

Our Ref: PSM4636-006L REV5

25 August 2023

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Attention: Athlene Kyle

Dear Athlene

**RE: AUGUSTA STREET, HUNTINGWOOD EAST,
RESULTS OF GEOTECHNICAL INVESTIGATION**

1. Introduction

PSM has been commissioned by the Trustee for Huntingwood Property Trust to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD-36138263) for the proposed Augusta Street warehouse and distribution centre at Augusta Street, Blacktown.

2. Description of the Site and Locality

The site is located at Augusta Street, Blacktown, within the Blacktown local government area (LGA). The site comprises multiple parcels of land and is legally described as:

- Lot 1 DP835264
- Lots 218-219 DP457024
- Lot 2151 DP135859
- Lot 2 DP516449
- Lot 163-164, 168-188 and 216 DP8716
- Lot 1 DP119616
- Lots 4-6 DP226294
- Lots 50-52 DP1144623
- Lot 7 DP803359
- Lots 6-10 DP801210
- Lot 4 DP585492
- Lot 4 DP583442
- Lot 2 DP1263824.

The site is identified in Inset 1 below.



Inset 1: Site Locality Plan (Source: Urbis 2022)

Key features of the site are as follows:

- The site has frontage to the Great Western Highway and the Western Motorway of approximately 940 metres and frontage to Flushcombe Road of approximately 250 metres. Augusta Street dissects part of the western portion of the site and is vested to Blacktown Council
- Access to the site is currently available from Augusta Street which connects to Flushcombe Road to the west. Flushcombe Road intersects with the Great Western Highway, providing east-west access to the metropolitan road network, with right-in and right-out movements available via the existing signalised intersection
- The eastern part of the site slopes to the west, while the western part of the site slopes to the east, with the central low point at Blacktown Creek adjacent to the easement for water supply
- The site is affected by multiple easements and restrictions including:
 - Multiple easements up to 30 metres wide for transmission lines along the southern part of the site. The site features high voltage power lines along the southern side
 - An 10-metre-wide easement for water supply which runs north-south within the central part of the site, with associated 9 metre wide and 3 metre wide easements for construction purposes.
- Lot 164 in DP8716 is identified as being owned by Amplitel as the land accommodates a Telstra mobile telecommunications facility which is proposed to be relocated
- The site has been cleared but is undeveloped with scattered trees across the western boundary and southern boundaries and in the north-eastern corner. Blacktown Creek runs north-south through the central part of the site with riparian vegetation along the corridor.

Key features of the locality:

- The site is approximately 34 km west of the Sydney CBD and approximately 3.3km south of the Blacktown commercial centre
- The region features a mix of land uses, including residential and employment-generating activities. The Huntingwood and Pemulwuy industrial estates are located to the west and south-east
- The Prospect Reservoir is approximately 1km south of the site adjacent to the Western Sydney Parklands.

The surrounding locality is described as follows:

- North: The site adjoins the Great Western Highway. The land further to the north primarily comprises residential development including detached single and double storey dwellings. A small natural reserve known as Timbertop Reserve separates the residential development and associated landscaping
- East: The land immediately to the east of the site is vacant. The Prospect Highway is located further east, providing access to the M4 Motorway and Great Western Highway. St Bartholomew's Church and Cemetery is located on the eastern side of the Prospect Highway
- South: The M4 Motorway runs along the southern boundary of the site, with boundary landscaping providing visual screening of the site. The land on the opposite side of the Motorway comprises recreational and entertainment facilities in the form of a water park and a drive-in movie theatre
- West: The land to the west comprises an animal holding facility and industrial development, characterised by large warehouse buildings.

This letter presents the results of the geotechnical investigations undertaken by Pells Sullivan Meynink (PSM) for the proposed development at Augusta Street, Huntingwood East (the **Site**). This work has been undertaken in accordance with PSM proposals dated 31 January 2022 (Ref. PSM4636-004L) and 30 March 2022 (Ref. PSM4636-009L).

PSM's commentary regarding SEARs Item 12 is addressed in a separate letter, PSM4636-008L REV2 dated 29 June 2023.

PSM has previously completed a due diligence stage desktop review of geotechnical conditions for this site (ref. PSM4636-002L, dated 3 November 2021).

This report has been updated to include additional investigation completed in May 2022 for the new additional lots as part of the development.

3. Project Description

3.1 Brief Description

Construction and operation of a warehouse and distribution centre development of 134,565 m² gross floor area, including four warehouse buildings, ancillary office space, office facilities, indicative warehouse fitout works inclusive of warehouse racking, on-site car parking, and associated works including excavation, landscaping, and signage.

3.2 Detailed Description

The proposed SSDA seeks approval to redevelop the site to accommodate a warehouse and distribution centre use inclusive of the following:

- Site establishment works, including tree removal, minor excavation / bulk earthworks
- Construction and operation of four (4) new warehouse buildings comprising a multi-level warehouse building on the eastern portion of the site and three single storey warehouse buildings on the western portion of the site. The warehouse buildings will include ancillary office space and indicative warehouse fit out works including warehouse racking
- The warehouse and distribution tenancies are proposed to be operated 24 hours per day, 7 days per week
- Other associated works including landscaping, at-grade car parking and general site improvements.
- Business and building identification signage including wayfinding signage
- Vehicle access provided via Augusta Street and a new proposed access from the Great Western Highway
- Lot consolidation of properties.

4. Background

We have been provided with, and reviewed, the following documents:

- Costin Roe Consulting Drawings – “Cut/Fill Plan” (Ref. Co13904.03-SSDA310, dated 22 June 2023)
- Costin Roe Consulting Report - “Civil Engineering Report Incorporation Water Cycle Management Strategy” (Ref. Co13904.03-03b.rpt dated 16 June 2023)
- Land Partners Drawings – “Detail Survey of Flushcombe Road, Augusta Street & Various Lots” (Ref. SY074904.000.6.1, dated 20 August 2021).

Based on your email request and the documents above, we understand the following:

- The proposed site currently comprises mainly vacant land with a telecommunication tower and an existing Telstra facility near the eastern end of Augusta Street. A high voltage transmission line passes across the southern portion of the proposed site
- The proposed development is of industrial nature which comprises one to two storey warehouses, conservation areas, hardstand and carparking areas
- LOGOS are looking to obtain two additional lots located along Flushcombe Road and to the west of the original proposed site boundary
- The proposed development at the two additional lots will comprise single storey warehouses, office buildings, hardstand areas and carparks
- The overall site has a combined area of approximately 232,216 m²
- The 3 conservative areas proposed have a combined area of approximately 29,199 m²
- The two additional lots at the proposed site are currently tenanted
- A maximum fill height of 8.7 m and a maximum cut depth of 9.4 m will be encountered across the site during bulk earthwork operations.

Figure 1 presents a site locality plan of the geotechnical investigation for the proposed development.

5. Geotechnical Investigation

5.1 Fieldwork (February 2022)

The fieldwork was undertaken on 17, 18, 21 and 25 February 2022 under the full-time supervision of a PSM geotechnical engineer who undertook the following tasks:

- Directing the drilling
- Preparing engineering logs of the materials encountered
- Taking photographs of any recovered rock core
- Undertaking point load strength index (PLSI) tests on any recovered rock core
- Collecting soil samples for laboratory testing.

A total of twelve (12) boreholes were drilled using a track mounted drill rig to depths between 5.4 and 9.4 m below the existing ground. These boreholes were commenced by using auger drilling techniques with a V-bit or TC-bit in soil and some weathered rock units and continued using NMLC coring technique to recover the bedrock to target depth.

These boreholes consist of:

- Four (4) cored boreholes (BH09 to BH12)
- Eight (8) augered borehole (BH01 to BH08).

At completion of the fieldwork, the boreholes were backfilled with excavated spoil / cuttings.

A total of three (3) standpipe piezometers were installed in BH03, BH08 and BH11 to monitor groundwater level. Details of the piezometer construction is presented in Appendix D.

5.2 Fieldwork (May 2022)

A further round of fieldwork was undertaken on 23 May 2022 at the two additional lots LOGOS are looking to incorporate into the development. The fieldwork occurred under the full-time supervision of a PSM geotechnical engineer who undertook the following tasks:

- Directing the drilling
- Preparing engineering logs of the materials encountered
- Collecting soil samples for laboratory testing.

A total of five (5) boreholes were drilled using a track mounted drill rig to a maximum depth of 6.0 m below the existing ground. The boreholes were drilled using a V-bit in soil and some weathered rock units before changing to a T-bit in more competent rock units.

The boreholes drilled are BH13, BH14, BH15, BH16 and BH17. At completion of the fieldwork, the boreholes were backfilled with excavated spoil / cuttings.

Geotechnical engineering logs of the boreholes are presented in Appendix A. Figure 2, 3, 4 and 5 present selected site photos.

5.3 Geotechnical Laboratory Testing

5.3.1 California Bearing Ratio (CBR)

Six (6) bulk soil samples were recovered for CBR 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; and
- 4.5 kg surcharge.

Table 1 presents a summary of the CBR test results. The laboratory test results are included in Appendix B.

Table 1 – Summary of CBR Test Results

PSM BH ID	Depth (m)	Material Description	Soaked CBR (%)	OMC (%)	Standard Maximum Dry Density (t/m ³)	Swell (%)
BH04	0.2 – 1.0	CLAY trace gravel	1.5	22.3	1.64	4.0
BH07	0.7 – 1.0	CLAY	1.5	20.8	1.67	3.5
BH09	0.3 – 1.0	CLAY	1.5	23.0	1.59	4.0
BH12	0.2 – 1.2	CLAY	2.0	21.9	1.65	3.5
BH13	0.5 – 1.2	CLAY with gravel	1.5	14.9	1.85	3.0
BH15	0.5 – 1.3	CLAY	2.0*	19.3	1.73	4.0

Notes: * Indicates Soaked CBR value at 5.0 mm penetration

5.3.2 Analytical Laboratory Testing

Ten (10) disturbed soil samples were recovered for testing by a NATA accredited analytical laboratory. The following tests were undertaken on the disturbed soil samples:

- Cation Exchange Capacity (CEC) of calcium, magnesium, potassium and sodium
- Exchangeable sodium percentage
- Salinity (EC 1:5, one part soil to five parts water)
- Soil pH
- Chlorides
- Sulphates
- Resistivity.

Table 2 presents a summary of the results. The laboratory test results are included in Appendix C.

Table 2 - Analytical Laboratory Test Results

Sample ID	pH	Electrical Conductivity [μS/cm]	Saturated Resistivity [ohm.cm]	Moisture Content [%]	Chloride by discrete analyser [mg/kg]	Soluble Sulfate by icpaes [mg/kg]	Exchangeable Cations [meq/100g]					ESP [%]
							Ca	Mg	K	Na	CEC	
BH01 (1.3 m)	5.4	685	1460	16.4	830	500	0.3	8.4	0.2	2.0	10.9	18.5
BH02 (0.8 m)	5.6	324	3090	16.8	380	160	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH03 (0.3 m)	6.1	70	14300	22.2	<50	50	8.0	7.9	0.8	0.8	17.6	4.7
BH06 (1.0 m)	5.2	426	2350	20.4	<50	120	1.6	16.2	0.4	4.7	23.4	20.5
BH07 (0.9 m)	5.0	226	4420	19.3	180	230	2.4	7.7	0.2	2.0	12.3	15.9
BH09 (0.5 m)	5.3	253	3950	18.7	260	140	0.5	10.8	0.3	3.7	17.4	24.0
BH11 (1.1 m)	5.3	370	2700	8.6	330	300	2.2	7.5	0.3	3.2	13.2	24.1
BH12 (0.5 m)	5.5	43	23200	16.7	<50	40	2.4	8.3	0.4	0.9	12.4	7.4
BH14 (1.0 m)	8.2	347	2880	12.4	90	320	7.5	2.5	0.3	1.3	11.6	11.4
BH16 (0.5 m)	5.5	388	2580	18.6	600	220	0.7	2.7	0.1	0.5	4.1	13.1

