiff consistency, moist.
BEDROCK	0.6 to 2.8	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. SILTSTONE; pale grey and orange, moderately weathered, iron stained, low to medium strength. SANDSTONE; fine grained, slightly weathered, high strength.

Table 4 shows the approximate depth (m) at the top of the inferred geotechnical units encountered in the test pits and auger holes.

Table 4 – Depth at the Top of Inferred Subsurface Conditions Encountered in Test Pits

Test Pits	Inferred Top of Geological Unit Depth Below Ground Surface (m)				
	Topsoil	Fill	Residual	Bedrock	EOH
TP01	0	N.E.	0.1	0.8	1.3
TP02 (Auger)	0	N.E.	0.3	0.8	1.6
TP03	0	N.E.	0.2	0.7	1.3
TP04 (Auger)	0	N.E.	0.3	1.2	1.5
TP05	0	N.E.	0.1	1.2	1.8
TP06 (Auger)	0	N.E.	0.3	1.5	2.0
TP07	0	N.E.	0.2	1.0	1.4

Test Pits	Inferred Top of Geological Unit Depth Below Ground Surface (m)				
	Topsoil	Fill	Residual	Bedrock	EOH
TP08 (Auger)	0	N.E.	0.2	0.8	1.5
TP09	0	N.E.	0.1	1.3	1.7
TP10 (Auger)	0	N.E.	0.2	1.0	2.1
TP11	0	N.E.	0.3	1.5	1.8
TP12 (Auger)	0	N.E.	0.3	0.7	1.0
TP13	0	N.E.	0.2	0.9	1.5
TP14 (Auger)	0	N.E.	0.2	1.8	2.2
TP15	0	N.E.	0.1	0.9	1.2
TP16 (Auger)	0	N.E.	0.2	1.7	1.8
TP17	0	0	0.2	0.8	1.7
TP18 (Auger)	0	N.E.	0.3	2.6	3.0
TP19	0	N.E.	0.1	0.7	1.3
TP20 (Auger)	0	N.E.	0.3	1.5	2.2
TP21	0	N.E.	0.3	1.4	1.6
TP22 (Auger)	0	N.E.	0.3	2.0	3.0
TP23	0	N.E.	0.1	1.1	1.5
TP24	0	N.E.	0.2	1.5	1.8
TP25 (Auger)	0	N.E.	0.1	1.5	2.6
TP26 (Auger)	0	N.E.	0.3	1.0	1.6
TP27	0	N.E.	0.3	1.9	2.1
TP28 (Auger)	0	N.E.	0.2	1.7	2.1
TP29	0	N.E.	0.2	17	1.9
TP30 (Auger)	0	N.E.	0.2	2.8	3.0
TP31	0	0.17	1.2	1.8	2.3
TP32 (Auger)	0	N.E.	0.2	0.8	1.7
TP33	0	N.E.	0.2	0.6	1.0
TP34 (Auger)	0	N.E.	0.3	0.9	1.5
TP35	0	N.E.	0.2	1.1	1.7
TP36 (Auger)*	0	N.E.	0.2	1.0	2.0
TP37	0	N.E.	0.2	0.6	1.2
TP38 (Auger)	0	N.E.	0.2	1.0	1.8
TP39 (Auger)	0	N.E.	0.2	1.6	2.3
TP40 (Auger)	0	0.1	0.5	1.0	3.4
TP41	0	N.E.	0.1	1.1	1.2

Test Pits	Inferred Top of Geological Unit Depth Below Ground Surface (m)				
	Topsoil	Fill	Residual	Bedrock	EOH
TP42 (Auger)	0	N.E.	0.2	1.5	2.0
TP43	0	0.2	N.E.	N.E.	5.0
TP44 (Auger)	0	N.E.	0.3	2.0	4.0
TP45	0	N.E.	0.3	1.6	2.0
TP46 (Auger)	0	N.E.	0.1	1.8	2.4
TP47	0	N.E.	0.1	2.5	3.2
TP48 (Auger)	0	N.E.	0.3	1.0	2.0
TP49 (Auger)	0	N.E.	0.2	1.6	2.3

Note: EOH = End of Hole
N.E. = Not Encountered
* = Practical Refusal

4.4 Groundwater

No groundwater was observed in any test pits / auger holes during the excavation. No long-term groundwater monitoring was undertaken.

5. Salinity and Aggressivity Assessment

5.1 Soil Chemistry

The salinity and aggressivity test results summarised in Table 2 indicate the following:

- pH of the soil samples analysed to be in the range of 4.9 to 7.3.
- Concentrations of chlorides in samples analysed to be in the range of 20 mg/kg to 1020 mg/kg.
- Concentrations of sulphates in samples analysed to be in the range of 10 mg/kg to 530 mg/kg.
- The 1:5 soil to water extraction and subsequent electrical conductivity (EC1:5) of the soil samples analysed to be in the range of 18 µS/cm to 863 µS/cm.

5.2 Salinity

Site Investigations for Urban Salinity (DLWC 2002) classify soil salinity based on electrical conductivity (ECe) as per Richards (1954). The method of conversion from EC1:5 to ECe (electrical conductivity of saturated extract) is based on DLWC (2002) and given by $ECe = EC1:5 \times M$, where M is the multiplication factor based on "Soil Texture Group".

The "Soil Texture Group" of the samples tested has been assessed as "Medium clay" or "Heavy clay" with a corresponding M of 7 or 6 respectively. The salinity classification for the soil samples that were tested is presented in Table 5.

Table 5 – Salinity Classification

Sample ID & Depth	EC _{1:5} (dS/m)	Soil Type	M	EC _e (dS/m)	Salinity Class
TP02 1.0 m	0.018	Heavy clay	6	0.108	Non-saline
TP05 0.3 m	0.030	Medium clay	7	0.210	Non-saline
TP15 0.6 m	0.167	Heavy clay	6	1.002	Non-saline
TP24 0.5 m	0.088	Medium clay	7	0.616	Non-saline
TP36 0.5 m	0.078	Medium clay	7	0.546	Non-saline
TP41 0.5 m	0.863	Medium clay	7	6.041	Moderately saline
TP44 1.5 m	0.297	Heavy clay	6	1.782	Non-saline
TP49 1.0 m	0.593	Medium clay	7	4.151	Moderately saline

It is assessed that the majority of soils on site are classified as “non-saline” with two soil samples classified as “moderately saline”.

Table 4.8.2 of Australian Standard AS3600-2009 “Concrete Structures” provides an exposure classification for concrete structures in saline soils based on soil electrical conductivity (EC_e). We assess the exposure classification for this site is “A2”.

5.3 Corrosivity

Table 4.8.1 of AS3600-2009 “Concrete Structures” provides criteria for exposure classification for concrete in sulphate soils based on sulphates in soil and groundwater, and pH of soil. On the basis of the sulphate and pH testing completed we assess the exposure classification for concrete in sulphate soils to be A2.

Similarly, Table 6.4.2(C) of Australian Standard AS2159:2009, Piling – Design and Installation provides criteria for exposure classification for concrete piles in soil, and here the exposure classification for concrete piles in soil is Mild.

Table 6.5.2(C) of Australian Standard AS2159:2009, Piling – Design and Installation provides criteria for exposure classification for steel piles based on resistivity, soil and groundwater pH, and chlorides in soil and groundwater. On the basis of the resistivity, pH and chloride testing completed we assess the exposure classification for steel piles in the soil to be Moderate.

5.4 Sodicity

Sodicity provides a measure of the likely dispersion on wetting and to shrink/swell properties of a soil. Soil sodicity is classified based on the Exchangeable Sodium Percentage (ESP) which is the amount of exchangeable sodium as a percentage of the Cation Exchange Capacity (DLWC, 2002).

The Exchangeable Sodium Percentages calculated from these laboratory results, ranging from 1.9% to 22.0%, indicates that the soils on site range from non-sodic to highly sodic when compared to criteria listed in “Site Investigations for Urban Salinity”, DLWC (2002).

6. Discussion and Recommendation

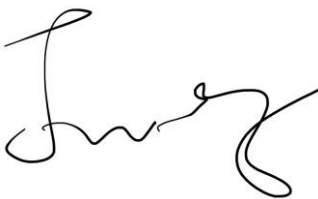
6.1 Bulk Earthworks Specification and Interim Geotechnical Design Advice

We have prepared a separate document for the following:

- An Interim Geotechnical Design Advice (IGDA) for the proposed warehouse facilities – Refer to
- PSM3859-004L (Appendix E).
- Bulk Earthworks Specification – Refer PSM3859-005S Rev 0 (Appendix F).

Should there be any queries, do not hesitate to contact the undersigned.

For and on behalf of
PELLS SULLIVAN MEYNINK

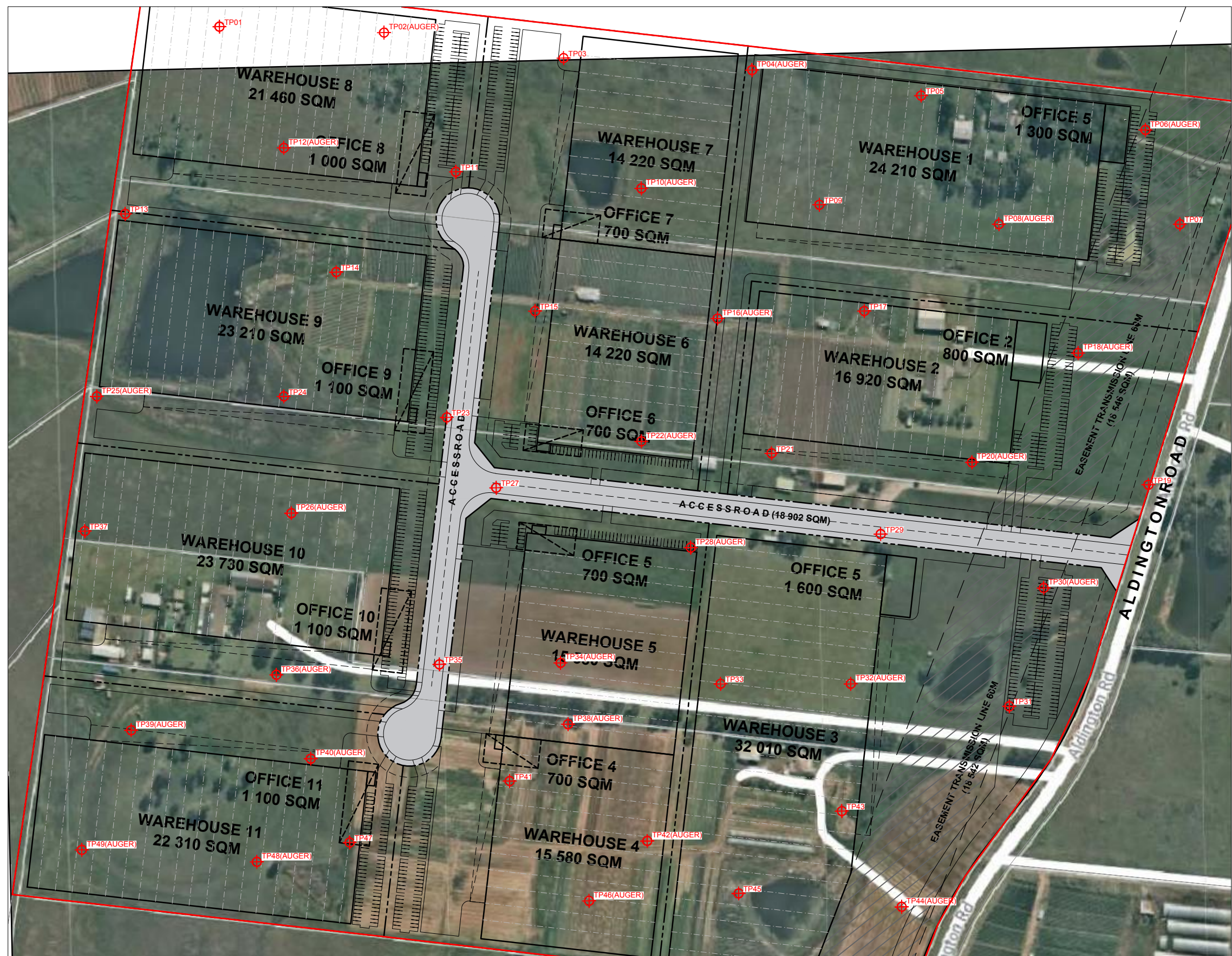


JUNO LIANG
GEOTECHNICAL ENGINEER



AGUSTRIA SALIM
PRINCIPAL

Encl.	Figure 1	Locality Plan and Test Locations			
	Figure 2	Selected Site Photos (1 of 5)			
	Figure 3	Selected Site Photos (2 of 5)			
	Figure 4	Selected Site Photos (3 of 5)			
	Figure 5	Selected Site Photos (4 of 5)			
	Figure 6	Selected Site Photos (5 of 5)			
	Appendix A	Tabulated Test Pit Logs			
	Appendix B	Test Pit Photographs			
	Appendix C	CBR Test Results			
	Appendix D	Salinity Test Results			
	Appendix E	PSM3859-004L–167-201	Aldington	Road,	Kemps Creek–Interim Geotechnical Design Advice
	Appendix F	PSM3859-005S – Bulk Earthworks Specifications			