6. Site Conditions

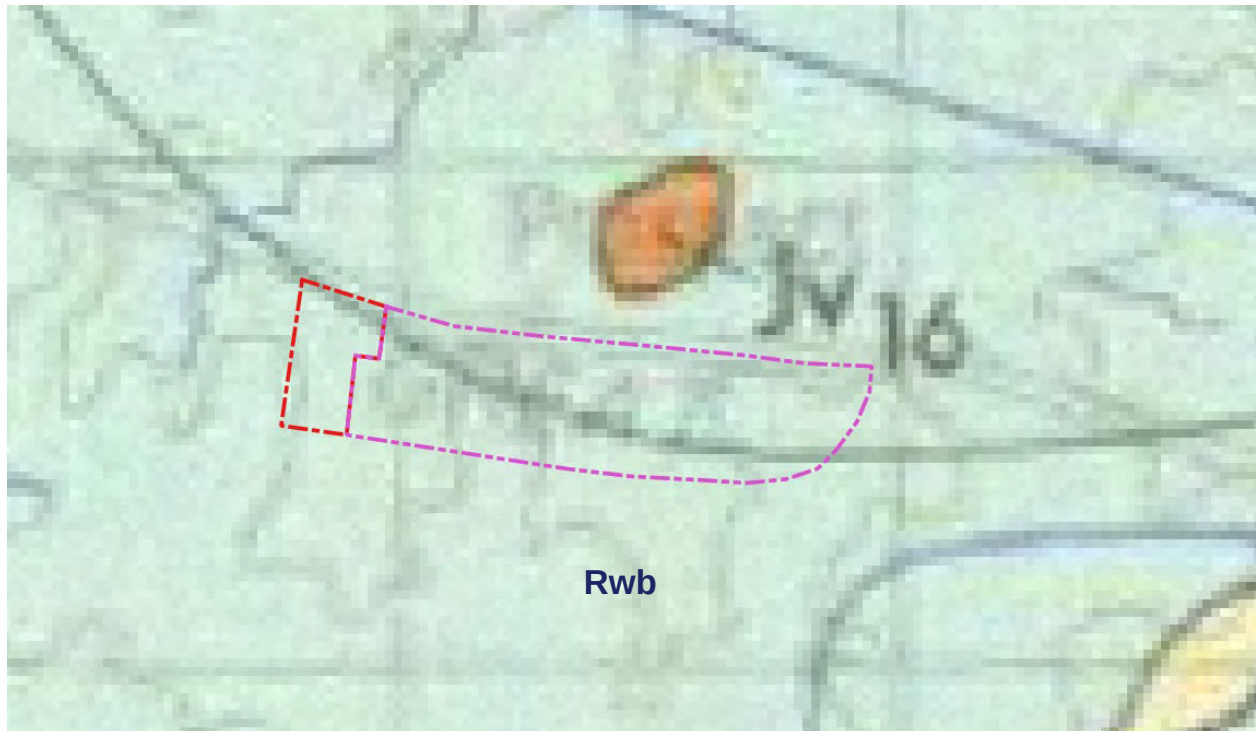
6.1 Geological Setting

The 1:100,000 Penrith geological map (1991) indicates that the site is underlain by:

- Bringelly Shale of the Wianamatta Group (Rwb) comprising shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff.

The geological map also indicates that a diatrema (Jv16) comprising volcanic breccia and basalt is located in close proximity to the site.

Inset 2 presents the site location with regards to the geological settings.



Inset 2: Penrith 1:100,000 geological map (main site marked in purple, additional two lots marked in red)

6.2 Surface Conditions

The site is bounded by Great Western Highway to the north, Prospect Highway to the East, M4 Western Motorway to the South and commercial buildings and vacant areas to the east.

At time of the fieldwork, the following observations were made:

- Blacktown Creek passes across the middle portion of the Site from north to south
- Two sets of high voltage transmission tower are located adjacent to the southern boundary of the site
- The western region of the transmission tower to the left of the Blacktown Creek is dipping in the western direction towards Flushcombe Road
- The remainder of the site had an undulating surface but is generally dipping towards Blacktown Creek
- A telecommunication tower and a single-storey demountable building mounted on brick piers were observed near the eastern end of Augusta Street
- The site is bounded by post and wire fences
- Existing fill comprising CLAY material mixed with debris from demolition e.g., tiles, bricks and glass bottles were observed at localised areas.

Inset 3 presents an aerial photograph of the site.



Inset 3: Nearmap Aerial photograph of the site conditions on 19 May 2022

6.3 Subsurface Condition

Table 3 shows the approximate depth to the top of the inferred geotechnical units encountered at the test locations.

Table 3 – Summary of Inferred Subsurface Conditions Encountered in Test Locations

Inferred Unit	Inferred top of unit depth below ground surface (m)	Description
TOPSOIL	0.0	CLAY to Silty CLAY trace/ with gravel: red and brown, high plasticity; gravel sub-angular up to 5 mm, soft to firm consistency, moist to wet condition, rootlets observed.
EXISTING FILL	0.1 – 0.3	CLAY to CLAY trace/ with gravel: red, grey and brown, low to high plasticity; gravel sub-angular up to 20 mm, soft to very stiff consistency, dry to moist condition, rootlets observed. Some debris from demolition e.g., tiles, bricks and glass bottles were observed at localised areas
NATURAL SOIL	0.0 – 1.8	CLAY to CLAY trace gravel: red, grey and yellow brown, low to high plasticity; gravel sub-angular up to 25 mm, firm to hard consistency, dry to moist condition, with ironstone embedded.
BEDROCK A	1.2 – 3.5	SHALE: red, grey and brown, extremely to slightly weathered, very low to low strength
BEDROCK B	5.7 – 7.6	SHALE: grey and brown, moderately to slightly weathered, low strength

Table 4 presents the depth to the top of inferred geotechnical units in each borehole

Table 4 – Depth to Top of Inferred Geotechnical Units Encountered in PSM Boreholes

BH ID	Depth to Top of Inferred Geotechnical Units below existing ground surface (m)					
	TOPSOIL	EXISTING FILL	NATURAL SOIL	BEDROCK A	BEDROCK B	EOH ^[1]
BH01	0.0	NE ^[2]	0.2	2.3	NE ^[2]	5.4
BH02	0.0	NE ^[2]	0.2	3.4	NE ^[2]	6.0
BH03	0.0	0.2	1.2	2.4	NE ^[2]	6.0
BH04	0.0	0.2	1.2	2.3	NE ^[2]	6.0
BH05	0.0	0.3	1.5	2.3	NE ^[2]	5.5
BH06	0.0	0.3	1.3	3.5	NE ^[2]	6.0
BH07	0.0	NE ^[2]	0.3	3.4	NE ^[2]	6.0
BH08	0.0	0.1	1.8	3.5	NE ^[2]	6.0
BH09	0.0	NE ^[2]	0.2	2.0	5.7	6.9
BH10	0.0	0.1	1.8	2.0	7.0	7.3
BH11	NE ^[2]	NE ^[2]	0.0	1.2	7.6	9.4
BH12	0.0	NE ^[2]	0.1	1.9	6.9	7.8
BH13	0.0	0.2	4.0	NE ^[2]	NE ^[2]	6.0
BH14	0.0	0.2	2.8	NE ^[2]	NE ^[2]	6.0
BH15	NE ^[2]	0.0	0.4	1.3	NE ^[2]	6.0
BH16	0.0	NE ^[2]	0.1	2.1	NE ^[2]	6.0
BH17	NE ^[2]	0.0	2.8	3.5	NE ^[2]	6.0

¹ EOH = End of Hole

² NE = Not Encountered

6.4 Groundwater

Groundwater was encountered during the fieldwork at BH14 at a depth of 4.0 m below the surface. There was no groundwater observed during drilling in the other boreholes. After the installation of piezometer at BH11, it was observed that the piezometer was filled with water used during the drilling process and was kept undrained. PSM returned the Site on 18 March 2022 to measure the groundwater level at the piezometers installed. Table 5 presents the depth of groundwater encountered below the ground surface level following significant rainfall in the first week of March 2022.

Table 5 – Depth to Groundwater Encountered in Piezometers (18/03/2022)

BH ID	Depth of Groundwater encountered from manual measurement (mbgl)
BH03	3.8
BH08	5.9
BH11	4.5

Figure 6 presents the measured groundwater level with the rainfall chart.

Future groundwater monitoring should be undertaken if required for the proposed development.

6.5 Assessment of Analytical Laboratory Testing

6.5.1 Soil Chemistry

The laboratory test results summarised in Table 2 indicate the following:

- pH of the soil samples analysed was in the range of 5.0 to 8.2
- The 1:5 soil to water extraction and subsequent electrical conductivity ($EC_{1:5}$) of the soil samples analysed to be in the range of 43 $\mu\text{S}/\text{cm}$ to 685 $\mu\text{S}/\text{cm}$
- Concentrations of chlorides in samples analysed was in the range of < 50 mg/kg to 830 mg/kg
- Concentrations of soluble sulphate in samples analysed was in the range of 40 mg/kg to 500 mg/kg
- Cation Exchange Capacity (CEC) in samples analysed was in the range of <0.1 meq/100g to 23.4 meq/100g
- Exchange Sodium Percentage (ESP) in samples analysed was in the range of <0.1 % to 24.1 %.

6.5.2 Salinity Assessment

Site Investigations for Urban Salinity (DLWC 2002) classify soil salinity based on electrical conductivity (EC_e). The method of conversion from $EC_{1:5}$ to EC_e (electrical conductivity of saturated extract) is based on DLWC (2002) and given by $EC_e = EC_{1:5} \times M$, where M is the multiplication factor based on “Soil Texture Group”.

The “Soil Texture Group” of the samples tested were assessed during our investigation. The salinity classification for the soil samples that were tested are presented in Table 6.

Table 6 – Salinity Classification

SAMPLE ID	$EC_{1:5}$	SOIL TYPE	M	EC_e	SALINITY CLASS
	(dS/m)			(dS/m)	
BH01 (1.3 m)	0.685	Light Clays	8.5	5.823	Moderately-saline
BH02 (0.8 m)	0.324	Light Clays	8.5	2.754	Slightly Saline
BH03 (0.3 m)	0.070	Light Clays	8.5	0.595	Non-saline
BH06 (1.0 m)	0.426	Light Clays	8.5	3.621	Slightly Saline
BH07 (0.9 m)	0.226	Light Clays	8.5	1.921	Non-saline
BH09 (0.5 m)	0.253	Light Clays	8.5	2.151	Slightly Saline
BH11 (1.1 m)	0.370	Sandy loams	14	4.76	Moderately-saline
BH12 (0.5 m)	0.043	Light Clays	8.5	0.366	Non-saline
BH14 (0.5 m)	0.347	Light Clays	8.5	2.950	Slightly saline
BH16 (0.5 m)	0.388	Light Clays	8.5	3.298	Slightly saline

It is assessed that the soils on site are classified as “non-saline to moderately saline”.

We have referred to Clause 4.8.2 of Australian Standard AS3600-2018 “Concrete Structures” and note that the assessed soil electrical conductivity (EC_e) is within the “A2” exposure classification.

6.6 Corrosivity / Aggressivity

Table 4.8.1 of AS3600-2018 “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”.

Table 6.4.2(C) of Australian Standard AS2159:2009, Piling – Design and Installation provides criteria for exposure classification for concrete piles based on sulfates in the soil and groundwater, soil and groundwater pH, and chlorides in groundwater. On the basis of the soil sulfates and pH testing completed we assess the exposure classification for concrete piles in the soil to be 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 soil chlorides and pH testing completed we assess the exposure classification for steel piles in the soil to be mild.

6.7 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 <0.1% to 24.1%, indicates that the soils on site are non-sodic to highly sodic when compared to criteria listed in “Site Investigations for Urban Salinity”, DLWC (2002).

6.8 Salinity Management Plan

With regards to salinity, PSM has prepared a salinity management plan (SMP) for the site, refer to PSM4636-007L REV2, dated 29 June 2023.

7. Earthworks

A separate bulk earthworks specification has previously been prepared (ref. PSM4636-003S) which sets out clearly the roles and responsibilities of the earthworks contractor and its Geotechnical Inspection and Testing Authority (GITA). Appendix E presents the bulk earthworks specification for the Site.

8. Interim Geotechnical Design Advice (IGDA)

8.1 General

The design advice in the following sections is provided on the basis that:

- The subsurface conditions are as those encountered in the detailed geotechnical investigation in Section 4 of this report
- The earthworks are to be completed in accordance with the PSM bulk earthworks specification (PSM4636-003S)
- The proposed new facility will comprise of a warehouse and distribution centre use with the following features:
 - Four warehouse buildings
 - Ancillary office space
 - Office facilities
 - Indicative warehouse fitout works inclusive of warehouse racking
 - On-site car parking.

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, 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 road base 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.

Alternatively, 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.

8.2 Site Classification

As the proposed development is of industrial nature (and multistorey), it is outside the scope of AS2870-2011 "Residential slabs and footings". Notwithstanding this, we assess that, based on the natural CLAY soil on site, and for fill placed in accordance with the PSM bulk earthworks Specification, 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 the PSM bulk earthworks 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, $y_m = 20$ 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 $y_s = 55$ mm.

8.3 Foundations

It is expected that the foundations used as part of the proposed development at the site would typically include pad, or pile footings depending on the design loads. The two storey warehouses are likely to be supported with piles.

8.3.1 Shallow Footings

Pad footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads provided in Table 7. Further advice should be sought if the footings are located adjacent to a batter or wall.

We note that an allowable bearing pressure (ABP) is not a soil property. It depends on many factors such as the size of the footings, the embedment depth, the load direction and eccentricity, the stiffness of the footing, the adopted factor of safety (FOS), as well as the soil properties. As footings get bigger or deeper the capacity increases rapidly, and as the load gains eccentricity or becomes inclined, the capacity reduces rapidly.

Settlements in the NATURAL SOIL unit can be estimated using the elastic moduli provided in Table 7.

The differential settlement due to the building load shall also be assessed.

Foundation conditions at the proposed shallow pad footing locations should be inspected by a suitably qualified geotechnical engineer prior to the pouring of concrete.

8.3.2 Piles

We envisage that piles would be founded within BEDROCK A or BEDROCK B units.

Piles should be designed in accordance with the requirements in AS 2159 (2009), *Piling – Design and Installation*. The parameters provided in Table 7 may be adopted in the design of piles founded in BEDROCK unit.

The designer should note the following with regards to the pile design:

- The ABP needs to be confirmed by a geotechnical engineer through pile inspections prior to pouring concrete
- Under permanent load, the contribution of side adhesion for soils including the Fill and Natural soil unit should be ignored
- Pile settlement can be checked using the recommended elastic parameters in Table 7
- Where adjacent foundation details differ (e.g. pile and pad, differing loads or ground conditions), differential settlement should also be assessed.

Should higher bearing capacities be required of the BEDROCK units, this may be available subject to further advice.

With regards to the pile design, we recommend that:

- A basic geotechnical strength reduction factor, $\Phi_{gb} = 0.60$ (AS2159 CL. 4.3.2) be adopted for a high redundancy system for an assessed average risk rating (ARR) between 2.5 and 3.0. This should be reviewed to suit the specific design and appropriate pile testing proposed by the structural / pile designers in accordance with the requirements of AS2159
- It may be possible to increase the pile reduction factors, if the details of the proposed pile installation procedures indicate a high level of quality control with regards to concrete placement, base cleanliness, etc
- If a geotechnical strength reduction factor, $\Phi_g = 0.40$ is adopted then no pile testing will be required (AS2159 Clause 8.2.4 (b)).

Where the pile is sized using the allowable bearing capacity in Table 7 (i.e., assuming all serviceability load is carried by the base), the settlement would be expected to be less than 1% of the pile diameter plus elastic shortening of the pile itself.

Table 7 – Foundation Parameters of Inferred Geotechnical Units

Inferred Unit	Bulk Unit Weight (kN/m ³)	Soil Effective Strength Parameters		Ultimate Bearing Pressure under Vertical Centric Loading ^[2] (kPa)	Allowable Bearing Pressure (ABP) under Vertical Centric Loading ^[3] (kPa)	Ultimate Shaft Adhesion (kPa)	Elastic Parameters	
		c' (kPa)	ϕ' (deg)				Long Term Youngs Modulus (MPa)	Poisson's Ratio
ENGINEERED FILL / NATURAL SOIL	18	0	30	420	150 ^[1]	N/A	10	0.3
BEDROCK A	22	N/A	N/A	3,000	1,000	50	100	0.25
BEDROCK B	22	N/A	N/A	6,000	2,500	350	500	0.25

- 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)
- ³ ABP is an end bearing pressure to cause settlement of <1% of minimum footing.

8.4 Temporary and Permanent Batters

The batter slope angles shown in Table 8 are recommended for the design of batters up to a nominal height of 3 m and above the groundwater table; subject to the following recommendations:

1. All 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.

If the conditions above cannot be met, further advice should be sought.

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

Table 8 – Batter Slope Angles

Unit	Temporary	Permanent
SOIL UNITS, e.g. ENGINEERED FILL / NATURAL SOIL	2H : 1V	2.5H : 1V
BEDROCK A	1.5H : 1V	2.0H : 1V
BEDROCK B	0.5H : 1V	1H : 1V

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

The batters should be inspected by an experienced geotechnical engineer during excavation to confirm the batter advice provided and assess the need for localised support.

8.5 Retention

Cuts in soil unit steeper than the recommended permanent batter slopes in Table 8 will need to be supported by some form of retaining structure.

The design of these structures should be based on the following:

- Proposed wall geometry
- Effective soil strength parameters in Table 6
- Surcharge loads behind the retention
- Water pressure (depending on the type of structure).

Note that design of retention systems may be based on either K_a or K_o earth pressures. Design using active earth pressures (K_a) 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.

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.

Where excavations are proposed in the vicinity of existing structures designers shall consider the effects of the excavation including horizontal and vertical deflections on the neighbouring structures.

8.6 Slabs

The design of slabs can be based on a subgrade with the Young's moduli in Table 7.

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

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

8.7 Pavements

Six (6) CBR tests were undertaken on samples collected. The results (refer to Table 1) indicated a CBR of between 1.5% and 2.0%.

A CBR of 2.0% can be adopted for subgrade and fill formed in bulk earthworks placed in accordance with a PSM Specification.

Subgrade CBR for pavement design depends on the material at the finished subgrade levels.

We recommend that specific CBR testing be undertaken at subgrade level when pavement layouts are finalised. CBR testing shall be undertaken for any new imported material within the pavement subgrade (e.g., within 1 m below pavement).

9. General

If at any time, the conditions are found to vary from those described in this report, further advice should be sought.

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

For and on behalf of

PELLS SULLIVAN MEYNINK

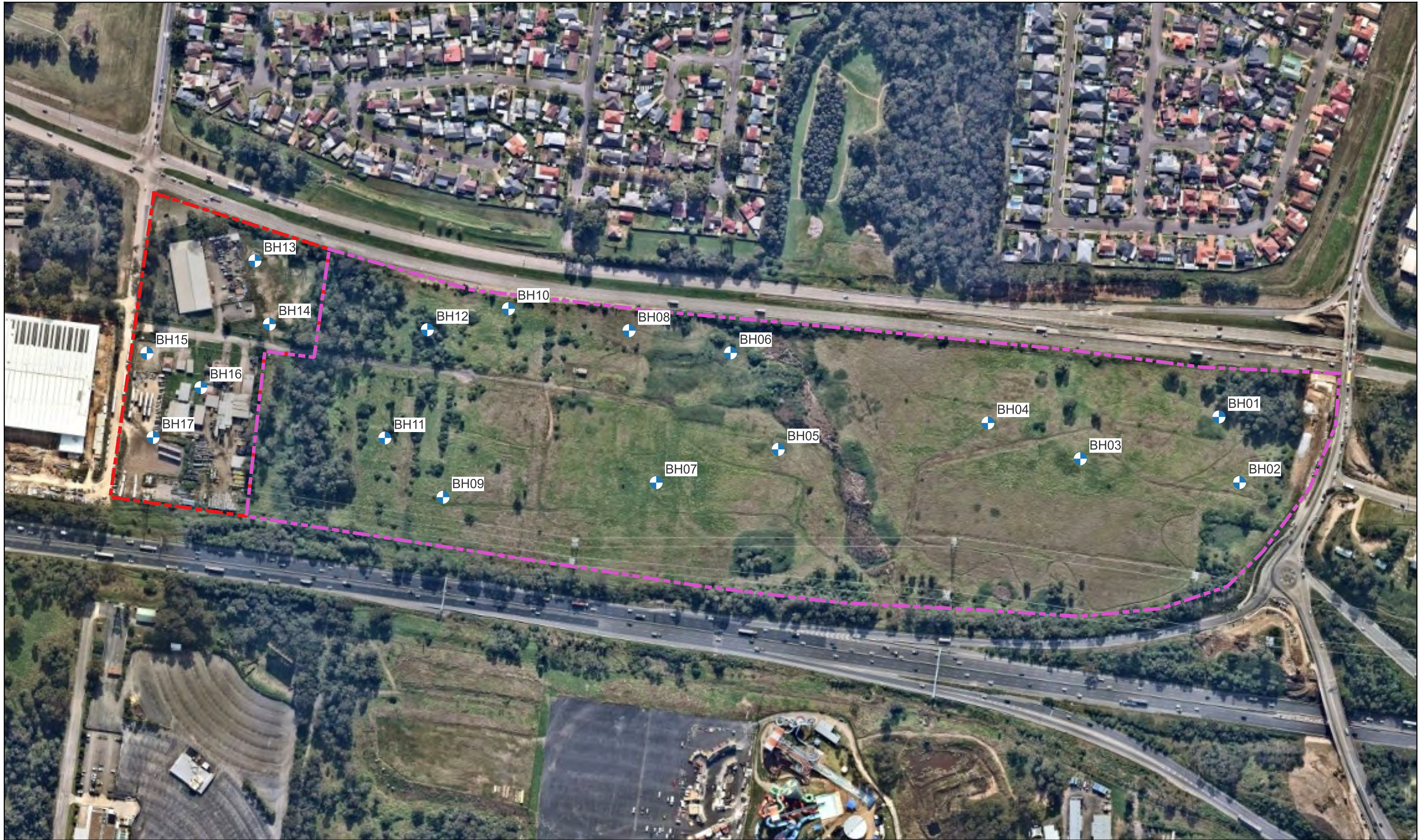


KEN TONG LEE
GEOTECHNICAL ENGINEER



AGUSTRIA SALIM
PRINCIPAL

Encl.	Figure 1	Site Locality Plan
	Figure 2	Selected Site Photos (1 of 4)
	Figure 3	Selected Site Photos (2 of 4)
	Figure 4	Selected Site Photos (3 of 4)
	Figure 5	Selected Site Photos (3 of 4)
	Figure 6	Groundwater vs Rainfall Plot
	Appendix A	Borehole Logs
	Appendix B	CBR Results
	Appendix C	Analytical Laboratory Testing Results
	Appendix D	Piezometer Construction Record
	Appendix E	PSM4636-003S



- Legend**
-  Borehole Locations
 -  Site Boundary - Main Site
 -  Site Boundary - Additional Lots

Notes

Aerial image sourced from Nearmap.com dated 19 May 2022.



Scale 1:3,500

0 75 150 m

Map Projection:
Horizontal Datum:
Grid: EPSG:7856

P	S	M	Created By: PSM	Revision: A
			Date: 01 Jun 2022	Paper Size: A3

LOGOS Property Group Ltd
Augusta Street
Huntingwood East

**GEOTECHNICAL INVESTIGATION
LOCALITY PLAN**

PSM4636-006L	FIGURE 1
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Photo 1 - General site conditions near BH11 facing north west (17/02/2022)



Photo 2 - General site conditions near BH01 facing south east (21/02/2022)



LOGOS Property Group Ltd
Augusta Street, Huntingwood East
Geotechnical Investigation

SELECTED SITE PHOTOGRAPHS (1 of 4)
17/02/2022 to 25/02/2022 and 24/05/2022

PSM4636-006L REV1

FIGURE 2



Photo 3 - Drill rig setup on BH12 (18/02/2022)



Photo 4 - Cuttings from BH02 (21/02/2022)



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Augusta Street, Huntingwood East
Geotechnical Investigation

SELECTED SITE PHOTOGRAPHS (2 of 4)
17/02/2022 to 25/02/2022 and 24/05/2022

PSM4636-006L REV1

FIGURE 3



Photo 5 - Typical NATURAL unit encountered in BH11 (17/02/2022)



Photo 6 - Typical BEDROCK unit encountered in BH08 (21/02/2022)



LOGOS Property Group Ltd
Augusta Street, Huntingwood East
Geotechnical Investigation

SELECTED SITE PHOTOGRAPHS (3 of 4)
17/02/2022 to 25/02/2022 and 24/05/2022

PSM4636-006L REV1

FIGURE 4



Photo 7 - Existing dwellings located on the western perimeter of the site (23/05/2022)



Photo 8 - Water encountered at BH14 (23/05/2022)