Notes:



Approximate Site Boundary
Approximate Test pit Location



167-201 Aldington Road
Frasers Property

Kemps Creek, NSW
SITE LOCALITY PLAN

PSM3859-003L

Figure 1



Photo 1 - Aerial Site Photo looking towards East (167-169 Aldington Road)



Photo 2 - Aerial Site Photo looking towards East (183-201 Aldington Road)



Frasers Property
167-201 Aldington Road
Kemps Creek NSW
GEOTECHNICAL INVESTIGATION
SELECTED SITE PHOTOS (1 OF 5)

PSM3859-003L

FIGURE 2



Photo 3 - General Site Photo looking towards South (167 Aldington Road)



Photo 4 - General Site Photo looking towards East (201 Aldington Road)



Frasers Property
167-201 Aldington Road
Kemps Creek NSW
GEOTECHNICAL INVESTIGATION
SELECTED SITE PHOTOS (2 OF 5)

PSM3859-003L

FIGURE 2



Photo 6 - Existing Farmland at 183 Aldington Road



Photo 5 - Existing Dam at 169 Aldington Road



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167-201 Aldington Road
Kemps Creek NSW
GEOTECHNICAL INVESTIGATION
SELECTED SITE PHOTOS (3 OF 5)

PSM3859-003L

FIGURE 2



Photo 7 - 15 T Excavator with the 300 mm Auger



Photo 8 - 15T Excavator with the 500 mm Bucket



Frasers Property
167-201 Aldington Road
Kemps Creek NSW
GEOTECHNICAL INVESTIGATION
SELECTED SITE PHOTOS (4 OF 5)

PSM3859-003L

FIGURE 2



Photo 9 - Typical CLAY Unit excavated on Site



Photo 10 - Typical SILTSTONE Unit excavated on Site



Photo 11 - Typical SANDSTONE Unit excavated on Site



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167-201 Aldington Road
Kemps Creek NSW
GEOTECHNICAL INVESTIGATION
SELECTED SITE PHOTOS (5 OF 5)

PSM3859-003L

FIGURE 2

Appendix A

Tabulated Test Pit Logs

Test Pit ID	Depth (m)	Material Encountered
TP01	0 – 0.1 m	TOPSOIL; silty CLAY; low plasticity, pale brown and grey, firm to stiff consistency, dry, rootlets and barks down to 0.1 m.
	0.1 – 0.5 m	CLAY; low to medium plasticity, pale brown and grey, very stiff to hard consistency, dry, trace of rootlets.
	0.5 – 0.8 m	CLAY; high plasticity, pale brown and grey, very stiff to hard consistency, dry to moist.
	0.8 – 1.2 m	SILTSTONE; pale grey and black, extremely weathered to highly weathered, very low strength.
	1.2 – 1.3 m	SILTSTONE; pale grey and black, highly weathered, low strength.
	1.3 m	Hole terminated at 1.3 m; target depth achieved.
TP02 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY; low plasticity, dark brown, firm consistency, dry, rootlets and barks down to 0.3 m.
	0.3 – 0.8 m	Silty CLAY; medium to high plasticity, dark brown, very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 0.7 m.
	0.8 – 1.5 m	SILTSTONE; pale grey and yellow, moderately weathered, iron stained, low to medium strength. Ironstone encountered from 0.8 m with medium strength.
	1.5 – 1.6 m	SILTSTONE; pale grey and red, moderately to slightly weathered, medium strength.
	1.6 m	Hole terminated at 1.6 m, target depth achieved.
TP-03	0 – 0.2 m	TOPSOIL; silty CLAY with gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry to moist, rootlets and barks down to 0.2 m.
	0.2 – 0.7 m	CLAY; high plasticity, pale grey and yellow, stiff to very stiff consistency, dry.
	0.7 – 1.2 m	SILTSTONE; pale grey, extremely weathered to highly weathered, extremely low to very low strength.
	1.2 – 1.3 m	SILTSTONE; pale black and grey, highly weathered to moderately weathered, low to medium strength.
	1.3 m	Hole terminated at 1.3 m, target depth achieved.
TP04 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY with trace of gravel; pale brown and grey, firm consistency, sub-angular gravel size up to 5 mm, low plasticity, dry, rootlets and barks down to 0.3 m.
	0.3 – 1.2 m	Silty CLAY; low plasticity, yellow and pale grey, stiff to very stiff consistency, dry. Becomes hard consistency from 1.0 m.
	1.2 – 1.5 m	SILTSTONE; pale grey and yellow, moderately weathered, low to medium strength.
	1.5 m	Hole terminated at 1.5 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP05	0 – 0.1 m	TOPSOIL; silty CLAY with gravel; low plasticity, dark brown, soft to firm consistency, sub-angular gravel size up to 5 mm, dry to moist, rootlets and barks down to 0.1 m.
	0.1 – 0.4 m	CLAY; low to medium plasticity, dark brown and grey, stiff to very stiff consistency, dry to moist, trace of rootlets.
	0.4 – 1.2 m	CLAY; high plasticity, pale brown and yellow, stiff to very stiff consistency, dry to moist. Becomes hard consistency from 0.9 m.
	1.2 – 1.8 m	SILTSTONE; brown and grey, extremely weathered to highly weathered, extremely low to very low strength.
	1.8 m	Hole terminated at 1.8 m, target depth achieved.
TP06 (Auger)	0 – 0.1 m	TOPSOIL; silty CLAY; low plasticity, dark brown and grey, firm consistency, moist, rootlets and barks down to 0.1 m.
	0.1 – 0.3 m	Silty CLAY; low to medium plasticity, brown and grey, stiff consistency, moist, trace of rootlets.
	0.3 – 1.5 m	Silty SAND; fine grained, dense density, yellow and grey, moist.
	1.5 – 2.0 m	SILTSTONE; yellow and dark grey, moderately weathered, low to medium strength. Becomes medium strength from 1.9 m.
	2.0 m	Hole terminated at 2.0 m, target depth achieved.
TP07	0 – 0.2 m	TOPSOIL; silty CLAY with gravel, low plasticity, dark brown and grey, stiff consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.2 m.
	0.2 – 1.0 m	CLAY; medium to high plasticity, pale red and grey, very stiff to hard consistency, dry to moist.
	1.0 – 1.4 m	SILTSTONE; pale grey and brown, extremely weathered to highly weathered, iron stained, extremely low strength.
	1.4 m	Hole terminated at 1.4 m, target depth achieved.
TP08 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown and red, stiff consistency, dry, rootlets and barks down to 0.2 m.
	0.2 – 0.4 m	Silty CLAY; medium plasticity, dark brown and orange, very stiff consistency, dry.
	0.4 – 0.8 m	CLAY; high plasticity, brown and red, very stiff consistency, dry.
	0.8 – 1.4 m	SILTSTONE; pale grey and yellow, moderately weathered, low to medium strength.
	1.4 – 1.5 m	SILTSTONE; dark grey and black, slightly weathered, medium to high strength.
	1.5 m	Hole terminated at 1.5 m, target depth achieved

Test Pit ID	Depth (m)	Material Encountered
TP09	0 – 0.1 m	TOPSOIL; silty CLAY; low plasticity, dark brown and grey, firm to stiff consistency, dry, rootlets and barks down to 0.1 m.
	0.1 – 1.3 m	CLAY; high plasticity, pale red and grey, very stiff consistency, moist. Becomes hard consistency from 1.0 m.
	1.3 – 1.7 m	SILTSTONE; pale grey and red, highly weathered to extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.6 m with medium strength.
	1.7 m	Hole terminated at 1.7 m, target depth achieved.
TP10 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; medium plasticity, dark brown and red, firm consistency, dry to moist, rootlets and barks down to 0.2 m.
	0.2 – 1.0 m	CLAY; high plasticity, brown, yellow and red, very stiff consistency, dry to moist. Becomes hard consistency from 0.9 m.
	1.0 – 2.0 m	SILTSTONE; dark grey and yellow, highly weathered to moderately weathered, low to medium strength.
	2.0 – 2.1 m	SILTSTONE; dark grey and pale grey, slightly weathered to moderately weathered, medium to high strength.
	2.1 m	Hole terminated at 2.1 m, target depth achieved.
TP11	0 – 0.3 m	TOPSOIL; sandy silty CLAY; low plasticity, pale grey and brown, firm consistency, fine sand, dry to moist, rootlets and barks down to 0.3 m.
	0.3 – 1.5 m	CLAY; medium to high plasticity, pale grey and yellow, very stiff consistency, dry to moist. Becomes hard consistency from 1.1 m.
	1.5 – 1.8 m	SILTSTONE; pale grey and black, highly weathered, very low to low strength.
	1.8 m	Hole terminated at 1.8 m, target depth achieved.
TP12 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY; low to medium plasticity, dark brown and orange, firm consistency, moist, rootlets and barks down to 0.3 m.
	0.3 – 0.5 m	CLAY; medium plasticity, pale grey, brown and yellow, very stiff consistency, moist.
	0.5 – 0.7 m	CLAY; medium to high plasticity, pale brown and yellow, very stiff consistency, dry to moist.
	0.7 – 1.0 m	SILTSTONE; pale grey and yellow, moderately weathered, low to medium strength.
	1.0 m	Hole terminated at 1.0 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP13	0 – 0.2 m	TOPSOIL; silty CLAY with gravel; low plasticity, pale brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.2 m.
	0.2 – 0.9 m	CLAY; high plasticity, pale brown and grey, stiff to very stiff consistency, dry to moist. Becomes hard consistency from 0.8 m.
	0.9 – 1.5 m	SILTSTONE; pale brown and grey, extremely weathered to highly weathered, iron stained, very low to low strength. Ironstone encountered from 1.3 m with medium strength.
	1.5 m	Hole terminated at 1.5 m, target depth achieved.
TP14 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown and orange, firm consistency, dry, rootlets and barks down to 0.2 m.
	0.2 – 1.8 m	CLAY; low to medium plasticity, red and pale grey, very stiff consistency, dry.
	1.8 – 2.0 m	SILTSTONE; pale grey, yellow and red, extremely weathered, iron stained, extremely low strength. 200 mm ironstone encountered from 1.8 m with medium strength.
	2.0 – 2.2 m	SILTSTONE; pale grey and red, moderately weathered, iron stained, low to medium strength.
	2.2 m	Hole terminated at 2.2 m, target depth achieved.
TP15	0 – 0.1 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown and black, firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.1 m.
	0.1 – 0.9 m	CLAY; medium to high plasticity, pale grey, red and brown, very stiff consistency, moist, trace of rootlets.
	0.9 – 1.1 m	SILTSTONE; pale grey, orange and red, extremely weathered to highly weathered, very low to low strength.
	1.1 – 1.2 m	SILTSTONE; pale grey and brown, highly weathered, iron stained, medium strength.
	1.2 m	Hole terminated at 1.2 m, target depth achieved.
TP16 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; medium plasticity, dark brown and black, firm consistency, moist, rootlets and barks down to 0.2 m.
	0.2 – 1.3 m	CLAY; medium to high plasticity, orange and pale grey, stiff to very stiff consistency, moist.
	1.3 – 1.7 m	CLAY; high plasticity, pale grey and red, stiff to very stiff consistency, moist. Becomes hard consistency from 1.6 m.