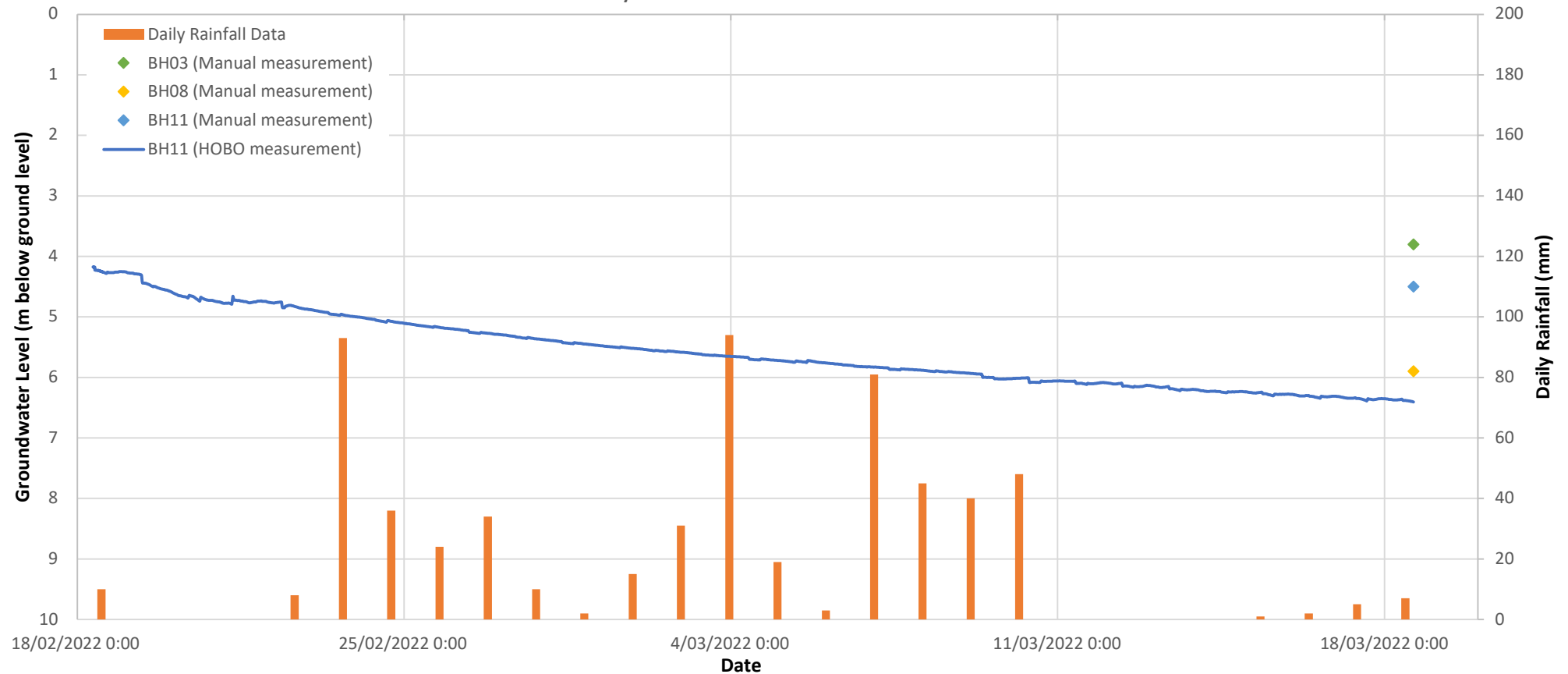
LOGOS Property Group Ltd
Augusta Street, Huntingwood East
Geotechnical Investigation

SELECTED SITE PHOTOGRAPHS (4 of 4)
17/02/2022 to 25/02/2022 and 23/05/2022

PSM4636-006L REV1

FIGURE 5

Daily Rainfall vs Groundwater Level



Notes:

1. Groundwater was not observed at the 2 piezometers (BH08 and BH03) on the day of installation on 21 and 25 March 2022 respectively
2. For the piezometer at BH11;
 - a) It was observed to be filled with drilling water (from rock coring) subsequent to installation on 17 March 2022.
 - b) The drilling water was not emptied / pumped out prior to the reading on 18 March 2022 & could have affected the measured level.



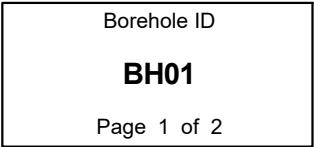
LOGOS Property Group Ltd
Augusta Street
Huntingwood East

Groundwater vs Rainfall Plot

PSM4636-006L REV1

FIGURE 6

Appendix A
Borehole Logs



Project No.: PSM4636

PSM 3.02.2 LIB.GLB Log PSM AU NONCORE BH NZAU PSM 4636 AUGUSTA STREET HUNTINGWOOD.GPJ <<DrawingFile>> 16/03/2022 11:58 10.01.00.01 Datotef Fence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Pri: PSM 3.02.0 2019-02-24



Borehole ID

BH01

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306225.0 m E 6257679.0 m N GDA2020

Commenced: 21/02/2022
Completed: 21/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 120 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N								SHALE: brown, extremely weathered, very low strength <i>(continued)</i>			100 200 300 400 500	
							6 							



Borehole ID

BH02

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 21/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 21/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306210.0 m E 6257757.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK305		Inclination: -90°	
Hole Diameter: 120 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information				Soil Description						Observations					
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations	
AD/T	N	Not Encountered		SPT 0.50-0.95 m 3,3,4 N=7			0.50			Silty CLAY: high plasticity, dark brown, rootlets observed	M	S	100	0.00: TOPSOIL	
															0.20: INFERRED NATURAL
															0.50: SPT recovered 370/450 mm
				SPT 1.50-1.95 m 5,6,7 N=13			1.50			CLAY: high plasticity, red and brown					
							2.00			Becomes red, grey and brown	M	F			
							2.50			CLAY trace gravel: high plasticity, red, grey and brown; gravel sub-angular up to 5 mm, ironstone embedded					
							3.00								
				SPT 3.00-3.45 m 10,14,23 N=37			3.00			Becomes grey					
							3.50								
							4.00			SHALE: grey, extremely weathered, very low strength					
							4.50			Becomes brown					
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Borehole ID

BH02

Page 2 of 2

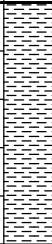
Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306210.0 m E 6257757.0 m N GDA2020

Commenced: 21/02/2022
Completed: 21/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclinometer: -90° RL Surface: No survey
Hole Diameter: 120 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			Becomes brown and grey			100 200 300 400 500	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method

AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration

 No resistance
 Refusal

Water

▽ Inflow
▽ Partial Loss
◄ Complete Loss

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition

D - Dry
M - Moist
W - Wet

Consistency/Relative Density

VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

BH03

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 25/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 25/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306224.0 m E 6257861.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: Comacchio 205		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T			Not Encountered	SPT 0.50-0.95 m 2,5,9 N=14			1			Silty CLAY: high plasticity, brown, rootlets observed	M	S		0.00: TOPSOIL
										CLAY: high plasticity, grey and brown, rootlets observed				0.20: INFERRED FILL
														0.50: SPT recovered 450/450 mm
				SPT 1.50-1.95 m 9,9,9 N=18			2			CLAY trace gravel: high plasticity, red grey and brown, gravel sub-angular up to 5mm				1.20: INFERRED NATURAL
										Becomes grey and red	D	St		1.50: SPT recovered 400/450 mm
										SHALE: grey, extremely weathered, very low strength				2.40: INFERRED BEDROCK
										Becomes brown				



Borehole ID

BH03

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306224.0 m E 6257861.0 m N GDA2020

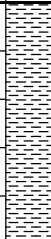
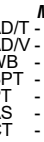
Commenced: 25/02/2022
Completed: 25/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: Comacchio 205
Hole Diameter: 100 mm

Inclination: -90°
Bearing:

RL Surface: No survey
Datum: AHD

Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey, extremely weathered, very low strength (<i>continued</i>) Becomes grey			100 200 300 400 500	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method

AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration

 No resistance
 Refusal

Water

 Inflow
 Partial Loss
 Complete Loss

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition

D - Dry
M - Moist
W - Wet

Consistency/Relative Density

VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

BH04

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 25/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 25/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306288.0 m E 6257860.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: Comacchio 205		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T			N	SPT 0.50-0.95 m 2,5,7 N=12			1			Silty CLAY: high plasticity, brown, rootlets observed	M	S		0.00: TOPSOIL
										CLAY trace gravel: high plasticity, red and brown; gravel sub-angular up to 20mm				0.20: INFERRED FILL
														0.50: SPT recovered 400/450 mm
				SPT 1.50-1.95 m 5,15,16 N=31			2			CLAY: high plasticity, red and grey				1.20: INFERRED NATURAL
														1.50: SPT recovered 450/450 mm
							3			SHALE: grey and brown, extremely weathered, very low strength				2.30: INFERRED BEDROCK
							4							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

BH04

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 25/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 25/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306288.0 m E 6257860.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: Comacchio 205		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information				Soil Description						Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey and brown, extremely weathered, very low strength (continued)			100	
							7			Hole Terminated at 6.00 m Target depth			200	
							8						300	
							9						400	
													500	

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD.GPJ <<DrawingFile>> 16/03/2022 11:58 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-08 Pj: PSM 3.02.0 2019-02-24



Borehole ID

BH05

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306404.0 m E 6257839.0 m N GDA2020

Commenced: 21/02/2022
Completed: 21/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: Comacchio 205 Inclin: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T				SPT 0.50-0.95 m 3,6,7 N=13			1			Silty CLAY: high plasticity, brown	M	S	100	0.00: TOPSOIL
										CLAY: high plasticity, brown	M	St	200	0.30: INFERRED FILL
														0.50: SPT recovered 350/450 mm
										CLAY: high plasticity, grey	M	F	300	1.50: INFERRED NATURAL SPT recovered 450/450 mm
SHALE: grey, extremely weathered, very low strength			400	2.30: INFERRED BEDROCK										
								500						



Borehole ID

BH05

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 21/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 21/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306404.0 m E 6257839.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: Comacchio 205		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information						Soil Description						Observations		
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T										SHALE: grey, extremely weathered, very low strength (continued)			100 200 300 400 500	
							6			Hole Terminated at 5.50 m Refusal on TC-bit				
							7							
							8							
							9							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-08 Pj: PSM 3.02.0 2019-02-24



Borehole ID

BH06

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 25/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 25/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306474.0 m E 6257832.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: Comacchio 205		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T			N	SPT 0.50-0.95 m 2,1,3 N=4			1			Silty CLAY: high plasticity, brown	W	S		0.00: TOPSOIL
										CLAY: high plasticity, yellow and brown				0.30: INFERRED FILL
										Becomes red, grey and brown	M	S		0.50: SPT recovered 300/450 mm
										CLAY trace gravel: high plasticity, brown and grey; gravel sub-angular up to 10mm				1.30: INFERRED NATURAL
			Not Encountered	SPT 1.50-1.95 m 6,8,10 N=18			2				St		1.50: SPT recovered 450/450 mm	
				SPT 3.00-3.45 m 7,16,29 N=45			3				H		3.00: SPT recovered 450/450 mm	
							4			SHALE: grey and brown, extremely weathered, very low strength				3.50: INFERRED BEDROCK
										Becomes brown				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
▽ Inflow
▽ Partial Loss
◀ Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD.GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datalog Fence and Map Tool | Lib PSM 3.02.1 2016-03-06 Pjt: PSM 3.02.0 2019-02-24



Borehole ID

BH06

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306474.0 m E 6257832.0 m N GDA2020

Commenced: 25/02/2022
Completed: 25/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: Comacchio 205 Inclin: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey and brown, extremely weathered, very low strength (<i>continued</i>)			100 200 300 400 500	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method

AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration

No resistance
 Refusal

Water

Inflow
 Partial Loss
 Complete Loss

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition

D - Dry
M - Moist
W - Wet

Consistency/Relative Density

VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

BH07

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306548.0 m E 6257725.0 m N GDA2020

Commenced: 18/02/2022
Completed: 18/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclinometer: -90° RL Surface: No survey
Hole Diameter: 120 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure, Zoning, Origin, Additional Observations
AD/V		N	Not Encountered	SPT 0.50-0.95 m 2,2,3 N=5			1			CLAY: high plasticity, brown, rootlets observed	M	S		0.00: TOPSOIL
										CLAY: high plasticity, red grey and brown				0.30: INFERRED NATURAL
										Becomes grey	M	F		0.50: SPT recovered 400/450 mm
										CLAY trace gravel: high plasticity, grey and red; gravel sub-angular up to 25mm		St		1.50: SPT recovered 450/450 mm
AD/T		N	Not Encountered	SPT 1.50-1.95 m 3,5,5 N=10			2			Becomes red	M	VSt		3.00: SPT recovered 450/450 mm
										SHALE: red grey and brown, extremely weathered, very low strength				3.40: INFERRED BEDROCK
										Becomes dark grey				
							4			Becomes grey				