Test Pit ID	Depth (m)	Material Encountered
	1.7 – 1.8 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.7 m with medium strength.
	1.8 m	Hole terminated at 1.8 m, target depth achieved.
TP17	0 – 0.1 m	FILL; roadbase and gravel; grey and black, sub-angular gravel size up to 30 mm, dry.
	0.1 – 0.2 m	FILL; silty CLAY with gravel; low plasticity, dark grey and brown, firm to stiff consistency, sub-angular gravel size up to 20mm, dry,
	0.2 – 0.8 m	CLAY; high plasticity, dark red and grey, very stiff to high dry to moist, trace of rootlets.
	0.8 – 1.7 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, very low to low strength.
	1.7 m	Hole terminated at 1.7 m, target depth achieved.
TP18 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY; medium plasticity, dark brown and black, soft to firm consistency, moist to wet, rootlets and barks down to 0.3 m.
	0.3 – 1.0 m	Silty CLAY; medium plasticity, dark brown, stiff consistency, moist to wet.
	1.0 – 2.6 m	CLAY; medium to high plasticity, pale brown and yellow, very stiff consistency, moist to wet, trace of rootlets. Becomes hard consistency from 2.5 m.
	2.6 – 3.0 m	SILTSTONE; pale grey and red, highly weathered to moderately weathered, iron stained, low to medium strength. Ironstone encountered from 2.6 m with medium strength.
	3.0 m	Hole terminated at 3.0 m, target depth achieved.
TP19	0 – 0.1 m	TOPSOIL; silty CLAY; low plasticity, dark brown and grey, very stiff consistency, dry, rootlets and barks down to 0.1 m.
	0.1 – 0.7 m	CLAY; low to medium plasticity, pale grey, brown and red, very stiff consistency, dry. Becomes hard plasticity from 0.6 m.
	0.7 – 1.3 m	SILTSTONE; pale grey and orange, highly weathered, iron stained, low to medium strength. Ironstone encountered from 0.8 m with medium strength.
	1.3 m	Hole terminated at 1.3 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP20 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY, low to medium plasticity, dark brown, firm consistency, dry, rootlets and barks down to 0.3 m.
	0.3 – 0.8 m	CLAY; medium plasticity, dark brown and grey, very stiff consistency, dry.
	0.8 – 1.5 m	CLAY; medium to high plasticity, pale grey and red, very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 1.4 m.
	1.5 – 2.1 m	SILTSTONE; pale grey and red, extremely weathered to highly weathered, iron stained, very low to low strength. Ironstone encountered from 1.5 m with medium strength.
	2.1 – 2.2 m	SILTSTONE, pale grey, yellow and red, moderately weathered, iron stained, low to medium strength.
	2.2 m	Hole terminated at 2.2 m, target depth achieved.
TP21	0 – 0.3 m	TOPSOIL; silty CLAY; low plasticity, dark brown and black, soft consistency, moist, rootlets and barks down to 0.3 m.
	0.3 – 1.4 m	CLAY; medium to high plasticity, red, pale grey and brown, stiff consistency, moist. Becomes very stiff to hard consistency from 1.2 m.
	1.4 – 1.6 m	SILTSTONE; pale grey and brown, highly weathered, iron stained, low strength. Ironstone encountered from 1.45 m with medium strength.
	1.6 m	Hole terminated at 1.6 m, target depth achieved.
TP22 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown, firm consistency, sub-angular gravel size up to 5 mm, moist, rootlets and barks down to 0.3 m.
	0.3 – 0.8 m	CLAY; medium plasticity, dark brown and black, stiff to very stiff consistency, moist, trace of rootlets.
	0.8 – 2.0 m	CLAY; medium plasticity, red, orange and pale grey, very stiff consistency, moist, trace of rootlets. Becomes hard consistency from 1.9 m. Ironstone encountered from 1.9 m with medium strength.
	2.0 – 2.6 m	SILTSTONE; pale grey and red, extremely weathered, extremely low to very low strength.
	2.6 – 3.0 m	SILTSTONE; pale grey and red, highly weathered, low strength.
	3.0 m	Hole terminated at 3.0 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP23	0 – 0.1 m	TOPSOIL; silty CLAY; low plasticity, dark brown and grey, soft to firm consistency, dry, rootlets and barks down to 0.1 m.
	0.1 – 1.1 m	CLAY; medium to high plasticity, pale grey and red, stiff to very stiff consistency, moist, trace of rootlets. Becomes hard consistency from 0.9 m.
	1.1 – 1.3 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.1 m with medium strength.
	1.3 – 1.5 m	SILTSTONE; pale grey and red, highly weathered, iron stained, low strength.
	1.5 m	Hole terminated at 1.5 m, target depth achieved.
TP24	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, pale brown and grey, firm consistency, dry, rootlets and barks down to 0.2 m.
	0.2 – 1.5 m	CLAY; medium plasticity, pale grey and red, very stiff consistency, moist.
	1.5 – 1.6 m	SILTSTONE; pale grey and red, extremely weathered, extremely low to very low strength.
	1.6 – 1.75 m	SILTSTONE; pale grey and yellow, highly weathered to moderately weathered, low to medium strength.
	1.75 m	Hole terminated at 1.75 m, target depth achieved.
TP25 (Auger)	0 – 0.1 m	TOPSOIL; silty CLAY; medium plasticity, dark brown, firm consistency, moist, rootlets and barks down to 0.1 m.
	0.1 – 1.5 m	CLAY; medium to high plasticity, pale grey and red, stiff to very stiff consistency, moist. Becomes hard consistency from 1.4 m
	1.5 – 2.5 m	SILTSTONE; pale grey and orange, highly weathered, iron stained, low strength. Ironstone encountered from 1.5 m with medium strength.
	2.5 – 2.6 m	SILTSTONE; pale grey and red, moderately weathered, iron stained, medium strength.
	2.6 m	Hole terminated at 2.6 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP26 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY, low plasticity, dark brown and grey, firm consistency, dry to moist. rootlets and barks down to 0.3 m.
	0.3 – 1.0 m	CLAY; medium plasticity, dark brown, very stiff consistency, dry to moist. Becomes hard consistency from 0.9 m.
	1.0 – 1.5 m	SILTSTONE; pale grey and red, extremely weathered, very low to low strength.
	1.5 – 1.6 m	SILTSTONE; pale grey and red, moderately weathered, medium strength.
	1.6 m	Hole terminated at 1.6 m, target depth achieved.
TP27	0 – 0.3 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown and black, soft to firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.3 m.
	0.3 – 1.8 m	CLAY; medium plasticity, pale grey, red and orange, stiff to very stiff consistency, moist.
	1.8 – 1.9 m	CLAY; high plasticity; pale grey and yellow, stiff to very stiff consistency, moist.
	1.9 – 2.1 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, low strength. Ironstone encountered from 1.9 m with medium strength.
	2.1 m	Hole terminated at 2.1 m, target depth achieved.
TP28 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown, firm consistency, sub-angular gravel size up to 5 mm, moist, rootlets and barks down to 0.2 m.
	0.2 – 1.7 m	CLAY; medium to high plasticity, dark brown and red, stiff to very stiff consistency, moist, trace of rootlets. Becomes hard consistency from 1.6 m.
	1.7 – 2.0 m	SILTSTONE; pale grey and red, extremely weathered, extremely low strength.
	2.0 – 2.1 m	SILTSTONE; dark grey, moderately weathered, medium strength.
	2.1 m	Hole terminated at 2.1 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP29	0 – 0.2 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.2 m.
	0.2 – 1.35 m	CLAY; medium plasticity, pale grey and red, stiff to very stiff consistency, moist, trace of rootlets. Becomes high plasticity from 1.35 m.
	1.35 – 1.7 m	CLAY; high plasticity, pale grey, stiff to very stiff consistency, dry to moist.
	1.7 – 1.9 m	SILTSTONE; pale grey and red, highly weathered, low to medium strength. Ironstone encountered from 1.7 m with medium strength.
	1.9 m	Hole terminated at 1.9 m, target depth achieved.
TP30 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown, firm consistency, moist, rootlets and barks down to 0.2 m.
	0.2 – 1.8 m	CLAY; medium plasticity, dark brown, stiff to very stiff consistency, moist, trace of rootlets.
	1.8 – 2.8 m	CLAY; high plasticity, pale grey, stiff to very stiff consistency, moist, trace of rootlets. Becomes hard consistency from 2.7 m.
	2.8 – 3.0 m	SILTSTONE; pale grey and red, extremely weathered, extremely low strength.
	3.0 m	Hole terminated at 3.0 m, target depth achieved.
TP31	0 – 0.17 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, pale brown and grey, firm to stiff consistency, sub-angular gravel size up to 10 mm, dry, rootlets and barks down to 0.17 m.
	0.17 – 1.2 m	FILL; CLAY with ripped sandstone; low plasticity, pale grey and red, very stiff consistency, fine to medium grained sand, dry to moist. Becomes pale grey and yellow from 0.6 m.
	1.2 – 1.8 m	CLAY; high plasticity, pale grey, very stiff consistency, dry to moist.
	1.8 – 2.3 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, very low to low strength. Ironstone and carbonaceous stone encountered from 1.8 m with medium strength.
	2.3 m	Hole terminated at 2.3 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP32 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown and red, firm consistency, dry, rootlets and barks down to 0.2 m.
	0.2 – 0.8 m	CLAY; medium plasticity, dark brown, very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 0.7 m.
	0.8 – 1.5 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 0.8 m with medium strength.
	1.5 – 1.7 m	SILTSTONE; pale grey and yellow, moderately weathered, iron stained, low to medium strength.
	1.7 m	Hole terminated at 1.7 m, target depth achieved.
TP33	0 – 0.15 m	TOPSOIL; silty CLAY with trace of gravel, low plasticity, dark brown and grey, stiff consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.15 m.
	0.15 – 0.6 m	CLAY; low to medium plasticity, pale grey and red, very stiff consistency, dry to moist, trace of rootlets. Becomes medium to high plasticity and hard consistency from 0.4 m.
	0.6 – 1.0 m	SILTSTONE; pale grey and red, highly weathered to moderately weathered, iron stained, medium strength. Ironstone encountered from 0.6 m with medium strength.
	1.0 m	Hole terminated at 1.0 m, target depth achieved.
TP34 (Auger)	0 – 0.3 m	FILL; silty CLAY with ripped carbonaceous stone; low plasticity, dark brown and orange, firm consistency, dry to moist, rootlets and barks down to 0.3 m.
	0.3 – 0.9m	Silty CLAY; medium plasticity, dark brown, pale grey and red, stiff to very stiff consistency, dry, trace of rootlets.
	0.9 – 1.4 m	SILTSTONE; pale grey and red, highly weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.2 m with medium strength.
	1.4 – 1.5 m	SILTSTONE; pale grey and yellow, moderately weathered, medium strength.
	1.5 m	Hole terminated at 1.5 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP35	0 – 0.15 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, pale brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.15 m.
	0.15 – 1.0 m	CLAY; low to medium plasticity, pale grey and red, stiff to very stiff consistency, dry, trace of rootlets.
	1.0 – 1.1 m	CLAY; high plasticity, pale grey and orange, hard consistency, dry.
	1.1 – 1.65 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.1 m with medium strength.
	1.65 m	Hole terminated at 1.65 m, target depth achieved.
TP36 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low to medium plasticity, pale grey and brown, firm consistency, dry.
	0.2 – 1.0 m	Silty CLAY; medium plasticity, pale brown, stiff to very stiff consistency, dry. Becomes hard consistency from 0.9 m.
	1.0 – 1.8 m	SILTSTONE; pale grey and red, extremely weathered, extremely low to very low strength.
	1.8 – 1.9 m	SILTSTONE; dark grey and yellow, moderately weathered, medium strength.
	1.9 – 2.0 m	SANDSTONE; medium to coarse grained sand, slightly weathered, high strength.
	2.0 m	Hole terminated at 2.0 m, practical refusal.
TP37	0 – 0.15 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 20 mm, dry, rootlets down to 0.15 m.
	0.15 – 0.6 m	CLAY; medium plasticity, pale grey, orange and red, very stiff consistency, dry to moist. Becomes hard consistency from 0.6 m.
	0.6 – 1.2 m	SILTSTONE; pale grey, slightly to moderately weathered, iron stained, low to medium strength. Ironstone encountered from 0.6 m with medium strength.
	1.2 m	Hole terminated at 1.2 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP38 (Auger)	0 – 0.15 m	TOPSOIL; silty CLAY; low to medium plasticity, dark brown and red, firm consistency, moist.
	0.15 – 1.0 m	Silty CLAY; high plasticity, dark brown and red, stiff to very stiff consistency, moist. Becomes hard consistency from 0.9 m.
	1.0 – 1.7 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low strength. Ironstone encountered from 1.2 m with medium strength.
	1.7 – 1.8 m	SILTSTONE; pale grey and red, highly weathered to moderately weathered, iron stained, low strength.
	1.8 m	Hole terminated at 1.8 m, target depth achieved.
TP39 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown and grey, firm consistency, dry.
	0.2 – 1.6 m	CLAY; low to medium plasticity, pale grey and yellow, stiff to very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 1.4 m.
	1.6 – 2.0 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, low strength. Ironstone encountered from 1.6 m with medium strength.
	2.0 – 2.2 m	SILTSTONE; pale grey and red, highly weathered, low to medium strength.
	2.2 – 2.3 m	SILTSTONE; pale grey, moderately weathered, medium strength.
	2.3 m	Hole terminated at 2.3 m, target depth achieved.
TP40 (Auger)	0 – 0.1 m	TOPSOIL; silty CLAY; medium plasticity, dark brown, stiff consistency, dry, rootlets and barks down to 0.2 m.
	0.1 – 0.5 m	FILL; silty SAND with ripped sandstone; fine sand, pale brown and yellow, dense density.
	0.5 – 1.0 m	CLAY; medium to high plasticity, dark brown and red, very stiff consistency, dry to moist, trace of rootlets. Becomes hard consistency from 0.9 m.
	1.0 – 2.2 m	SILTSTONE; pale grey and brown, highly weathered, iron stained, extremely low to very low strength.
	2.2 – 3.0 m	SILTSTONE; pale grey, highly weathered, iron stained, very low to low strength. Ironstone encountered from 2.4 m with medium strength.
	3.0 – 3.4 m	SILTSTONE; pale grey and yellow, moderately weathered, iron stained, medium strength.
	3.4 m	Hole terminated at 3.4 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP41	0 – 0.12 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.12 m.
	0.12 – 1.1 m	CLAY; medium plasticity, pale grey and red, stiff to very stiff consistency, moist, trace of rootlets. Becomes hard consistency from 1.0 m.
	1.1 – 1.2 m	SILTSTONE; pale grey and orange, moderately weathered, iron stained, low to medium strength. Ironstone encountered from 1.1 m with medium strength.
	1.2 m	Hole terminated at 1.2 m, target depth achieved.
TP42 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY, low plasticity, dark brown, firm consistency, dry, rootlets and barks down to 0.2 m, waste disposal (e.g. plastic) encountered from 0.2 m.
	0.2 – 1.5 m	CLAY; medium plasticity, dark brown, stiff to very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 1.4 m.
	1.5 – 1.6 m	SILTSTONE; pale grey and red, extremely weathered, very low strength.
	1.6 – 2.0 m	SILTSTONE; pale grey and brown red, highly weathered, low to medium strength.
	2.0 m	Hole terminated at 2.0 m, target depth achieved.
TP43	0 – 0.15 m	TOPSOIL; silty CLAY; low to medium plasticity, dark brown and yellow, firm consistency, moist, rootlets and barks down to 0.15 m.
	0.15 – 1.5 m	FILL; silty CLAY; medium plasticity, dark brown and orange, firm consistency, moist. Plastic and rubber disposals encountered at 0.15 m.
	1.5 – 2.0 m	FILL; silty CLAY; medium plasticity, pale grey and black, stiff to very stiff consistency, moist. Bricks and concrete encountered at 1.5 m.
	2.0 – 5.0 m	FILL; silty CLAY; medium plasticity, black and grey, stiff consistency, moist to wet. Bricks and concrete encountered at 2.5 m. Tyre disposals encountered at 5 m.
	5.0 m	Hole terminated at 5.0 m, maximum excavation depth.