Method

AD/T - Auger drilling TC bit

AD/V - Auger drilling V bit

WB - Washbore

SPT - Standard penetration test

PT - Push tube

AS - Auger screwing

CT - Continuous push tube 1.5m long 76mm diameter

Penetration

No resistance

Refusal

Water

Inflow

Partial Loss

Complete Loss

Samples and Tests

U - Undisturbed Sample

D - Disturbed Sample

SPT - Standard Penetration Test

ES - Environmental Sample

TW - Thin Walled

LB - Large Disturbed Sample

Moisture Condition

D - Dry

M - Moist

W - Wet

Consistency/Relative Density

VS - Very soft

S - Soft

F - Firm

St - Stiff

VSt - Very stiff

H - Hard

VL - Very loose

L - Loose

MD - Medium dense

D - Dense

VD - Very dense

Ce - Cemented

C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

BH07

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 18/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 18/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306548.0 m E 6257725.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK305		Inclination: -90°	
Hole Diameter: 120 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: red grey and brown, extremely weathered, very low strength (continued) Becomes brown and grey				
							7							
							8							
							9							
										Hole Terminated at 6.00 m Target depth				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-08 Pj PSM 3.02.0 2019-02-24



Borehole ID

BH08

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 21/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 21/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306430.0 m E 6257693.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK300		Inclination: -90°	
Hole Diameter: 110 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V			N	Not Encountered			1			CLAY: high plasticity, brown, rootlets observed	M	F		0.00: TOPSOIL
										CLAY: high plasticity, brown and grey, rootlets observed				0.10: INFERRED FILL
				SPT 0.50-0.95 m 3,11,22 N=33			2			CLAY: low to medium plasticity, brown	D	VSt		1.50: SPT recovered 300/450 mm
										CLAY: high plasticity, brown red and grey				1.80: INFERRED NATURAL
				SPT 1.50-1.95 m 2,12,19 N=31			3							3.00: SPT recovered 270/400 mm
AD/T			N				4			SHALE: grey, extremely weathered, very low strength				3.50: INFERRED BEDROCK
				SPT 3.00-3.40 m 2,3,12R / 400mm N=R										4.50: V-bit refusal

Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger screwing CT - Continuous push tube 1.5m long 76mm diameter	Penetration No resistance Refusal	Water Inflow Partial Loss Complete Loss	Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	Moisture Condition D - Dry M - Moist W - Wet	Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact
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Borehole ID

BH08

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 21/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 21/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306430.0 m E 6257693.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK300		Inclination: -90°	
Hole Diameter: 110 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information				Soil Description						Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey, extremely weathered, very low strength (continued)			100 200 300 400 500	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
No resistance
Refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-08 Pj: PSM 3.02.0 2019-02-24



Borehole ID

BH09

Page 1 of 3

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306749.0 m E 6257750.0 m N GDA2020

Commenced: 21/02/2022
Completed: 21/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 120 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T				SPT 0.50-0.95 m 3,3,4 N=7			1			SILTY CLAY: high plasticity, red and brown	M	S		0.00: TOPSOIL
				SPT 1.50-1.95 m 7,9,12 N=21			2			CLAY trace gravel: high plasticity, red, grey and brown; gravel sub-angular up to 5 mm, ironstone embedded		F		0.20: INFERRED NATURAL
												St		0.50: SPT recovered 380/450 mm
												VSt		1.50: SPT recovered 360/450 mm
										SHALE: grey and brown, extremely weathered, very low strength				2.00: INFERRED BEDROCK
										Becomes grey				
										Continued on cored borehole sheet				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

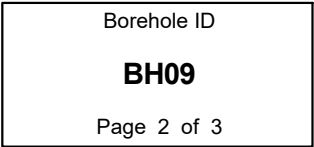
Penetration
No resistance
Refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact



Project No.: PSM4636

PSM 3.02.1 2019-03-06 Pri: PSM 3.02.0 2019-02-24
Date[] Fence and Map Tool [Lib: PSM 3.02.1 2019-03-06 Pri:
16/03/2022 12:13 10.01.00.01 DrawingFile>>



Borehole ID

BH09

Page 3 of 3

Engineering Log - Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd						Commenced: 21/02/2022																				
Project Name: Augusta Street, Huntingwood East						Completed: 21/02/2022																				
Hole Location: Refer to Figure 1						Logged By: BT/BG																				
Hole Position: 306749.0 m E 6257750.0 m N GDA2020						Checked By: AS																				
Drill Model and Mounting: JK305						Inclination: -90°		RL Surface: No survey																		
Barrel Type and Length: 3 m						Bearing:		Datum: AHD		Operator: JK Drilling																
Drilling Information						Rock Substance						Rock Mass Defects														
Method	Water	RQD (%)	Samples and Field Tests	WPT (Lugeons)	RL (m)	Depth (m)	Graphic Log	Material Description	Weathering				Strength Is(50)				Defect Spacing (mm)				Defect Descriptions / Comments					
								ROCK NAME: particle/grain characteristics, colour, fabric/texture, inclusions or minor components, moisture, mineral composition, alteration	XW	HW	MW	SW	FR	VL	L	M	H	VH	EH	<20	60	200	600	1000		
NMLC	Not Encountered	67	Is(20) d=0.03 a=0.03 MPa			6		SHALE: grey and brown, moderately weathered, low strength(continued)																		BP, 30°, RF, ST
							Becomes grey																			
			Is(30) d=0.24 a=0.41 MPa			7		Hole Terminated at 6.90 m Target depth																		
						8																				
						9																				
Method						Water		Weathering				Defect Type				Infilling/Coating				Roughness						
AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore HQ3- Wireline core (63.5 mm) PQ3- Wireline core (85.0 mm) SPT- Standard penetration test PT - Push tube WPT - Water pressure test						▽ Inflow △ Partial Loss ▲ Complete Loss		XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh				FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VN - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break				CN - Clean SN - Stain VN - Veneer CO - Coating RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron QZ - Quartz X - Carbonaceous				SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough						
Graphic Log/Core Loss						Core recovered (hatching indicates material) No core recovery		Strength												Shape						
								VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High												PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular						

Logged in accordance with AS 1726:2017 Geotechnical site investigations



JOB No.: PS144636

PROJECT: Augusta Street

LOCATION: Huntingwood

BH ID: B1109

FROM: 4.3m

TO: 6.9m

DATE: 21/02/22



START CORING @ 4.3m

5m

6m

EOH @ 6.9m



Borehole ID

BH10

Page 1 of 3

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 18/02/2022													
Project Name: Augusta Street, Huntingwood East		Completed: 18/02/2022													
Hole Location: Refer to Figure 1		Logged By: BT/BG													
Hole Position: 306838.0 m E 6257716.0 m N GDA2020		Checked By: AS													
Drill Model and Mounting: JK305		Inclination: -90°													
Hole Diameter: 120 mm		RL Surface: No survey													
		Datum: AHD													
		Operator: JK Drilling													
Drilling Information				Soil Description				Observations							
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations	
AD/T			N	Not Encountered			1			Silty CLAY trace gravel: high plasticity, dark grey; gravel sub-angular up to 5 mm, rootlets observed	M	S	100	0.00: TOPSOIL	
										CLAY: high plasticity, red					
											M	St			0.10: FILL
							2			CLAY trace gravel: high plasticity, brown; gravel sub-angular up to 20mm					0.50: SPT recovered 300/450 mm
											D	St			
							3			CLAY trace gravel: yellow and brown, low plasticity; gravel sub-angular up to 15mm					1.50: SPT recovered 330/450 mm
											D	St			
							4			SHALE: brown, extremely weathered, very low strength					1.80: INFERRED NATURAL
Continued on cored borehole sheet															

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
 No resistance
 Refusal

Water
 Inflow
 Partial Loss
 Complete Loss

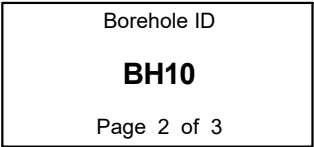
Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

PSM 3.02.2 LIB GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-06 Pj: PSM 3.02.0 2019-02-24

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Project No.: PSM4636

PSM AU CORE BH PSM 3.02.2 LIB.GLB Log PSM 3.02.1 2019-03-06 Pri: PSM 3.02.0 2019-02-24
17/03/2022 17:56 10.01.00.01 Datge| Fence and Map Tool | Lib: PSM 3.02.0 2019-02-24
<<DrawingFile>>



Borehole ID

BH10

Page 3 of 3

Engineering Log - Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 18/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 18/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306838.0 m E 6257716.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK305		Inclination: -90°	
Barrel Type and Length: 3 m		Bearing:	
RL Surface: No survey		Datum: AHD	
Operator: JK Drilling			

Drilling Information						Rock Substance										Rock Mass Defects													
Method	Water	RQD (%)	Samples and Field Tests	WPT (Lugeons)	RL (m)	Depth (m)	Graphic Log	Material Description	Weathering				Strength Is(50)						Defect Spacing (mm)				Defect Descriptions / Comments						
								ROCK NAME: particle/grain characteristics, colour, fabric/texture, inclusions or minor components, moisture, mineral composition, alteration	XW	HW	MW	SW	FR	VL	L	M	H	VH	EH										
NMLC	Not Encountered	72	Is(50) d=0.04 a=0.04 MPa			6		SHALE: grey and brown, highly weathered, very low strength(continued)																					
						Becomes grey																							
			Is(50) a=0.03 MPa			7																							
			Is(50) d=0.19 a=0.14 MPa					Hole Terminated at 7.27 m Target depth																					
						8																							
						9																							

Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore HQ3- Wireline core (63.5 mm) PQ3- Wireline core (85.0 mm) SPT- Standard penetration test PT - Push tube WPT - Water pressure test	Water ▽ Inflow △ Partial Loss ▲ Complete Loss Graphic Log/Core Loss Core recovered (hatching indicates material) No core recovery	Weathering XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh Strength VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	Defect Type FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VN - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	Infilling/Coating CN - Clean SN - Stain VN - Veneer CO - Coating RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron QZ - Quartz X - Carbonaceous	Roughness SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough Shape PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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Logged in accordance with AS 1726:2017 Geotechnical site investigations



JOB No.: PSM 4636

PROJECT: AUGUSTA ST

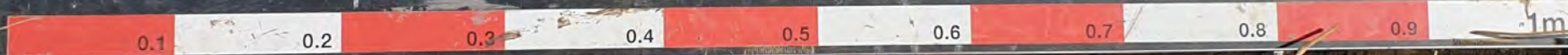
LOCATION: BH10

BH ID: BH10

FROM: 4.25

TO: 7.27

DATE: 10/02/2022



START CORING @ 4.25m

5m

6m

7m

EOH @ 7.27m



Borehole ID

BH11

Page 1 of 3

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 17/02/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 17/02/2022	
Hole Location: Refer to Figure 1		Logged By: BT/BG	
Hole Position: 306991.0 m E 6257693.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK305		Inclination: -90°	
Hole Diameter: 120 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T				SPT 0.50-0.95 m 4,4,8 N=12			1			CLAY: high plasticity, red and brown	M	St		0.00: INFERRED NATURAL
										CLAY: medium plasticity, brown	D	VSt		0.50: SPT recovered 450/450 mm
										SHALE: brown, extremely weathered, very low strength				1.20: INFERRED BEDROCK
										Continued on cored borehole sheet				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration
No resistance
Refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations

PSM 3.02.2 LIB.GLB Log PSM AU NONCORE BH NZ AU PSM4636 AUGUSTA STREET HUNTINGWOOD.GPJ <<DrawingFile>> 16/03/2022 11:59 10.01.00.01 Datagel Fence and Map Tool Lib PSM 3.02.1 2016-03-08 Pj: PSM 3.02.0 2019-02-24



Borehole ID

BH11

Page 2 of 3

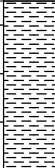
Engineering Log - Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306991.0 m E 6257693.0 m N GDA2020

Commenced: 17/02/2022
Completed: 17/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclinometer: -90° RL Surface: No survey
Barrel Type and Length: 3 m Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Rock Substance											Rock Mass Defects								
Method	Water	RQD (%)	Samples and Field Tests	WPT (Lugeons)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK NAME: particle/grain characteristics, colour, fabric/texture, inclusions or minor components, moisture, mineral composition, alteration	Weathering				Strength Is(50) ● - Axial ○ - Diametral				Defect Spacing (mm)			Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other						
						1			XW	HW	MW	SW	FR	VL	L	M	H	VH	EH	<20	60	200	600	1000		
						2																				
						3																				
						4																				
								Continued from non-cored borehole sheet																		
NMLC	Not Encountered	69	Is(50) d=0.03 a=0.04 MPa					SHALE: brown, highly weathered, very low strength																		—BP, 0°, CN, PL, S —BP, 3°, CN, CU, S —BP, 5°, CN, PL, S
Method			Water			Weathering			Defect Type			Infilling/Coating			Roughness											
AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore HQ3- Wireline core (63.5 mm) PQ3- Wireline core (85.0 mm) SPT- Standard penetration test PT - Push tube WPT - Water pressure test			▷ Inflow ◁ Partial Loss ◄ Complete Loss Graphic Log/Core Loss  Core recovered (hatching indicates material)  No core recovery			XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh Strength VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High			FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VN - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break			CN - Clean SN - Stain VN - Veneer CO - Coating RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron QZ - Quartz X - Carbonaceous			SL - Slicksided POL - Polished S - Smooth RF - Rough VR - Very Rough Shape PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular											



Borehole ID

BH11

Page 3 of 3

Engineering Log - Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306991.0 m E 6257693.0 m N GDA2020

Commenced: 17/02/2022
Completed: 17/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclinometer: -90° RL Surface: No survey
Barrel Type and Length: 3 m Bearing: Datum: AHD Operator: JK Drilling

Drilling Information						Rock Substance										Rock Mass Defects											
Method	Water	RQD (%)	Samples and Field Tests	WPT (Lugeons)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK NAME: particle/grain characteristics, colour, fabric/texture, inclusions or minor components, moisture, mineral composition, alteration	Weathering					Strength Is(50)					Defect Spacing (mm)			Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other					
									XW	HW	MW	SW	FR	VL	L	M	H	VH	EH	<20	60	200	600	1000			
NMLC	Not Encountered	69	Is(50) d=0.6 a=0.55 MPa			6		SHALE: brown, highly weathered, very low strength(continued)																		BP, 5°, CN, IR, S BP, 10°, FE, PL, S BP, 5°, FE, PL, S BP, 3°, CL, PL, S, 2 mm BP, 0°, CN, PL, S JT, 45°, CN, PL, S BP, 0°, CN, PL, IR BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S JT, 80°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, FE, PL, S BP, 0°, CL, IR, S, 2 mm BP, 5°, CN, IR, S BP, 10°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 0°, CN, PL, S BP, 3°, CN, PL, S BP, 2°, CN, PL, S IS, CL, 5 mm IS, CL, 2 mm BP, 3°, CN, PL, RF BP, 3°, CN, ST, S JT, 30°, CL, PL, S, 1 mm FZ, G, 5 mm BP, 0°, CL, PL, S, 1 mm BP, 0°, CN, PL, RF IS, CL, 2 mm BP, 10°, CN, PL, S	
			Is(50) d=0.02 a=0.88 MPa			7																					JT, 90° BP, 5°, FE, ST, S BP, 15°, FE, PL, S
		100	Is(50) d=0.12 a=0.33 MPa			8		Becomes brown and grey																			BP, 3°, CN, PL, S IS, CL, 4 mm BP, 3°, CN, PL, S
			Is(50) d=0.15 MPa			9																					
								Hole Terminated at 9.40 m Target depth																			
Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore HQ3- Wireline core (63.5 mm) PQ3- Wireline core (85.0 mm) SPT- Standard penetration test PT - Push tube WPT - Water pressure test Water ▽ Inflow △ Partial Loss ▲ Complete Loss Graphic Log/Core Loss Core recovered (hatching indicates material) No core recovery Weathering XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh Strength VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High Defect Type FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VN - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break Infilling/Coating CN - Clean SN - Stain VN - Veneer CO - Coating RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron QZ - Quartz X - Carbonaceous Roughness SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough Shape PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular																											

Logged in accordance with AS 1726:2017 Geotechnical site investigations



JOB No.: PSM4636
PROJECT: AUGUSTA ST
LOCATION: BH11

BH ID: BH11
FROM: 4.3
TO: 9.4

DATE:



Start coring @ 4.30m

5m

6m

7m

8m

9m

EOH @ 9.4m.



Borehole ID

BH12

Page 1 of 3

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306972.0 m E 6257756.0 m N GDA2020

Commenced: 18/02/2022
Completed: 18/02/2022
Logged By: BT/BG
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 120 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Plasticity, behaviour or particle characteristics of primary component, colour, secondary components, additional observations	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T				SPT 0.50-0.95 m 4,2,2 N=4			0			CLAY: high plasticity, brown, rootlets observed	M	S	100	0.00: TOPSOIL 0.10: INFERRED NATURAL 0.50: SPT recovered 150/450 mm 1.50: SPT recovered 420/450 mm 1.90: INFERRED BEDROC
							CLAY: high plasticity, red and brown					200		
												300		
												400		
												500		
				SPT 1.50-1.95 m 4,7,10 N=17			1			Becomes grey and brown	M	F		
							2			SHALE: grey and brown, extremely weathered, very low strength		St		
							3			Becomes grey				
							4			Becomes dark grey				
										Continued on cored borehole sheet				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger screwing
CT - Continuous push tube 1.5m long 76mm diameter

Penetration

No resistance
Refusal

Water

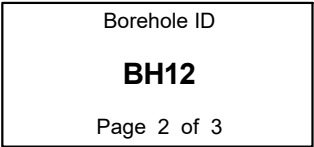
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

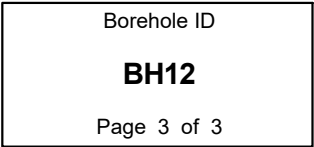
Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

Logged in accordance with AS 1726:2017 Geotechnical site investigations



Project No.: PSM4636

PSM AU CORE BH PSM 3.02.2 LIB.GLB Log PSM 3.02.1 2019-03-06 Pri: PSM 3.02.0 2019-02-24
16/03/2022 12:13 10.01.00.01 Datge| Fence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Pri: PSM 3.02.0 2019-02-24
<<DrawingFile>>



Project No.: PSM4636

PSM AU CORE BH PSM 3.02.2 LIB.GLB Log PSM 3.02.4 2019-03-06 Pri: PSM 3.02.0 2019-02-24
16/03/2022 12:13 10.01.00.01 Datge| Fence and Map Tool | Lib: PSM 3.02.4 2019-03-06 Pri: PSM 3.02.0 2019-02-24
<<DrawingFile>>



JOB No.: *PSM4636*
PROJECT: *AUGUSTA ST*
LOCATION: *BH12*

BH ID: *BH12*
FROM: *4.9*
TO: *7.82*

DATE: *18/02/2022*



START CORING @ 4.90m

5m

6m

7m

EOH @ 7.82m



Borehole ID

BH13

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306044.0 m E 6257906.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations			
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)				Structure, Zoning, Origin, Additional Observations
AD/T				1 CBR 0.50 m SPT 0.50-0.95 m 2,2,3 N=5			0			TOPSOIL: Silty CLAY with gravel: medium plasticity, dark brown, gravel is sub-angular up to 15mm	M					0.00: Rootlets present	
							0.20: INFERRED FILL										
							CLAY with gravel: high plasticity, brown, gravel is sub-angular up to 10mm								0.50: CLAYSTONE fragments present at base of SPT		
							Becomes brown and grey			M	F to St						
							CLAY trace gravel: high plasticity, red and grey, gravel is sub-angular up to 10mm										
AD/V		N	Not Encountered	SPT 1.50-1.95 m 3,4,5 N=9			1			Becomes dark grey	M	F					
							Becomes light grey and brown										
							CLAY: high plasticity, red								4.00: INFERRED NATURAL		
							Becomes grey mottled yellow			M	St						

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration

Water

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH13

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306044.0 m E 6257906.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N	Not Encountered				6			CLAY: high plasticity, red (<i>continued</i>)	M	St	100	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method

AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration

No resistance through to refusal

Water

▽ Inflow
▽ Partial Loss
◼ Complete Loss

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition

D - Dry
M - Moist
W - Wet

Consistency/Relative Density

VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH14

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306058.0 m E 6257845.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations								
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)				Structure, Zoning, Origin, Additional Observations					
ADW			N	SPT 0.50-0.95 m 2,3,3 N=6			1			TOPSOIL: Silty CLAY with gravel: medium plasticity, dark brown, gravel is sub-angular up to 10mm CLAY with gravel: high plasticity, brown, gravel is sub-angular up to 15mm	M to W					0.00: Rootlets present 0.20: INFERRED FILL						
							2			CLAY trace gravel: high plasticity, grey, gravel is sub-angular up to 15mm	M	F to St			1.50: SHALE gravel present at bottom of SPT							
							3			CLAY: high plasticity, grey and brown	M	St			2.80: INFERRED NATURAL							
							4			Becomes yellow mottled red Becomes grey mottled brown	M to W	St										
											W											
<table><tr><td>Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</td><td>Penetration No resistance through to refusal</td><td>Water Inflow Partial Loss Complete Loss</td><td>Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</td><td>Moisture Condition D - Dry M - Moist W - Wet</td><td>Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact</td></tr></table>																	Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	Penetration No resistance through to refusal	Water Inflow Partial Loss Complete Loss	Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	Moisture Condition D - Dry M - Moist W - Wet	Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact
Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	Penetration No resistance through to refusal	Water Inflow Partial Loss Complete Loss	Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	Moisture Condition D - Dry M - Moist W - Wet	Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact																	

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH14

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 306058.0 m E 6257845.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclinometer: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N					6			CLAY: high plasticity, grey and brown (continued)	W	St	100	
										200			300	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method

AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration

No resistance through to refusal

Water

Inflow
 Partial Loss
 Complete Loss

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition

D - Dry
M - Moist
W - Wet

Consistency/Relative Density

VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH15

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 305940.0 m E 6257817.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)					Structure, Zoning, Origin, Additional Observations
													100	200	300	400	500	

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH15

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd		Commenced: 23/05/2022	
Project Name: Augusta Street, Huntingwood East		Completed: 23/05/2022	
Hole Location: Refer to Figure 1		Logged By: KTL	
Hole Position: 305940.0 m E 6257817.0 m N GDA2020		Checked By: AS	
Drill Model and Mounting: JK305		Inclination: -90°	
Hole Diameter: 125 mm		RL Surface: No survey	
		Datum: AHD	
		Operator: JK Drilling	

Drilling Information					Soil Description					Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey, extremely weathered, low strength (continued)			100 200 300 400 500	
							7			Hole Terminated at 6.00 m Target depth				
							8							
							9							

Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	Penetration 	Water ▽ Inflow ▽ Partial Loss ◼ Complete Loss	Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	Moisture Condition D - Dry M - Moist W - Wet	Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact
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See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH16

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 305992.0 m E 6257784.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N		1 ES 0.50 m SPT 0.50-0.95 m 3,4,6 N=10			1			TOPSOIL: Silty CLAY trace gravel: high plasticity, dark brown, gravel is sub-angular up to 10mm CLAY: high plasticity, brown mottled grey	M			0.10: INFERRED NATURAL
AD/T		N	Not Encountered	SPT 1.50-1.95 m 4,8,9 N=17			2			SHALE: brown, extremely weathered, very low strength		St to VSt		2.10: INFERRED BEDROCK
							3							
							4							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration

Water
▽ Inflow
▽ Partial Loss
◄ Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH16

Page 2 of 2

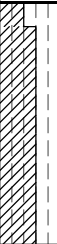
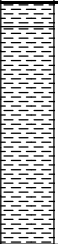
Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 305992.0 m E 6257784.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations				
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)					Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Encountered				6			SHALE: grey, extremely weathered, low strength			100					
							7			Hole Terminated at 6.00 m Target depth								
							8											
							9											

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
 No resistance through to refusal

Water
▽ Inflow
▽ Partial Loss
◄ Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH17

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client: LOGOS Property Group Ltd
Project Name: Augusta Street, Huntingwood East
Hole Location: Refer to Figure 1
Hole Position: 305946.0 m E 6257736.0 m N GDA2020

Commenced: 23/05/2022
Completed: 23/05/2022
Logged By: KTL
Checked By: AS

Drill Model and Mounting: JK305 Inclin: -90° RL Surface: No survey
Hole Diameter: 125 mm Bearing: Datum: AHD Operator: JK Drilling

Drilling Information							Soil Description							Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T				SPT 1.50-1.95 m 2,4,2 N=6			1			Clayey GRAVEL: dark grey, sub-angular up to 20mm	W			0.00: INFERRED FILL
										CLAY with gravel: medium to high plasticity, dark brown, gravel is sub-angular up to 20mm	M	F		
										CLAY trace gravel: high plasticity, red and yellow, gravel is sub-angular up to 10mm				
										Becomes dark grey				
										Becomes pale brown	M	F		
										CLAY: high plasticity, brown				
				SPT 3.00-3.45 m 5,10,14 N=24			3			Becomes grey mottled red	M	VSt	2.80: INFERRED NATURAL	
										SHALE: brown, extremely weathered, very low strength				
							4							3.50: INFERRED BEDROCK

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration

No resistance through to refusal

Water

Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017



Borehole ID

BH17

Page 2 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM4636

Client:		LOGOS Property Group Ltd		Commenced:		23/05/2022																	
Project Name:		Augusta Street, Huntingwood East		Completed:		23/05/2022																	
Hole Location:		Refer to Figure 1		Logged By:		KTL																	
Hole Position:		305946.0 m E 6257736.0 m N GDA2020		Checked By:		AS																	
Drill Model and Mounting:		JK305		Inclination:		-90°																	
Hole Diameter:		125 mm		RL Surface:		No survey																	
				Bearing:		Datum: AHD Operator: JK Drilling																	
Drilling Information				Soil Description				Observations															
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations									
AD/T			Not Encountered				6			SHALE: brown, extremely weathered, very low strength (continued)			100 200 300 400 500										
							7			Hole Terminated at 6.00 m Target depth													
							8																
							9																
Method AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing				Penetration No resistance through to refusal				Water ▽ Inflow ▽ Partial Loss ◀ Complete Loss				Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample				Moisture Condition D - Dry M - Moist W - Wet				Consistency/Relative Density VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense Ce - Cemented C - Compact			

See Explanatory Notes for details of abbreviations and basis of descriptions.