Test Pit ID	Depth (m)	Material Encountered
TP44 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY with gravel; low plasticity, dark brown and grey, firm consistency, sub-angular gravel size up to 5 mm, moist, rootlets and barks down to 0.3 m.
	0.3 – 1.0 m	Silty CLAY; low plasticity, pale grey, stiff to very stiff consistency, moist.
	1.0 – 2.0 m	Silty CLAY; medium to high plasticity, pale grey and red, very stiff consistency, moist. Becomes hard consistency from 1.9 m.
	2.0 – 2.5 m	SILTSTONE; pale grey and brown, extremely weathered, extremely low strength.
	2.5 – 3.0 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 2.5 m with medium strength.
	3.0 – 4.0 m	SILTSTONE; pale grey and red, highly weathered to moderately weathered, iron stained, low strength.
	4.0 m	Hole terminated at 4.0 m, target depth achieved.
TP45	0 – 0.3 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, dark brown, firm to stiff consistency, sub-angular gravel size up to 5 mm, dry, rootlets and barks down to 0.3 m.
	0.3 – 0.9 m	CLAY; low to medium plasticity, dark brown and red, very stiff consistency, moist, trace of rootlets and alluvial soils.
	0.9 – 1.9 m	CLAY; low plasticity, pale grey and yellow, very stiff consistency, moist. Becomes medium plasticity and pale grey and red from 1.1 m.
	1.9 – 2.0 m	SILTSTONE; pale grey and red, highly weathered, iron stained, low to medium strength. Ironstone encountered from 1.9 m with medium strength.
	2.0 m	Hole terminated at 2.0 m, target depth achieved.
TP46 (Auger)	0 – 0.1 m	TOPSOIL; CLAY; medium plasticity, dark brown and red, firm consistency, dry.
	0.1 – 0.5 m	CLAY; medium plasticity, pale grey and red, stiff consistency, moist.
	0.5 – 1.6 m	CLAY; high plasticity, pale grey and red, very stiff consistency, dry to moist.
	1.6 – 2.4 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 1.6 m with medium strength.
	2.3 – 2.4 m	SILTSTONE; pale grey and red, highly weathered to moderately weathered, iron stained, medium strength.
	2.4 m	Hole terminated at 2.4 m, target depth achieved.

Test Pit ID	Depth (m)	Material Encountered
TP47	0 – 0.1 m	TOPSOIL; silty CLAY with trace of gravel; low plasticity, pale brown and grey, stiff consistency, sub-angular gravel size up to 5 mm, dry to moist, rootlets and barks down to 0.1 m.
	0.1 – 0.6 m	CLAY; medium plasticity, pale grey and yellow, stiff to very stiff consistency, dry to moisture.
	0.6 – 2.5 m	CLAY; medium to high plasticity, pale grey and red, stiff to very stiff consistency, moisture. Becomes hard consistency from 2.4 m.
	2.5 – 3.1 m	SILTSTONE; pale grey and red, extremely weathered, iron stained, extremely low to very low strength. Ironstone encountered from 2.5 m with medium strength.
	3.1 – 3.2 m	SILTSTONE; pale grey and red, highly to moderately weathered, iron stained, extremely low strength.
	3.2 m	Hole terminated at 3.2 m, target depth achieved.
TP48 (Auger)	0 – 0.3 m	TOPSOIL; silty CLAY; low plasticity, dark brown and black, firm consistency, dry, rootlets and barks down to 0.3 m.
	0.3 – 1.0 m	CLAY; medium plasticity, pale grey and red, very stiff consistency, dry. Becomes hard consistency from 0.9 m.
	1.0 – 1.5 m	SILTSTONE; dark grey, moderately weathered, iron stained, medium strength. Ironstone encountered from 1.0 m with medium strength.
	1.5 – 1.9 m	SILTSTONE; pale grey, moderately weathered, iron stained, low strength.
	1.9 – 2.0 m	SILTSTONE; dark grey and black, moderately weathered, medium strength.
	2.0 m	Hole terminated at 2.0 m, target depth achieved.
TP49 (Auger)	0 – 0.2 m	TOPSOIL; silty CLAY; low plasticity, dark brown and yellow, firm consistency, dry, rootlets and barks down to 0.2 m.
	0.2 – 1.6 m	CLAY; medium plasticity, dark grey and brown, stiff to very stiff consistency, dry, trace of rootlets. Becomes hard consistency from 1.5 m.
	1.6 – 2.2 m	SILTSTONE; pale grey and red, extremely weathered, extremely low to very low strength. Ironstone encountered from 1.6 m with medium strength.
	2.2 – 2.3 m	SILTSTONE; pale grey and white, moderately weathered, low to medium strength.
	2.3 m	Hole terminated at 2.3 m, target depth achieved.

Table A – Test Pits Coordinates

Test Pit ID	Easting (m MGA)	Northing (m MGA)
TP01	295645	6253015
TP02 (Auger)	295755	6253011
TP03	295875	6252994
TP04 (Auger)	296001	6252986
TP05	296114	6252969
TP06 (Auger)	296264	6252946
TP07	296287	6252883
TP08 (Auger)	296166	6252883
TP09	296046	6252896
TP10 (Auger)	295927	6252907
TP11	295803	6252918
TP12 (Auger)	295688	6252934
TP13	295582	6252890
TP14 (Auger)	295723	6252851
TP15	295856	6252825
TP16 (Auger)	295978	6252820
TP17	296076	6252825
TP18 (Auger)	296219	6252757
TP19	296266	6252709
TP20 (Auger)	296148	6252724
TP21	296014	6252730
TP22 (Auger)	295927	6252738
TP23	295797	6252754
TP24	295688	6252768
TP25 (Auger)	295563	6252768
TP26 (Auger)	295693	6252690
TP27	295830	6252707
TP28 (Auger)	295960	6252667
TP29	296087	6252676
TP30 (Auger)	296196	6252640
TP31	296173	6252561
TP32 (Auger)	296067	6252576
TP33	295980	6252576

Test Pit ID	Easting (m MGA)	Northing (m MGA)
TP34 (Auger)	295873	6252590
TP35	295792	6252589
TP36 (Auger)	295683	6252582
TP37	295555	6252678
TP38 (Auger)	295878	6252549
TP39 (Auger)	295586	6252545
TP40 (Auger)	295706	6252526
TP41	295839	6252511
TP42 (Auger)	295931	6252471
TP43	296061	6252491
TP44 (Auger)	296101	6252427
TP45	295992	6252436
TP46 (Auger)	295892	6252431
TP47	295732	6252470
TP48 (Auger)	295670	6252457
TP49 (Auger)	295553	6252465

Note: The investigation locations were recorded with a hand-held GPS unit with a horizontal accuracy of approximately ± 5 m

Appendix B

Test Pit Photographs



Test Pit TP01



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP01

PSM3859-003L

Appendix B



Test Pit TP02 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP02 (Auger)

PSM3859-003L

Appendix B



Test Pit TP03



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP03

PSM3859-003L

Appendix B



Test Pit TP05



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP05

PSM3859-003L

Appendix B



Test Pit TP07



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP07

PSM3859-003L

Appendix B



Test Pit TP09



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP09

PSM3859-003L

Appendix B



Test Pit TP10 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP10 (Auger)

PSM3859-003L

Appendix B



Test Pit TP11



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP11

PSM3859-003L

Appendix B



Test Pit TP12 (Auger)



Frasers Property

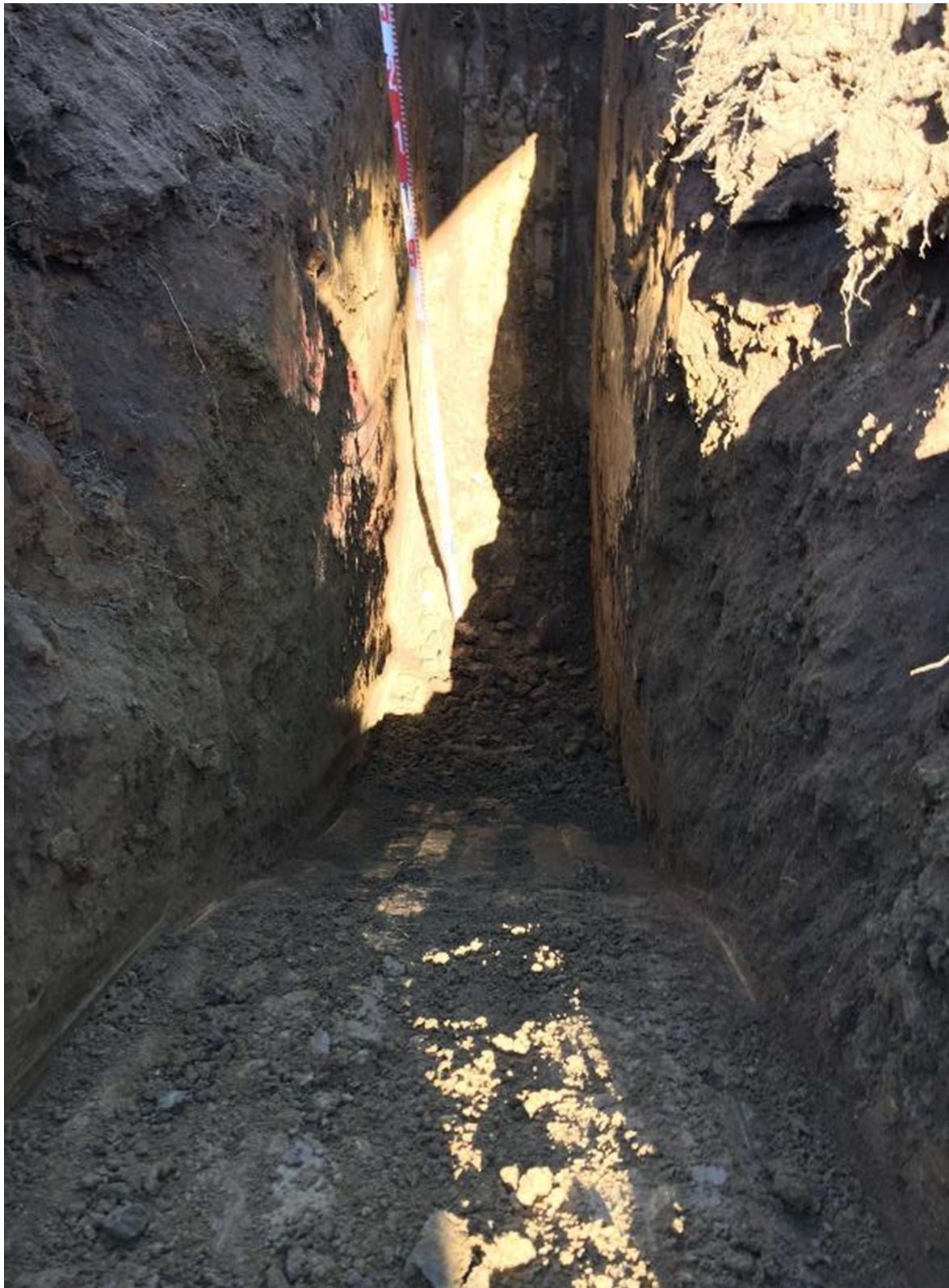
167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP12 (Auger)