Soil and rock descriptions in accordance with AS 1726:2017

Appendix B

CBR Results

FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: Pells Sullivan Meynink

PSM Job No.: PSM4636

Report No.: L4747E - 1

Report Date: 1/03/2022

Page 1 of 1

BOREHOLE NUMBER	BH 07	BH 09	BH 12
DEPTH (m)	0.70 - 0.00	0.30 - 1.00	0.20 - 1.20
Surcharge (kg)	4.5	4.5	4.5
Maximum Dry Density (t/m ³)	1.67 STD	1.59 STD	1.65 STD
Optimum Moisture Content (%)	20.8	23.0	21.9
Moulded Dry Density (t/m ³)	1.63	1.56	1.62
Sample Density Ratio (%)	98	98	98
Sample Moisture Ratio (%)	102	99	98
Moisture Contents			
Insitu (%)	24.1	23.1	20.6
Moulded (%)	21.3	22.8	21.5
After soaking and			
After Test, Top 30mm(%)	35.7	36.8	38.6
Remaining Depth (%)	24.0	26.6	21.8
Material Retained on 19mm Sieve (%)	0	0	0
Swell (%)	3.5	4.0	3.5
C.B.R. value:	@2.5mm penetration		
	1.5	1.5	2.0

NOTES: Sampled and supplied by client. Samples tested as received.

- Refer to appropriate Borehole logs for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.
- Date of receipt of sample: 22/02/2022.



NATA Accredited Laboratory
Number:1327

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the items tested or sampled.



01/03/2022
Authorised Signature / Date
(T. Finnegan)

FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: Pells Sullivan Meynink
PSM Job No.: PSM4636

Report No.: L4747E - 1
Report Date: 8/03/2022
Page 1 of 1

BOREHOLE NUMBER	BH 4
DEPTH (m)	0.20 - 1.00
Surcharge (kg)	4.5
Maximum Dry Density (t/m ³)	1.64 STD
Optimum Moisture Content (%)	22.3
Moulded Dry Density (t/m ³)	1.60
Sample Density Ratio (%)	98
Sample Moisture Ratio (%)	102
Moisture Contents	
Insitu (%)	30.9
Moulded (%)	22.8
After soaking and	
After Test, Top 30mm(%)	39.5
Remaining Depth (%)	26.4
Material Retained on 19mm Sieve (%)	0
Swell (%)	4.0
C.B.R. value:	@2.5mm penetration 1.5

NOTES: Sampled and supplied by client. Samples tested as received.

- Refer to appropriate Borehole logs for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.
- Date of receipt of sample: 25/02/2022.
- Sample dried back prior to testing as it was too saturated.



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08/03/2022
Authorised Signature / Date
(D. Trewick)

FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: Pells Sullivan Meynink
PSM Job No.: PSM4636
Location: Augusta Street, Blacktown, NSW

Report No.: L4747E - 3
Report Date: 2/06/2022
Page 1 of 1

BOREHOLE NUMBER	BH 01	BH 03
DEPTH (m)	0.5	0.5
Surcharge (kg)	4.5	4.5
Maximum Dry Density (t/m ³)	1.85 STD	1.73 STD
Optimum Moisture Content (%)	14.9	19.3
Moulded Dry Density (t/m ³)	1.82	1.70
Sample Density Ratio (%)	99	98
Sample Moisture Ratio (%)	95	101
Moisture Contents		
Insitu (%)	17.4	18.3
Moulded (%)	14.2	19.4
After soaking and		
After Test, Top 30mm(%)	25.9	34.9
Remaining Depth (%)	17.5	22.5
Material Retained on 19mm Sieve (%)	3*	0
Swell (%)	3.0	4.0
C.B.R. value:	@2.5mm penetration 1.5	
	@5.0mm penetration	2.0

NOTES: Sampled and supplied by client. Samples tested as received.

- Refer to appropriate Borehole logs for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.
- Date of receipt of sample: 24/05/2022.
- * Denotes not used in test sample.



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02/06/2022
Authorised Signature / Date
(D. Treweek)

Appendix C

Analytical Laboratory Testing Results

CERTIFICATE OF ANALYSIS

Work Order : **ES2205747**
Client : **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**
Contact : **BRYAN TAM**
Address : **G3, 56 DELHI ROAD**
NORTH RYDE NSW, AUSTRALIA 2113
Telephone : **----**
Project : **PSM4036**
Order number : **----**
C-O-C number : **----**
Sampler : **BRYAN TAM**
Site : **----**
Quote number : **EN/333**
No. of samples received : **3**
No. of samples analysed : **3**

Page : 1 of 3
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 : 18-Feb-2022 17:00
Date Analysis Commenced : 22-Feb-2022
Issue Date : 25-Feb-2022 07:47



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 due to sample matrix.
- 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⁺ + Al³⁺).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH07-0.9m	BH11-1.1-1.2m	BH12-0.5m	----	----
Sampling date / time					18-Feb-2022 00:00	17-Feb-2022 00:00	18-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2205747-001	ES2205747-002	ES2205747-003	-----	-----
				Result	Result	Result	Result	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		5.0	5.3	5.5	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		226	370	43	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		19.3	8.6	16.7	----	----
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		4420	2700	23200	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		2.4	----	2.4	----	----
Exchangeable Magnesium	----	0.1	meq/100g		7.7	----	8.3	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.2	----	0.4	----	----
Exchangeable Sodium	----	0.1	meq/100g		2.0	----	0.9	----	----
Cation Exchange Capacity	----	0.1	meq/100g		12.3	----	12.4	----	----
Exchangeable Sodium Percent	----	0.1	%		15.9	----	7.4	----	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	2.2	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	7.5	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	0.3	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	3.2	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	13.2	----	----	----
Exchangeable Sodium Percent	----	0.1	%		----	24.1	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		230	300	40	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		180	330	<50	----	----

CERTIFICATE OF ANALYSIS

Work Order : **ES2205930**
Client : **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**
Contact : **BRYAN TAM**
Address : **G3, 56 DELHI ROAD**
NORTH RYDE NSW, AUSTRALIA 2113
Telephone : **----**
Project : **PSM4636**
Order number : **----**
C-O-C number : **----**
Sampler : **----**
Site : **----**
Quote number : **EN/333**
No. of samples received : **3**
No. of samples analysed : **3**

Page : 1 of 3
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 : 21-Feb-2022 17:50
Date Analysis Commenced : 24-Feb-2022
Issue Date : 28-Feb-2022 15:05



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- Analytical Results

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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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- 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+}).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01-1.3m	BH02-0.8m	BH09-0.5m	----	----
Sampling date / time					21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2205930-001	ES2205930-002	ES2205930-003	-----	-----
				Result	Result	Result	Result	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		5.4	5.6	5.3	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		685	324	253	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.4	16.8	18.7	----	----
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		1460	3090	3950	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	0.5	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	10.8	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	0.3	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	3.7	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	17.4	----	----
Exchangeable Sodium Percent	----	0.1	%		----	----	24.0	----	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		0.3	<0.1	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		8.4	<0.1	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.2	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		2.0	<0.1	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		10.9	<0.1	----	----	----
Exchangeable Sodium Percent	----	0.1	%		----	<0.1	----	----	----
Exchangeable Sodium Percent	----	0.1	%		18.5	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		500	160	140	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		830	380	260	----	----

CERTIFICATE OF ANALYSIS

Work Order : **ES2206581**
Client : **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**
Contact : **BRYAN TAM**
Address : **G3, 56 DELHI ROAD**
NORTH RYDE NSW, AUSTRALIA 2113
Telephone : **----**
Project : **PSM4363**
Order number : **----**
C-O-C number : **----**
Sampler : **----**
Site : **----**
Quote number : **EN/333**
No. of samples received : **2**
No. of samples analysed : **2**

Page : 1 of 3
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 : 25-Feb-2022 14:20
Date Analysis Commenced : 01-Mar-2022
Issue Date : 03-Mar-2022 18:16



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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
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 due to sample matrix.
- 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⁺ + Al³⁺).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH03-0.3m	BH06-1.0m	----	----	----
Sampling date / time					25-Feb-2022 00:00	25-Feb-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2206581-001	ES2206581-002	-----	-----	-----
				Result	Result		----	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		6.1	5.2	----	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		70	426	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		22.2	20.4	----	----	----
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		14300	2350	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		8.0	1.6	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		7.9	16.2	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.8	0.4	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		0.8	4.7	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		17.6	23.4	----	----	----
Exchangeable Sodium Percent	----	0.1	%		4.7	20.5	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		50	120	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<50	<50	----	----	----

CERTIFICATE OF ANALYSIS

Work Order : **ES2217749**
Client : **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**
Contact : Ken Tong Lee
Address : G3, 56 DELHI ROAD
 NORTH RYDE NSW, AUSTRALIA 2113
Telephone : ----
Project : PSM4636
Order number : ----
C-O-C number : ----
Sampler : Ken Tong Lee
Site : ----
Quote number : EN/333
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 3
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 : 23-May-2022 15:20
Date Analysis Commenced : 26-May-2022
Issue Date : 31-May-2022 15:11



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- Analytical Results

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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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- 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⁺ + Al³⁺).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02-1.0m	BH04-0.5m	----	----	----
Sampling date / time					23-May-2022 00:00	23-May-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2217749-001	ES2217749-002	-----	-----	-----
				Result	Result		----	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		8.2	5.5	----	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		347	388	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		12.4	18.6	----	----	----
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		2880	2580	----	----	----
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		7.5	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g		2.5	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g		0.3	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g		1.3	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g		11.6	----	----	----	----
Exchangeable Sodium Percent	----	0.2	%		11.4	----	----	----	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	0.7	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	2.7	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	0.5	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	4.1	----	----	----
Exchangeable Sodium Percent	----	0.1	%		----	13.1	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		320	220	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		90	600	----	----	----

Appendix D

Piezometer Construction Records



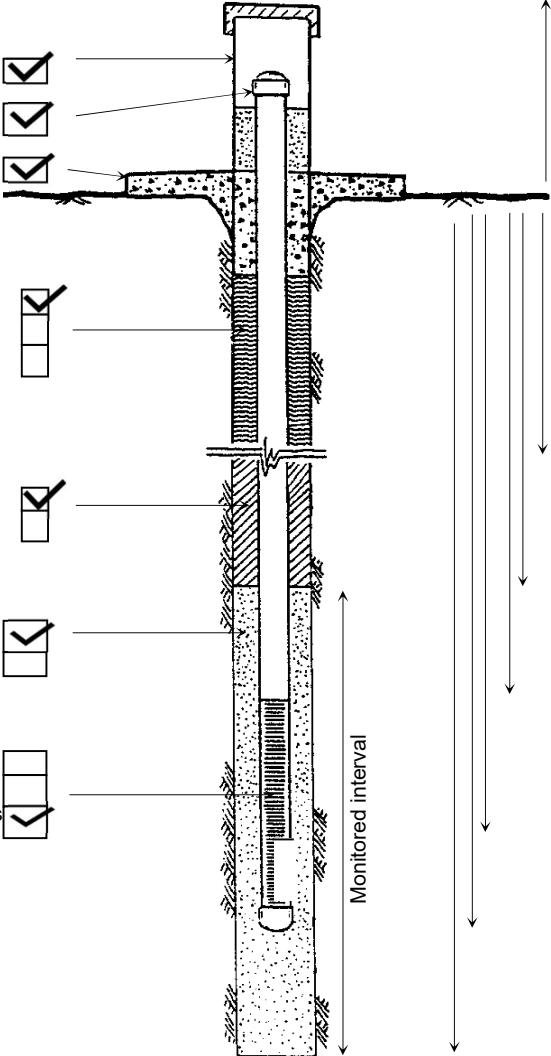
PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH03
PIEZOMETER: PZ_BH03
COLLAR EASTING: 306224
COLLAR NORTHING: 6257861
COLLAR RL(m): -
DATUM: AHD