PSM3859-003L

Appendix B



Test Pit TP13



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP13

PSM3859-003L

Appendix B



Test Pit TP14 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP14 (Auger)

PSM3859-003L

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Test Pit TP15



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP15

PSM3859-003L

Appendix B



Test Pit TP16 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP16 (Auger)

PSM3859-003L

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Test Pit TP17



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP17

PSM3859-003L

Appendix B



Test Pit TP18 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP18 (Auger)

PSM3859-003L

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Test Pit TP19



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP19

PSM3859-003L

Appendix B



Test Pit TP20 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP20 (Auger)

PSM3859-003L

Appendix B



Test Pit TP21



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP21

PSM3859-003L

Appendix B



Test Pit TP22 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP22 (Auger)

PSM3859-003L

Appendix B



Test Pit TP23



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP23

PSM3859-003L

Appendix B



Test Pit TP24



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP24

PSM3859-003L

Appendix B



Test Pit TP25 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP25 (Auger)

PSM3859-003L

Appendix B



Test Pit TP26 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP26 (Auger)

PSM3859-003L

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Test Pit TP27



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP27

PSM3859-003L

Appendix B



Test Pit TP28 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP28 (Auger)

PSM3859-003L

Appendix B



Test Pit TP31

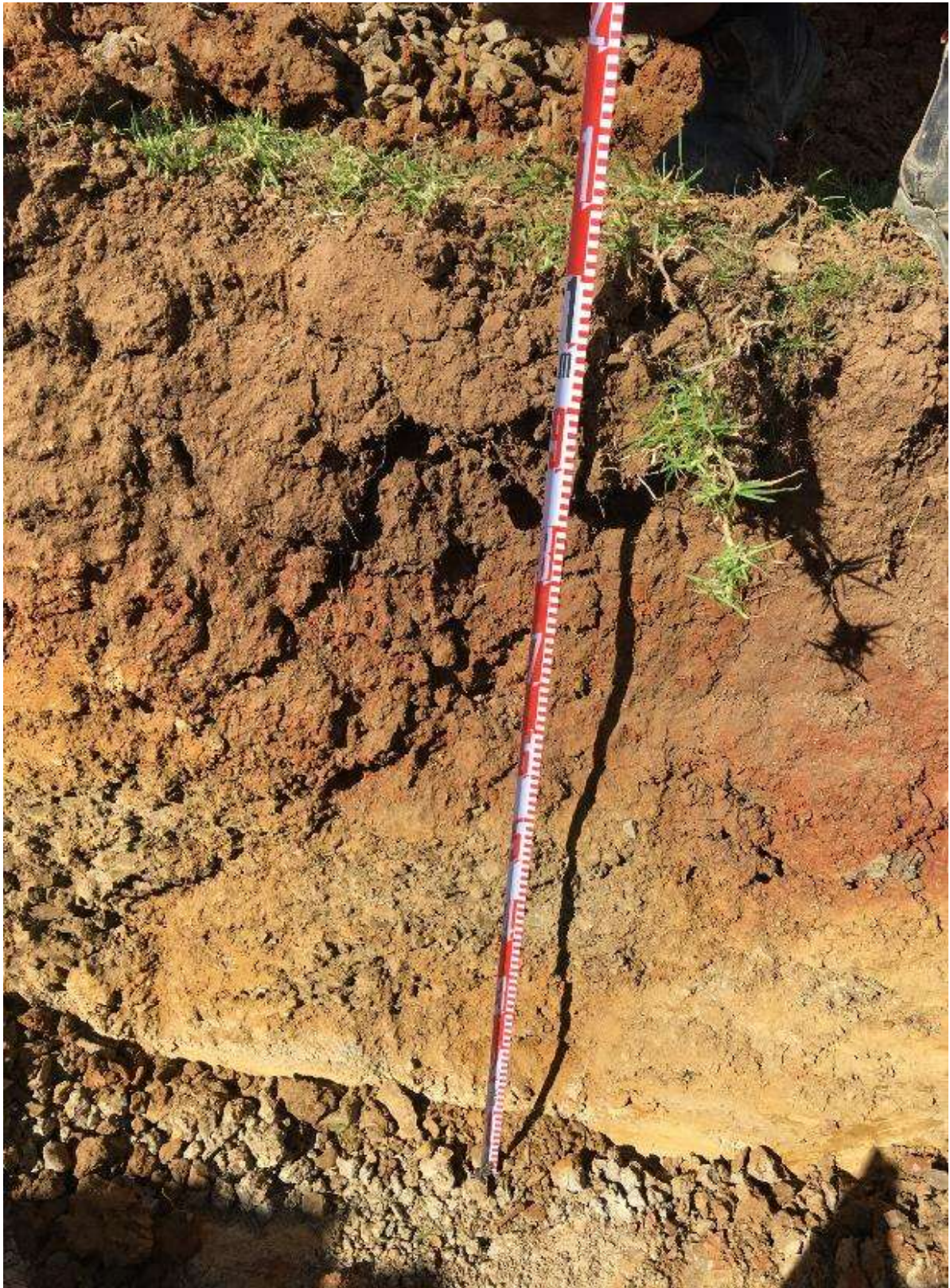


Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS

TP31

PSM3859-003L

Appendix B



Test Pit TP33



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP33

PSM3859-003L

Appendix B



Test Pit TP34 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP34 (Auger)

PSM3859-003L

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Test Pit TP35



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP35

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Test Pit TP36 (Auger)



Frasers Property 167-201 Aldington Road, Kemps Creek TEST PIT PHOTOS TP36 (Auger)	
PSM3859-003L	Appendix B



Test Pit TP37



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP37

PSM3859-003L

Appendix B



Test Pit TP38 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP38 (Auger)

PSM3859-003L

Appendix B



Test Pit TP39 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP39 (Auger)

PSM3859-003L

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Test Pit TP40 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP40 (Auger)

PSM3859-003L

Appendix B



Test Pit TP41



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP41

PSM3859-003L

Appendix B



Test Pit TP42 (Auger)



Frasers Property

167-201 Aldington Road, Kemps Creek

TEST PIT PHOTOS

TP42 (Auger)

PSM3859-003L

Appendix B



Test Pit TP43



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP43

PSM3859-003L

Appendix B



Test Pit TP44 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP44 (Auger)

PSM3859-003L

Appendix B



Test Pit TP45



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP45

PSM3859-003L

Appendix B



Test Pit TP46 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP46 (Auger)

PSM3859-003L

Appendix B



Test Pit TP47



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP47

PSM3859-003L

Appendix B



Test Pit TP48 (Auger)



Frasers Property
167-201 Aldington Road, Kemps Creek
TEST PIT PHOTOS
TP48 (Auger)

PSM3859-003L

Appendix B

Appendix C

CBR Test Results

FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: Pells Sullivan Meynink
PSM Job No.: PSM3859 - 167-201 Aldington Road

Ref No: L4295E
Report: 1
Report Date: 12/06/2019
Page 1 of 1

TESTPIT NUMBER	TP 23	TP 27	TP 29	TP 35
DEPTH (m)	0.50 - 1.10	0.30 - 1.80	0.00 - 0.40	0.40 - 1.10
Surcharge (kg)	4.5	4.5	4.5	4.5
Maximum Dry Density (t/m ³)	1.66 STD	1.73 STD	1.69 STD	1.56 STD
Optimum Moisture Content (%)	20.3	19.8	17.8	22.3
Moulded Dry Density (t/m ³)	1.63	1.70	1.65	1.53
Sample Density Ratio (%)	98	98	98	98
Sample Moisture Ratio (%)	100	98	97	103
Moisture Contents				
Insitu (%)	20.1	20.5	17.2	22.4
Moulded (%)	20.4	19.4	17.2	22.9
After soaking and				
After Test, Top 30mm(%)	28.9	27.4	33.8	34.5
Remaining Depth (%)	24.2	22.5	24.4	30.6
Material Retained on 19mm Sieve (%)	1*	0	0	0
Swell (%)	4.0	1.5	6.0	3.5
C.B.R. value: @2.5mm penetration	1.0	2.0	0.5	0.5

NOTES: Sampled and supplied by client.

- Refer to appropriate Test Pit logs for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.
- Date of receipt of sample: 03/06/2019.
- * Denotes not used in test sample.



NATA Accredited Laboratory
Number:1327

Accredited for compliance with ISO/IEC 17025 - Testing.
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All services provided by STS are subject to our standard terms and conditions. A copy is available on request.

Approved Signatory / Date
(D. Treweek)

 12/6/19

Appendix D

Salinity Test Results

CERTIFICATE OF ANALYSIS

Work Order : **ES1916922**
Client : **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**
Contact : **NGOC TUAN HOANG**
Address : **G3, 56 DELHI ROAD**
NORTH RYDE NSW, AUSTRALIA 2113
Telephone : **----**
Project : **167-201 ALDINGTONRD PS73859**
Order number : **----**
C-O-C number : **----**
Sampler : **NGOC TUAN HOANG**
Site : **----**
Quote number : **EN/333**
No. of samples received : **8**
No. of samples analysed : **8**

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 03-Jun-2019 12:30
Date Analysis Commenced : 03-Jun-2019
Issue Date : 07-Jun-2019 11:59



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ED045G: LOR raised for Chloride on a few samples due to sample matrix.
- EA032 (Saturated Paste EC): NATA accreditation does not cover the performance of this service.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H^+ + Al^{3+}).
- ALS is not NATA accredited for the calculation of saturated resistivity in a soil.



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				TP05 28.05.19 (0.3m) (8.30am)	BH02 31.05.19 (1m) (11am)	TP15 28.05.19 (0.6m) (13:30pm)	TP24 28.05.19 (0.5m) (3.50am)	BH36 30.05.19 (0.5m) (10am)
Client sampling date / time				28-May-2019 08:30	31-May-2019 11:00	28-May-2019 13:30	28-May-2019 15:50	30-May-2019 10:00
Compound	CAS Number	LOR	Unit	ES1916922-001	ES1916922-002	ES1916922-003	ES1916922-004	ES1916922-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.2	7.3	5.3	5.6	5.6
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	30	18	167	88	78
EA014 Total Soluble Salts								
Total Soluble Salts	----	5	mg/kg	96	58	544	286	254
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	15.3	13.8	15.0	15.6	16.3
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	3510	6580	1510	2100	3950
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	18.3	11.3	7.2	1.4	5.1
Exchangeable Magnesium	----	0.1	meq/100g	4.6	5.0	10.4	10.6	6.6
Exchangeable Potassium	----	0.1	meq/100g	0.6	0.2	0.3	0.2	0.2
Exchangeable Sodium	----	0.1	meq/100g	0.4	0.4	1.0	2.0	1.1
Cation Exchange Capacity	----	0.1	meq/100g	24.0	17.0	19.2	14.5	20.8
Exchangeable Sodium Percent	----	0.1	%	1.9	2.4	5.5	13.7	8.6
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	40	10	180	90	10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	<200	20	<200	<200	60



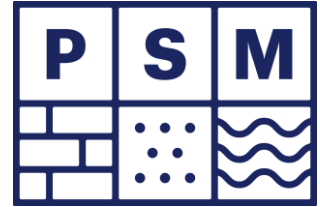
Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				TP41 29.05.19 (95-1m) (3pm)	BH44 30.05.19 (1.5-2m) (7am)	BH49 30.05.19 (1-1.5m) (11.30am)	----	----
Client sampling date / time				29-May-2019 15:00	30-May-2019 07:00	30-May-2019 11:30	----	----
Compound	CAS Number	LOR	Unit	ES1916922-006	ES1916922-007	ES1916922-008	-----	-----
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	4.9	5.2	5.8	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	863	297	593	----	----
EA014 Total Soluble Salts								
Total Soluble Salts	----	5	mg/kg	2800	965	1930	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	18.8	18.0	17.3	----	----
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	280	560	250	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	3.4	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	12.8	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	0.3	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	4.7	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	24.0	----	----	----
Exchangeable Sodium Percent	----	0.1	%	----	22.0	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.0	----	5.7	----	----
Exchangeable Magnesium	----	0.1	meq/100g	13.4	----	12.8	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.2	----	0.1	----	----
Exchangeable Sodium	----	0.1	meq/100g	1.6	----	2.5	----	----
Cation Exchange Capacity	----	0.1	meq/100g	17.3	----	21.2	----	----
Exchangeable Sodium Percent	----	0.1	%	9.3	----	11.8	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	530	170	230	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	1240	340	1020	----	----

Appendix E
PSM3859-004L
167-201 Aldington Road, Kemps Creek
Interim Geotechnical Design Advice



Our Ref: PSM3859-004L

13 June 2019

Frasers Property
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F +61-2 9812 5001
E mailbox@psm.com.au
www.psm.com.au

Attention: Michael Robinson

Dear Michael

**RE: 167-201 ALDINGTON ROAD, KEMPS CREEK
INTERIM GEOTECHNICAL DESIGN ADVICE**

1. Introduction

This letter presents interim geotechnical design advice (IGDA) for the proposed development at 167-201 Aldington Road, Kemps Creek. The work has been undertaken in accordance with the PSM proposal PSM3859-001L dated 23 May 2019.

2. Bulk Earthworks

PSM understand that cut and fill works will be required for this site. At this stage, volumes and depths of cut and fill are not known to PSM.

The design intent is for the bulk earthworks on site to be completed in accordance with a PSM Specification – PSM3859-005S Rev 0. The Specification sets out clearly the roles and responsibilities of the earthworks contractor and its Geotechnical Inspection and Testing Authority (GITA). The Specification will only be varied with the consent of PSM to ensure that this interim design advice is able to be confirmed at the completion of the earthworks.

The Specification allows for a broad range of fill to be incorporated into the earthworks. The Specification requires close inspection, and frequent testing to provide a high level of confidence that the completed work complies with the Specification.

We have based our assessment of moduli on numerous plate load tests (PLTs) completed on VENM/ENM fills by PSM. Fill placed in accordance with such a specification is referred to herein as ENGINEERED FILL. It is our opinion that the majority of the cut material would be suitable for reuse on the site as ENGINEERED FILL without the requirement for crushing. The criteria for and selection of acceptable material is set out in Clause 2.3 of The Specification.

If the structural or civil engineer requires engineering properties different to those provided in Section 3, then the Specification can be modified such that these properties will be obtained in the final earthworks.

This allows the additional cost of the earthworks to be balanced against any economies achieved in other parts of the works.

3. Geotechnical Design Advice for the Proposed Development

3.1 General

We note the details of the proposed development (e.g. type, loads, earthworks) are not known to PSM.

The design advice provided in the following sections has been prepared on the following basis:

- The proposed development will comprise subdivisions and typical light warehouse facilities.
- The subsurface conditions are as those encountered in the geotechnical investigation reported in PSM3859-003L.
- The earthworks are to be completed in accordance with the PSM bulk earthworks specification PSM3859-005S Rev 0.

If any of the above is not applicable, PSM should be requested to confirm that the design advice below is still valid.

We note that desiccation and/or wetting up of the pad surface is possible should it be exposed to the elements for an extended period of time, particularly at completion of the bulk earthworks prior to the builder taking responsibility for the pad. To reduce the likelihood of this and preserve the pad condition we recommend the following should be considered following completion of the bulk earthworks:

- Placement of a sacrificial layer comprising roadbase or other equivalent material.
- Grade the pad surface to reduce the extent and severity of standing water during and after weather events.
- Minimise the time between the completion of earthworks and the builder commencing construction of the warehouse roof.
- Limit vehicular and plant access until a roof has been installed.

Alternately, the builder may have to undertake some surficial remediation if the pad is to comply with the requirements of this IGDA (i.e. comply with the PSM Specification) at the time of construction. It is PSM's opinion that it should be the builder's responsibility to maintain the condition of the pad after the handover date and accept the risk that comes with modifying excavation levels and weather. There should be a strict transfer of the risk. We recommend that building tenderers be required to indicate how they intend to manage this risk.

3.2 Site Classification

While the proposed development is out of scope of AS2870-2011 "Residential slabs and footings", we assess that the characteristic surface movement, y_s , would be in the range 40 mm to 60 mm and thus would classify the site as Class H1. The civil and structural engineers should consider likely heave / settlement due to the effect of climatic factors in their designs.

We recommend that all structures and services be detailed such that they preclude any local wetting up or drying out of the subgrade after initial equilibrium is reached following construction of the slab and that the subgrade be within specification at the time of construction of the slab. We note that normal mounding or sagging away from the perimeter of covered areas will still occur and perimeters, or open joints, will still respond to environmental changes.

For effectively sealed areas away from the perimeter, the design should allow for the following:

- Differential mound movement, $y_m = 15$ mm. We note that this is not the total heave or settlement but the estimated local heave or settlement due to fill variability.
- Tilts of up to approximately 1 in 300.

Mounds at perimeters or penetrations of slabs open to the environment can be taken to be as per AS2870-2011 for $y_s = 45$ mm.

3.3 Permanent and Temporary Batters

The batter slope angles shown in Table 1 are recommended for the design of batters up to 3 m height and above the groundwater table; subject to the following recommendations:

1. The batters shall be protected from erosion.
2. Permanent batters shall be drained.
3. Temporary batters shall not be left unsupported for more than 1 month without further advice, and inspection by a geotechnical engineer should be undertaken following significant rain events.
4. Where loads are imposed or structures/services are located within one batter height of the crest of the batter, further advice should be sought.

Table 1 – Batter Slope Angles

Unit	Temporary	Permanent
SOIL UNITS, eg. ENGINEERED FILL, RESIDUAL SOIL	2.0H : 1V	2.5H : 1V
BEDROCK	1.0H : 1V	1.5H : 1V

Steeper batters may be possible subject to further advice, probably including inspection during construction.

The batters should be inspected by an experienced geotechnical engineer or engineering geologist during excavation to confirm the batter advice provided and assess the need for localised support, such as rock bolting to control adverse jointing and mesh and/or shotcreting for overall face support.

3.4 Excavation Support

Permanent cuts in the ENGINEERED FILL, RESIDUAL SOIL and BEDROCK units steeper than the recommended permanent batter slopes in Table 1 will need to be supported by some form of retaining structure.

Note that design of retention systems may be based on either K_a or K_o earth pressures. Design using active earth pressures provides the minimum lateral earth pressure that must be supported to avoid failure and requires a wall that can rotate or translate to allow the pressures to reduce to these values (vertical and lateral movements up to 2% of height may occur, typical movements will be much less).

Where the design is based on K_o pressures, construction should be carefully controlled to avoid unwanted effects. It should be noted that designing for K_o pressures does not, of itself, ensure that movement does not occur. Movements are controlled by the construction method, especially sequence.

The design of these structure should be based on the:

- Proposed wall geometry.
- Effective soil strength parameters in Table 2.
- 10 kPa lateral pressure for vertical cuts in BEDROCK. This is to allow for blocks and rock wedges formed due to adverse defects that may exist within the unit
- Surcharge loads behind the retention.
- Water pressure. The designer shall consider the information regarding groundwater in this report and the drainage features included in the design of the retention system.

Both surface and sub-surface drainage needs to be designed and constructed properly to prevent pore water pressures from building up behind the retaining walls or appropriate water pressures must be included in the design.

3.5 Foundations

3.5.1 Shallow Footings

Pad footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads provided in Table 2. Higher ABPs in soil units may be available, but these depend on the size, depth, loads, etc and would be subject to specific advice.

Settlements in soil units can be estimated using the elastic parameters provided in Table 2.

Table 2 – Engineering Parameters of Inferred Geotechnical Units

Inferred Unit	Bulk Unit Weight (kN/m ³)	Soil Effective Strength Parameters		Ultimate Bearing Pressure (UBP) under Vertical Centric Loading (kPa)	Allowable Bearing Pressure (ABP) under Vertical Centric Loading (kPa)	Elastic Parameters	
		c' (kPa)	φ' (deg)			Long Term Young Modulus (MPa)	Poisson's Ratio
SOIL UNITS, eg. ENGINEERED FILL, RESIDUAL SOIL	18	0	30	420 ¹	150	10	0.3
BEDROCK	22	NA	NA	3,000 ²	700 ³	50	0.25

- Note:
1. Pad footings (for ABP of 150 kPa) should have a minimum horizontal dimension of 1.0 m and a minimum embedment depth of 0.5 m.
 2. Ultimate values occur at large settlement (>5% of minimum footing dimensions).
 3. End bearing pressure to cause settlement of <1% of minimum footing dimensions.

3.5.2 Slab on ground

The design of slabs on ground on the ENGINEERED FILL and RESIDUAL SOIL units can be based on a subgrade with a long-term Young's Modulus of 10 MPa. The short-term Young's modulus can be taken to be 15 MPa.

We note that the environmental effects (e.g. drying or wetting up of the finished surface) affecting the land prior to development should be taken into account by the various designers of any development.

We note that the final bulk earthworks subgrade will require proof rolling and plate load testing to confirm the properties provided and may require some boxing out and refilling, etc.

We understand that the structural engineer should be able to design efficient slabs. If assessed deformation and settlement is an issue, our advice can be further refined if required.

The structural designer or builder may wish to employ a surface layer of road base / crushed sandstone / concrete for trafficability or structural purposes. This is not required to achieve the properties provided in this design advice.

3.6 Pavements

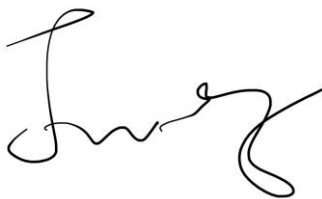
A total of three CBR tests were undertaken in the geotechnical investigation (Ref. PSM3859-003L). The test results indicate a soaked CBR value of between 0.5% and 2%. We note that the low CBR values were associated to samples' high swell.

We advise that a CBR of 2% can be adopted for subgrade and fill formed in bulk earthworks constructed in accordance with the Specification. Higher values, particularly in areas of significant cut, may be provided on completion of testing on the finished bulk earthworks or if, on request, the Specification is varied to obtain such higher values on fill.

We recommend that specific CBR testing be undertaken at subgrade level when pavement layouts are finalised.

Should there be any queries, do not hesitate to contact the undersigned.

For and on behalf of
PELLS SULLIVAN MEYNINK

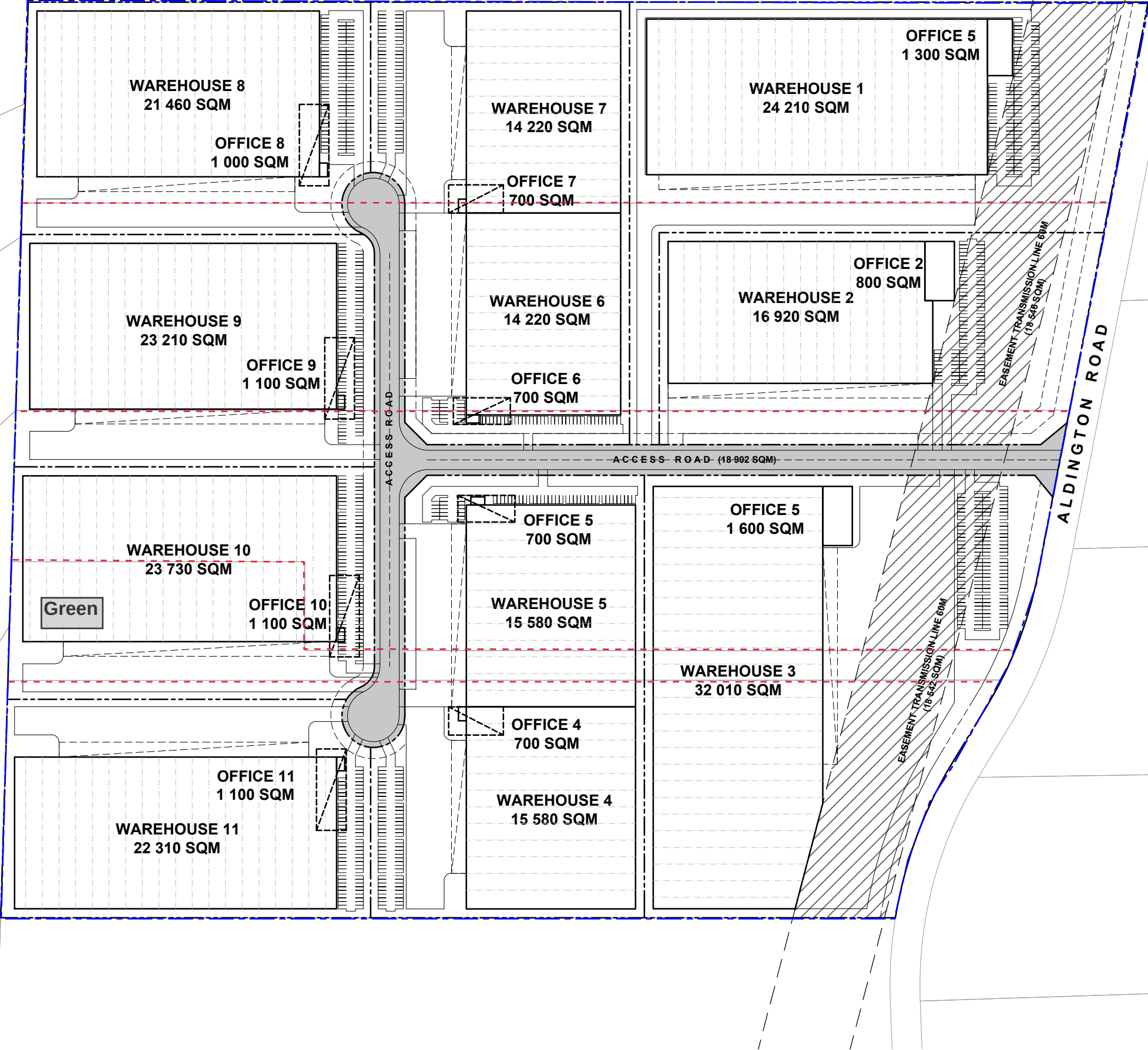
A handwritten signature in black ink, appearing to read 'Juno Liang', with a stylized, flowing script.