DRILLING CONTRACTOR: JK Drilling
RIG: Commachio 205
DEPTH OF HOLE (m): 5.90
BOREHOLE INCLINATION: -90
PIEZO INSTALLATION DATE: 25/02/2022
SUPERVISED BY: BT

Tick boxes

Complete dimensions if appropriate

Steel protective well cover	☒		Height of stickup (m)	<u>0 m</u>
PVC cap	☒		Diameter of PVC (mm)	<u>60 mm</u>
Concrete collar	☒		Depth to top of seal	<u>0 m</u>
Back fill type: Cement bentonite Soil None	☒ ☐ ☐ ☐		Depth to top of gravel pack	<u>2.4 m</u>
Seal: Bentonite pellets Other	☒ ☐ ☐		Depth to top of screen	<u>3.0 m</u>
Gravel type: 2-5mm gravel Other	☒ ☐ ☐		Depth to base of screen	<u>5.8 m</u>
Perforation type: Drill holes Hack saw cuts 40um machine slots	☐ ☐ ☐ ☒		Depth to base of piezo	<u>5.9 m</u>
			Depth to base of gravel	<u>-</u>

COMMENTS:



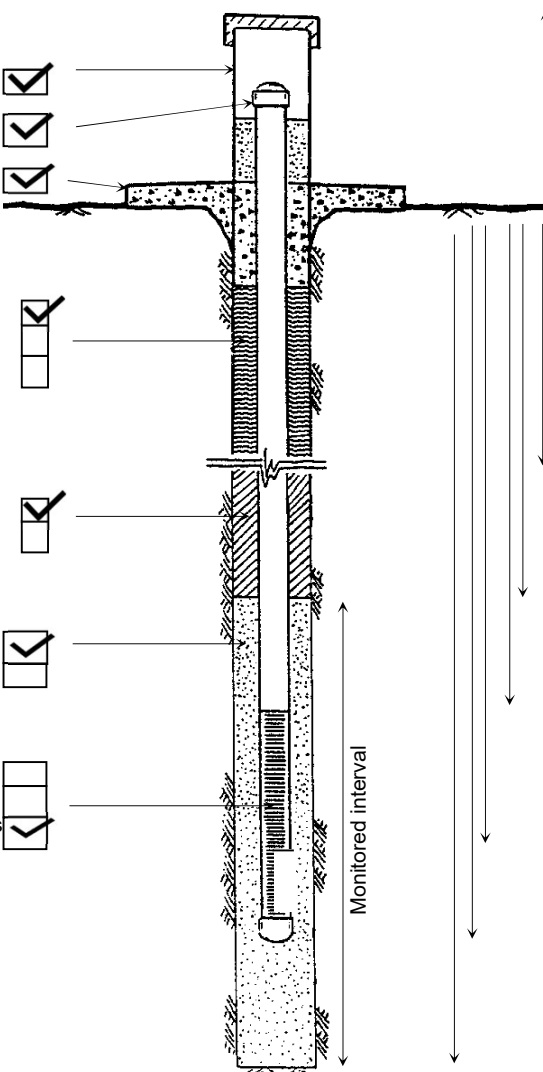
PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH08
PIEZOMETER: PZ_BH08
COLLAR EASTING: 306430
COLLAR NORTHING: 6257693
COLLAR RL(m): -
DATUM: AHD

DRILLING CONTRACTOR: JK Drilling
RIG: JK300
DEPTH OF HOLE (m): 6.0
BOREHOLE INCLINATION: -90
PIEZO INSTALLATION DATE: 21/02/2022
SUPERVISED BY: BT

Tick boxes

Complete dimensions if appropriate

Steel protective well cover	☒		Height of stickup (m)	<u>0 m</u>
PVC cap	☒		Diameter of PVC (mm)	<u>60 mm</u>
Concrete collar	☒		Depth to top of seal	<u>0.3 m</u>
Back fill type: Cement bentonite Soil None	☒ ☐ ☐ ☐		Depth to top of gravel pack	<u>2.5 m</u>
Seal: Bentonite pellets Other	☒ ☐ ☐		Depth to top of screen	<u>3.0 m</u>
Gravel type: 2-5mm gravel Other	☒ ☐ ☐		Depth to base of screen	<u>5.9 m</u>
Perforation type: Drill holes Hack saw cuts 40um machine slots	☐ ☐ ☐ ☒		Depth to base of piezo	<u>6.0 m</u>
			Depth to base of gravel	<u>-</u>

COMMENTS:



PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH11
PIEZOMETER: PZ_BH11
COLLAR EASTING: 306991
COLLAR NORTHING: 6257693
COLLAR RL(m): -
DATUM: AHD

DRILLING CONTRACTOR: JK Drilling
RIG: JK300
DEPTH OF HOLE (m): 9.4
BOREHOLE INCLINATION: -90
PIEZO INSTALLATION DATE: 17/02/2022
SUPERVISED BY: BT

Tick boxes

Complete dimensions if appropriate

Steel protective well cover	☒		Height of stickup (m)	<u>0 m</u>
PVC cap	☒		Diameter of PVC (mm)	<u>60 mm</u>
Concrete collar	☒		Depth to top of seal	<u>0.5 m</u>
Back fill type: Cement bentonite Soil None	☒ ☐ ☐ ☐		Depth to top of gravel pack	<u>4.0 m</u>
Seal: Bentonite pellets Other	☒ ☐ ☐		Depth to top of screen	<u>4.6 m</u>
Gravel type: 2-5mm gravel Other	☒ ☐ ☐		Depth to base of screen	<u>9.3 m</u>
Perforation type: Drill holes Hack saw cuts 40um machine slots	☐ ☐ ☐ ☒		Depth to base of piezo	<u>9.4 m</u>
			Depth to base of gravel	<u>-</u>

COMMENTS:

Appendix E

PSM4636-003S

AUGUSTA STREET, HUNTINGWOOD EAST, NSW BULK EARTHWORKS SPECIFICATION

PSM4636-003S 3 November 2021

LOGOS

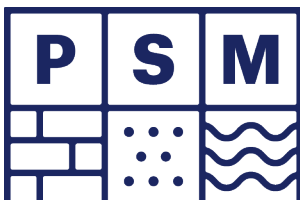


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List of Appendices

Appendix A Site Plan

Appendix B Subgrade Approval Report (Sample Only)

Appendix C Lot Approval Report (Sample Only)

Appendix D Daily Report (Sample Only)

Appendix E Certification Letter (Sample Only)



1 Scope

This specification details the requirements for the bulk earthworks to be undertaken at the proposed development at Augusta Street, Huntingwood East, NSW. The site area where this specification is applicable is shown in Appendix A

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 filling commencing.

All Engineered Fill is to be placed on one of the following four (4) 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.
4. Other materials as approved by PSM.

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 95% 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

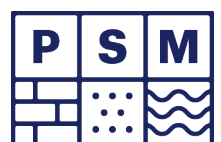
2.3.1 Site Won Material

Site won material can be used as Engineered Fill as long as it meets the requirements in Clause 2.3.3.

2.3.2 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 (e.g., 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, being 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.

2.3.3 All Fill

Engineered Fill shall be approved by the GITA as suitable for use in accordance with the requirements in this Specification.

Engineered Fill shall not comprise unsuitable material as defined by Clause 4.2 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 (e.g.: gypsum), or which undergo volume change or loss of strength when disturbed and exposed to moisture (e.g.: 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 0.25% 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 Half Density Ratio (Standard Compaction) of between 98% and 102%.

The in-situ density shall be measured over the full depth of each layer placed.

2.6 Moisture Control

The placement moisture variation or Half 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 in-situ material of at least stiff consistency.
3. 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

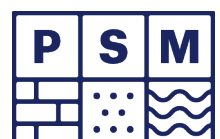
The survey requirements are as follows:

1. Any approved subgrade shall be surveyed prior to first filling such that subgrade levels are established to within ± 0.1 m.
2. The Lot boundaries shall be surveyed and shown on a plan drawing to an accuracy of at least ± 1 m in plan and ± 0.1 m in elevation.
3. The location of the field density tests shall be surveyed and shown on the Lot boundary plan drawing to an accuracy of at least ± 1 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 need to have competent personnel on site at all times while earthwork operations are undertaken. Such operations include:

- Completion of removal of topsoil
- 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 test per 500 m³ of material placed.
- 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 final bulk earthworks level (BEL). Expected test frequency is up to two days of testing for the entire site. The contractor is to make a suitable reaction (e.g., 20 tonne excavator) available for the tests.

5.6 Inspection, Testing and Survey

The GITA shall at least undertake the following tasks:

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.
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.
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. For each Lot, identify the material as defined in Clause 2.3.1, Clause 2.3.2 or Clause 2.3.3 of this specification and assess that the material placed is in accordance with the fill material requirements of Clause 2.3 of this specification.
6. Assess the proportion of deleterious material for each Lot is in accordance with Clause 2.3.3 of this specification.
7. 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.
8. 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.
9. Ensure that the survey requirements in Clause 3 of this specification have been completed.
10. Estimate the approximate volume of Engineered Fill placed in each Lot presented for approval.
11. Conduct Lot testing in accordance with the construction control testing requirements of Clauses 5.3 and 5.4 of this specification.
12. 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 in situ density testing that allows the density of the full layer to be assessed.
13. Assess that the moisture variation of each Lot is in accordance with the requirements for moisture control in Clause 2.6 of this specification.
14. Conduct material property testing in accordance with the material testing requirements in this specification (e.g., Deleterious material testing if required).



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 3 of Clause 5.6 including reporting the subgrade type
 - Document the subgrade survey that has been undertaken
 - Approve or reject the subgrade condition for cut areas based on task 1 of Clause 5.6
 - Approve or reject the subgrade condition and base geometry for filling, based on tasks 3 and 4 of Clause 5.6.
2. *Lot Approval Reports* (a sample is attached). Such a report shall:
 - Document assessments, testing and survey undertaken for tasks 5 to 14 of Clause 5.6
 - Report material identification undertaken for task 5 of Clause 5.6
 - Report proportion of deleterious material for task 6 of Clause 5.6
 - Report the results of testing undertaken for task 11 of Clause 5.6
 - Approve or reject lots based on tasks 12 and 13 of Clause 5.6.
3. *Material Testing Reports*. Such a report shall:
 - Report the results of material property testing undertaken for task 14 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 9 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.).

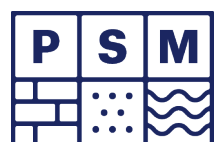
6.2 Certification

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 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.



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. PSM4636-003S)."

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. PSM4636-003S)."



Brisbane

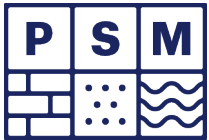
Level 6, 500 Queen St
Brisbane QLD 4000
+61 7 3220 8300

Sydney

G3-56 Delhi Road
North Ryde NSW 2113
+61 2 9812 5000

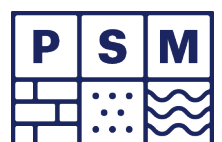
Perth

Level 3 22 Delhi Street
West Perth WA 6005
+61 8 9462 8400



Appendix A

Site Plan





Legend:

— Approximate site boundary

Note:

1. Aerial photo taken from Nearmap dated 17 October 2021

20 0 20 40 60 80m
1:4000 FULL SIZE A3



LOGOS Property Group Ltd
Augusta Street
Huntingwood East

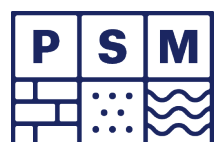
SITE LOCALITY PLAN

PSM4636-003S

FIGURE 1

Appendix B

Subgrade Approval Report (Sample Only)



GEOTECHNICAL INSPECTION AND TESTING AUTHORITY
NATA accreditation number



SUBGRADE APPROVAL REPORT

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

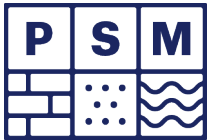
Subgrade areas assessed:

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

COMMENTS:

Signed:	Date:
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Appendix C
Lot Approval Report (Sample Only)





GEOTECHNICAL INSPECTION AND TESTING AUTHORITY
NATA accreditation number

LOT APPROVAL REPORT

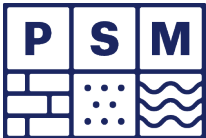
Client:	Report number:
Job number:	Report date:
Project:	Technician:
Contractor:	Test methods:

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:
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Appendix D
Daily Report (Sample Only)





GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

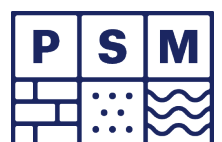
NATA accreditation number

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 E

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. PSM4636-003S, dated 2 November 2021) 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