JUNO LIANG
GEOTECHNICAL ENGINEER

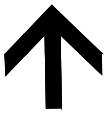
A handwritten signature in black ink, appearing to read 'Agustria Salim', with a stylized, flowing script.

AGUSTRIA SALIM
PRINCIPAL

Encl. Figure 1 – Locality Plan



DEVELOPMENT AREAS	
GROSS SITE AREA	430507 SQM
EASEMENT TRANSMISSION LINE	18546 SQM
EASEMENT TRANSMISSION LINE	18542 SQM
ACCESS ROAD	18902 SQM
NET DEVELOPABLE AREA	374517 SQM
WAREHOUSE 1	24210 SQM
OFFICE 1	1300 SQM
WAREHOUSE 2	16920 SQM
OFFICE 2	800 SQM
WAREHOUSE 3	32010 SQM
OFFICE 3	1600 SQM
WAREHOUSE 4	15580 SQM
OFFICE 4	700 SQM
WAREHOUSE 5	15580 SQM
OFFICE 5	700 SQM
WAREHOUSE 6	14220 SQM
OFFICE 6	700 SQM
WAREHOUSE 7	14220 SQM
OFFICE 7	700 SQM
WAREHOUSE 8	21460 SQM
OFFICE 8	1000 SQM
WAREHOUSE 9	23210 SQM
OFFICE 9	1100 SQM
WAREHOUSE 10	23730 SQM
OFFICE 10	1100 SQM
WAREHOUSE 11	22310 SQM
OFFICE 11	1100 SQM
TOTAL BUILDING AREA	234250 SQM
EFFICIENCY	62.5%



Appendix F
PSM3859-005S Rev0
Bulk Excavation Specification

167-201 Aldington Road, Kemps Creek NSW

Bulk Earthwork Specification. Filling, Cutting and Testing

PSM3859-005S Rev 0 13 June 2019



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1 Scope

This specification details the requirements for the bulk earthworks to be undertaken at 167-201 Aldington Road, Kemps Creek. The area where this specification is applicable is shown in Figure 1. This includes areas where material is filled or cut to bulk earthworks level (BEL) within the site.

Fill placed in accordance with this specification is denoted as Engineered Fill.

This specification does not address any environmental, contamination or erosion issues with respect to the fill material.

2 Filling Works

2.1 Subgrade Preparation

The condition of the subgrade should be assessed immediately prior to the commencement of filling.

All Engineered Fill is to be placed on one of the following materials:

1. Bedrock.
2. Natural insitu material of at least stiff consistency.
3. Engineered compacted fill placed in accordance with this or other approved specifications for which the Geotechnical Inspection and Testing Authority (GITA) has a Level 1 certificate certifying compliance with that approved specification AND of at least stiff consistency.
4. Existing fill and other materials as approved by PSM.

It is likely sediment within existing dams/ponds will be required to be removed for the subgrade to meet the above requirement.

Proof rolling shall only be undertaken under the direction of PSM. PSM may also direct a bridging layer of Engineered Fill be placed and compacted to a Dry or Hilt Density Ratio (Standard Compaction) of between 98% and 102%. Any such layer shall be a Lot under Clause 5.3.

The GITA should satisfy itself that the subgrade has not been desiccated, affected by rain or disturbed. If the GITA cannot so satisfy itself, then the subgrade should be moisture conditioned and compacted to be in accordance with Clauses 2.5 and 2.6 of this specification.

Engineered Fill shall be placed only on subgrade approved by the GITA as being in accordance with this specification.

2.2 Base Geometry

The slope of any buried batter shall be less than 1H:1V unless otherwise directed by PSM.

The contractor shall remove or flatten any geometrical obstructions (e.g. protrusions or holes) such that subsequent Engineered Fill can be placed to achieve the requirements of this specification.

Engineered Fill shall be placed only on areas where the base geometry has been approved by the GITA.



2.3 Material

2.3.1 Imported Fill

Imported Engineered Fill is to conform to one of the following definitions:

1. "Virgin excavated natural material" (VENM) as defined by the Protection of the Environment Operations Act 1997 No 156, Schedule 1, on Page 209:

"Virgin excavated natural material (eg clay, gravel, sand, soil and rock) that is not mixed with any other waste and that:

- a. has been excavated from areas that are not contaminated, as a result of industrial, commercial, mining or agricultural activities, with manufactured chemicals and that does not contain sulphide ores or soils, or
 - b. consists of excavated natural materials that meet such criteria as may be approved by the EPA".
2. "Excavated natural material" (ENM) as defined by the Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A, the excavated natural material exemption 2012:

"Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- a. been excavated from the ground, and
- b. contains at least 98% (by weight) natural material, and
- c. does not meet the definition of Virgin Excavated Natural Material in the Act.
- d. Excavated Natural Material does not include material that has been located in a hotspot; that has been processed; or that contains asbestos, Acid Sulphate Soils (ASS), Potential Acid Sulphate soils (PASS) or sulfidic ores."

and which meets the requirements of this exemption.

2.3.2 Site Won Material

Site Won material shall comprise material won from excavations on site including natural and existing fill. They need to satisfy Clause 2.3.3.

2.3.3 All Fill

The Engineered Fill shall be approved by the GITA as suitable for use in a structural fill.

Engineered Fill shall not comprise unsuitable material as defined by Clause 4.3 of AS3798-2007 "Guidelines on earthworks for commercial and residential developments" as:

- a. "organic soils, such as many topsoils, severely root-affected subsoils and peat;
- b. materials contaminated through past site usage which may contain toxic substances or soluble compounds harmful to water supply or agriculture;
- c. materials containing substances which can be dissolved or leached out in the presence of moisture (eg: gypsum), or which undergo volume change or loss of strength when disturbed and exposed to moisture (eg: some shales and sandstones), unless these matters are specifically addressed in the design;
- d. silts, or materials that have the deleterious engineering properties of silt;
- e. other materials with properties that are unsuitable for the forming of structural fill; and
- f. fill that contains wood, metal, plastic, boulders or other deleterious material, in sufficient proportions to affect the required performance of the fill."



The GITA shall assess that the proportion of deleterious material in each Lot is not greater than 1% by weight. Deleterious material is defined by Table 3015.3 of the RTA QA Specification 3051 (Edition 5 June 1998) as:

“Type III: Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and Other Vegetable Matter”

If the GITA is not able to visually assess the above criterion, the GITA shall arrange appropriate testing.

All Engineered Fill particles shall be able to be incorporated within a single layer. Further, less than 30% of particles shall be retained on the 37.5 mm sieve.

Engineered Fill shall be able to be tested in accordance with the Standard Compaction method (AS1289.5.4.1) or Hilf test method (AS1289.5.7.1). These methods require less than 20% retained on the 37.5 mm sieve. Where between 20% and 30% of particles are retained on the 37.5 mm sieve the above test methods shall still be adopted and test reports annotated appropriately.

These requirements should be met by the material after placement and compaction.

Only material approved by the GITA shall be placed as Engineered Fill.

2.4 Fill Zonation and Placement

Engineered Fill shall be placed in accordance with the following requirements:

1. In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the GITA.
2. The compacted thickness of each layer shall be equal to or less than 300 mm.

Engineered Fill shall only be placed on subgrade in accordance with this specification and approved by the GITA.

2.5 Compaction

Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.

The insitu density shall be measured over the full depth of each layer placed.

2.6 Moisture Control

The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.

Placement moisture content of the Engineered Fill shall be measured.

3 Cutting

3.1 Subgrade Condition

The subgrade is to comprise one of the following materials:

1. Bedrock.
2. Natural insitu material of at least stiff consistency.
3. Existing fill and other materials as approved by PSM.

Proof rolling shall only be undertaken under the direction of PSM.

The GITA should satisfy itself that the subgrade has not been desiccated, affected by rain or disturbed. If the GITA cannot so satisfy itself, then the subgrade should be excavated and filled to the BEL in accordance with this specification.



4 Survey

4.1 Filling Areas

The survey requirements are as follows:

1. Any approved subgrade shall be surveyed prior to first filling such that subgrade levels are established to within ± 0.1 m. The area subject to approval shall be assessed and shown on a plan drawing to an accuracy of at least ± 5 m in plan.
2. The Lot boundaries shall be assessed and shown on a plan drawing to an accuracy of at least ± 5 m in plan.
3. The location of the field density tests shall be assessed and shown on the Lot boundary plan drawing to an accuracy of at least ± 5 m in plan.
4. The elevation of the field density tests shall be surveyed to an accuracy of ± 0.05 m.

The plan drawing shall show at the boundaries of the site and other identifiable site features, so as to allow the location of the lots and the test to be recoverable.

4.2 Cutting Areas

Any approved subgrade for cut areas shall be surveyed such that subgrade levels are established to within ± 0.1 m.

5 Inspection and Testing

5.1 Role of the GITA

The Geotechnical Inspection and Testing Authority (GITA) shall be contracted to document and certify that the works undertaken by the contractor has been completed in accordance with the relevant design and specifications.

5.2 Level 1 Control

The GITA shall adopt Level 1 responsibility as described in Section 8.2 of AS 3798-2007 "Guidelines on earthworks for commercial and residential developments":

"The primary objective of Level 1 Inspection and Testing is for the geotechnical inspection and testing authority (GITA) to be able to express an opinion on the compliance of the work. The GITA is responsible for ensuring that the inspection and testing are sufficient for this purpose.

The geotechnical inspection and testing authority needs to have competent personnel on site at all times while earthwork operations are undertaken. Such operations include:

- Completion of removal of top soil
- Placing of imported or cut material
- Compaction and adding/removal of moisture
- Trenching and backfilling
- Test rolling
- Testing

The superintendent should agree a suitable inspection and testing plan prior to commencement of the works.

On completion of the earthworks, the GITA will usually be required to provide a report setting out the inspections, sampling and testing it has carried out, and the locations and results thereof. Unless very unusual conditions apply, the GITA should also be able to express an opinion that the works (as far as it has been able to determine) comply with the requirements of the specification and drawings."



For this particular contract, Level 1 responsibility includes:

1. Lot testing as per Clause 5.3 of this specification.
2. A frequency of compaction testing not less than that specified in Clause 5.4 of this specification.
3. The GITA documenting and reporting its activity in the terms required by Clause 6 of this specification.
4. The GITA undertaking adequate inspections and testing to comply with the above requirements and to be able to certify the fill in the terms required by Clause 6 of this specification.

5.3 Lot Testing

This specification requires lot testing to be undertaken.

A Lot is defined as a single layer of Engineered Fill consisting of uniform material which has undergone similar treatment.

Lot testing comprises the following:

1. A Lot shall be identified by the Contractor or the GITA with a Lot Number and presented for testing.
2. A Lot shall be deemed to be in accordance with the specification if all the tests undertaken within the Lot are in accordance with the specification, i.e. "a none to fail basis".
3. If any one test undertaken within a Lot fails, the whole of the Lot shall be reworked and retested.

Any portion of the placed Engineered Fill must be part of a single lot and all Lots will require approval by the GITA.

5.4 Testing Frequency (Compaction Testing)

The frequency of compaction testing for each lot shall be the greater of:

1. For lot less than 50 m³
 - a. 1 test per lot
2. For lot between 50 m³ and 100 m³
 - a. 2 tests per lot
3. For lot greater than 100 m³
 - a. 1 test per 500 m³ of material placed
 - b. 3 tests per lot.

A laboratory moisture content test shall be undertaken for each field density test.

5.5 Proof Rolling and Plate Load Testing

Proof rolling, together with minor boxing out and refilling, of the upper surface of the bulk earthworks will be undertaken as directed by PSM. The plant to be adopted depends upon the design loads adopted by the structural engineers for each section of the site.

Plate load testing shall be undertaken at the direction of PSM at final bulk earthworks level (BEL) prior to placement of roadbase or capping material. Expected test frequency is approximately a day of testing for each building pad.

The contractor is to make a suitable reaction (eg 20 tonne excavator) available for the tests.

5.6 Inspection, Testing and Survey

The GITA shall at least undertake the following tasks:

Cut areas

1. Identify the subgrade as one of the three (3) subgrade types listed in Clause 3.1 of this specification and assess that the subgrade condition of cut areas is in accordance with the subgrade condition requirements of Clause 3.1 of this specification.



2. Should Engineered Fill be required to fill overcut areas, assess that filling has been placed in accordance with this specification.

Fill areas

3. Identify the subgrade as one of the four (4) subgrade types listed in Clause 2.1 of this specification and assess that the subgrade condition of any area prior to placement of fill material is in accordance with the subgrade preparation requirements of Clause 2.1 of this specification. The GITA needs to include / refer to PSM approval in its weekly report for subgrade comprising existing fill and other materials as approved by PSM
4. Assess that the base geometry of any area prior to placement of fill material is in accordance with the base geometry requirements of Clause 2.2 of this specification.
5. Assess that the material placed is in accordance with the fill material requirements of Clause 2.3 of this specification.
6. Assess that the Engineered Fill has been placed in accordance with the requirements for fill zonation and placement of Clause 2.4 of this specification.
7. Assess that each Lot as presented for approval by the contractor is in accordance with the requirements for Lot definition of Clause 5.3 of this specification.
8. Ensure that the survey requirements in Clause 4 of this specification have been completed.
9. Estimate the approximate volume of Engineered Fill placed in each Lot presented for approval.
10. Conduct Lot testing in accordance with the construction control testing requirements of Clauses 5.3 and 5.4 of this specification.
11. Assess that the compaction of each Lot is in accordance with the requirements of Clause 2.5 of this specification. The GITA shall select a depth of insitu density tests that allows the density of the full layer to be assessed.
12. Assess that the moisture variation of each Lot is in accordance with the requirements for moisture control in Clause 2.6 of this specification.
13. Conduct material property testing in accordance with the material testing requirements in this specification.

6 Reporting and Certification

6.1 Reporting

The GITA shall produce at least the following reports:

1. *Subgrade Approval Reports* (a sample is attached). Such a report shall:
 - Document assessments undertaken for tasks 1 and task 3 of Clause 5.6 including reporting the subgrade type.
 - Document the subgrade survey that has been undertaken.
 - Approve or reject the subgrade condition and base geometry for filling, based on tasks 3 and 4 of Clause 5.6.
 - Approve or reject the subgrade condition for cut areas based on task 1.
2. *Lot Approval Reports* (a sample is attached). Such a report shall:
 - Document assessments, testing and survey undertaken for tasks 3 to 13 of Clause 5.6.
 - Report the results of testing undertaken for task 10 of Clause 5.6.
 - Approve or reject lots based on tasks 11 and 12 of Clause 5.6.
3. *Material Testing Reports*. Such a report shall:
 - Report the results of material property testing undertaken for task 13 of Clause 5.6.
4. *Daily Reports* (a sample is attached). Such a report shall be completed daily and shall:
 - Document time spent on site by the GITA personnel.
 - List subgrade assessments and approvals undertaken each day with reference to relevant Subgrade Approval Report(s).



- List Lots presented, accepted and approved or rejected each day, with reference to relevant Lot Approval Report(s).
- List survey undertaken each day as for task 8 of Clause 5.6 and not already documented in the Subgrade or Lot Approval Reports.
- Document other relevant activities undertaken on site that day (site instructions, breakdowns, compaction equipment used, etc.).

6.2 Certification

6.2.1 Weekly Certificates

The GITA shall produce a Weekly Certificate for any week in which earthworks are undertaken in accordance with this specification. The Weekly Certificate will cover all works from the previous Weekly Certificate until the end of work on a Saturday.

The Weekly Certificate shall transmit the following:

- Copy or reference to the complete specification document(s).
- Subgrade Approval Reports.
- Lot Approval Reports.
- Material property testing reports.
- Daily Reports.
- Survey of subgrade geometry prior to filling or in cut areas.
- Plan survey drawing showing lot boundaries and location of density tests.
- Survey documenting filling undertaken to date and showing location of testing.
- Provide an Excel spreadsheet presenting the results of the week's acceptance testing completed by the GITA.

And certify that:

“All the earthworks undertaken and the subgrade condition in the cut areas [in the stated period] are documented in the above reports and have been undertaken in accordance with the Specification (Ref. PSM3859-005S Rev 0 dated 12 June 2019).”

6.2.2 Interim or Final Filling Certificate

At the completion of the bulk earthworks, or as requested by the Client, the GITA shall provide an Interim or Final Filling Certificate which shall:

1. Transmit a reference list of the Weekly Certificates.
2. Provide an Excel spreadsheet presenting the results of all the acceptance testing completed by the GITA.
3. Certify that *“All the earthworks undertaken and the subgrade condition in the cut areas [in the stated period] are documented in the above reports and have been undertaken in accordance with the Specification (Ref. PSM3859-005S Rev 0 dated 12 June 2019).”*



Brisbane

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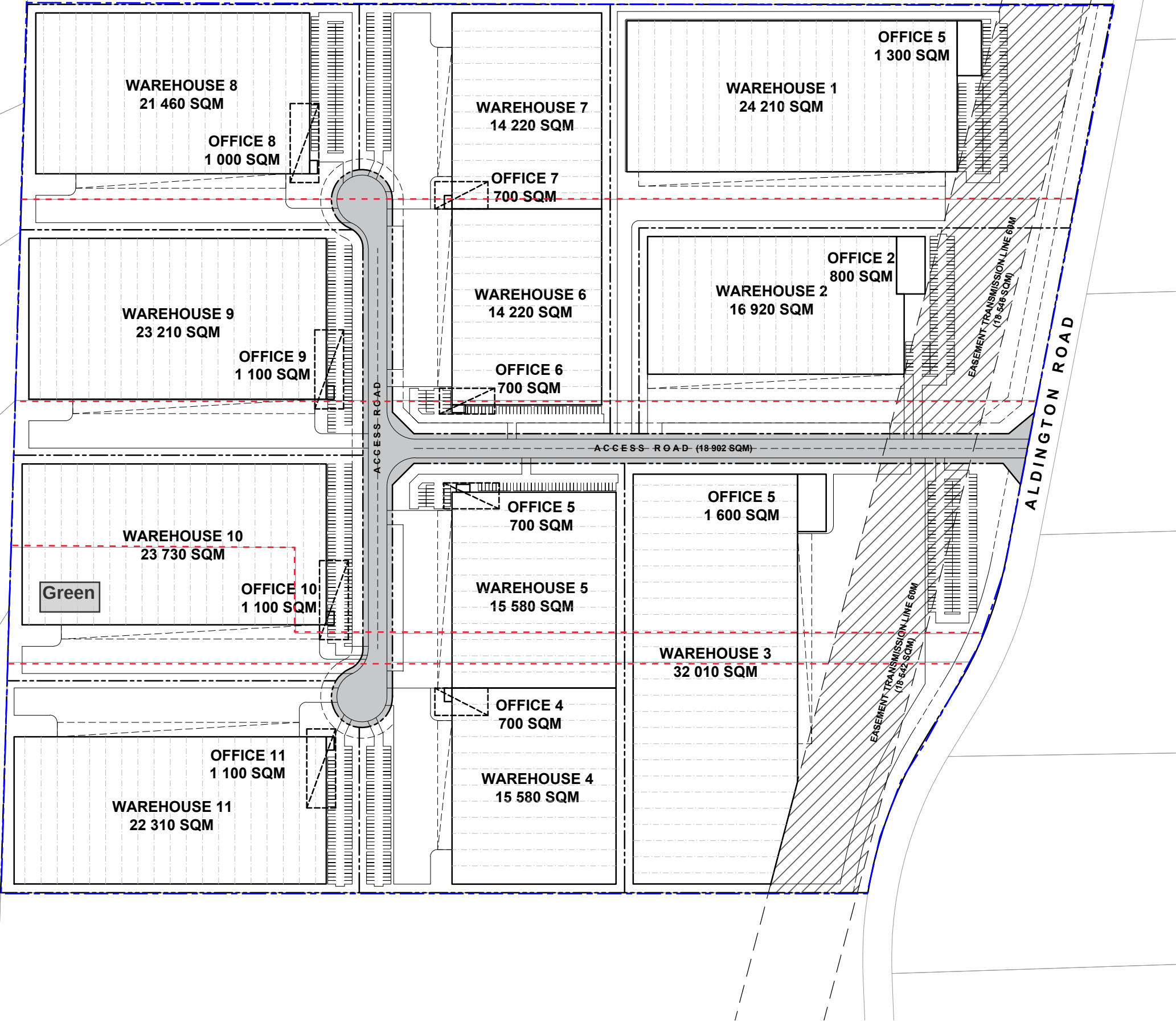
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DEVELOPMENT AREAS	
GROSS SITE AREA	430507 SQM
EASEMENT TRANSMISSION LINE	18546 SQM
EASEMENT TRANSMISSION LINE	18542 SQM
ACCESS ROAD	18902 SQM
NET DEVELOPABLE AREA	374517 SQM
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OFFICE 8	1000 SQM
WAREHOUSE 9	23210 SQM
OFFICE 9	1100 SQM
WAREHOUSE 10	23730 SQM
OFFICE 10	1100 SQM
WAREHOUSE 11	22310 SQM
OFFICE 11	1100 SQM
TOTAL BUILDING AREA	234250 SQM
EFFICIENCY	62.5%

Appendix A

Subgrade Approval Report



GEOTECHNICAL INSPECTION AND TESTING AUTHORITY
NATA accreditation number



SUBGRADE APPROVAL REPORT

Client:	Contractor:
Job number:	Report number:
Project:	Technician:

Subgrade areas assessed:

Area ID	Date	Approximate extent	Subgrade description	Geometry summary	Specification reference	Compliance (Pass/Fail)	Survey reference	Approved (Yes/No)

COMMENTS:

Signed:	Date:
---------	-------

Appendix B

Lot Approval Report





GEOTECHNICAL INSPECTION AND TESTING AUTHORITY
NATA accreditation number

LOT APPROVAL REPORT

Client:	Report number:
Job number:	Report date:
Project:	Technician:
Contractor:	Test methods:

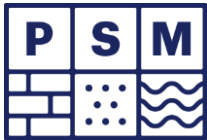
LOT ID:	Sheet	of
Retest (Yes/No)	Original test report number:	
Specification reference		
Location:		
Lot boundary survey reference/location:		
Materials description:	(MATERIAL TYPE, colour, minor components, maximum particle size)	
Material identification:	(Identify the material as defined in Clause 2.3.1, Clause 2.3.2 or Clause 2.3.3 of the Specification)	
Deleterious material assessment:	(Report proportion of deleterious material)	
Layer thickness:		
Accepted as Lot: (Yes/No)	Date:	
Approximate volume (m3)	Number of tests required:	

Test ID No.				
Test soil description				
Date tested:				
Grid reference				
Surveyed test locations (RL,E,N)				
Test depth (mm)				
Max size (mm)				
% Oversize material (wet)				
Field wet density (t/m ³)				
Field moisture content (%)				
PWCD (t/m ³)				
Compactive effort				
Moisture variation (%)				
HILF density ratio (%)				
TEST (Pass/Fail)				

LOT APPROVAL	(Pass/Fail)	Signed:	Date:
---------------------	-------------	---------	-------

Appendix C

Daily Report





GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number

DAILY REPORT

Client:		Report number:
Job number:		Report date:
Project:		Level of testing: Level 1
Location:		Technician:
Contractor		
Time on site:		
Time off site:		
1. Subgrade Approval		
Areas ID	Subgrade Approval Report No:	Comments
2. Lot Approval		
Lot ID	Lot Approval Report No:	Comments
3. Survey		
Type of survey	Survey undertaken by:	Reference
4. Instructions received on site		
5. Instructions given on site		
COMMENTS:		
Signed:		Date:

Appendix D

Certification Letter (Sample Only)



Our Ref:

Date:

Addressed to: Earthwork Contractor

Attention: Earthwork Contractor Representative

Dear

**RE: SAMPLE INTERIM (OR FINAL) FILLING CERTIFICATE
INDUSTRIAL DEVELOPMENT, BULK EARTHWORKS
CERTIFICATION OF EARTHWORKS
BETWEEN [DATE OF COMMENCEMENT] AND [DATE OF COMPLETION]**

In the period between [date start] and [date finish] the contractor has undertaken earthworks in areas XXX and XXX.

During the above period:

- The GITA has prepared the following Subgrade Approval Reports:

1. Subgrade Approval Report No 1
2.

- The GITA has prepared the following Lot Approval Reports:

1. Lot Approval Report No 1
2.

- The GITA has prepared the following Daily Reports:

1. Daily Report No 1.....
2.

- The following subgrade survey was undertaken:

1. Subgrade Survey reference.....
2.

- The following weekly survey was undertaken:

1. Weekly survey of week endingreference.....
2.

Copies of all the above documents are attached.

The GITA certifies that all the earthworks undertaken in the above stated period are documented in the above reports and have been undertaken in accordance with the Specifications (ref. PSM3820-005S, dated XXX) a copy of which is attached, with the exception of:

1. List outstanding issues (not approved subgrade, lots, unsuitable material, failed tests etc.)
2.

Signed

GITA