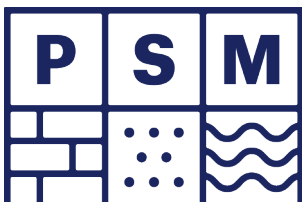


# Mamre Road Data Centre Campus (706- 752 Mamre Road Kemps Creek)

Results of Geotechnical Investigation

PSM5872-005R REV2    24 November 2025

Aurecon Australasia Pty Ltd



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# 1. Introduction

This report has been prepared for Mamre Road Data Centre Campus to accompany a State Significant Development Application (SSDA) for data centre development located at 706-752 Mamre Rd, Kemps Creek NSW (the **Site**).

The project area for the proposed development, 706-752 Mamre Road, Kemps Creek (Lot 10 DP 1280592), constitutes the main development site with areas across the shared boundaries to the east and south (described below) utilised to facilitate roadworks and bulk earthworks:

- Gibb Group site to the East known as 1-22 Bakers Lane, Kemps Creek (Lot 40 in DP 709347)
- GPT Group site to the South known as 754 Mamre Road, Kemps Creek (Lot 180 in DP 1290397).

Additionally, power supply lead-in from Sydney-West Substation is proposed as part of the development, which traverses through multiple landholdings.

The Site is proposed for development under a State Significant Development Application (SSDA) as a data centre campus comprising:

- Approximately 26 shells across four-storey data centre buildings (4x four shells and 2x five shells), including six technical office buildings, plus a campus office
- Incoming and internal electrical substations and associated infrastructure
- Site preparation, including earthworks, stormwater, sewer, roads, and associated infrastructure.

The purposes of the geotechnical investigation were to:

- Assess the ground profile and the groundwater levels across the Site
- Respond to the project-specific Secretary’s Environmental Assessment Requirements (SSD-92743706) by Department of Planning, Housing and Infrastructure dated 30 September 2025 relating to the geotechnical and groundwater aspects of Data Storage Centres, as outlined in Table 1.

**Table 1 - Project-specific SEARs Compliance Table (SSD-92743706)**

Section	Request Item	Report Section / Response
Soil	An assessment of potential impacts on soil resources and riparian land on and near the site, including: <ul style="list-style-type: none"><li>- Impacts on soil erosion, salinity and acid sulfate soils.</li></ul>	Refer to Section 7.1
Water Management	An assessment of potential surface and groundwater impacts (both quality and quantity) associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby in accordance with relevant EPA guidelines and the Department of Climate Change, Energy, the Environment and Water - Water Group (DCCEEW-Water) Groundwater Toolkit.	Refer to Section 7.2

We emphasise that the above SEARs are not all geotechnical matters and as such, it should be addressed by multiple consultants/disciplines, e.g. geotechnical consultant, ecologist, environmental consultant, civil / stormwater designer, hydraulic engineer, etc.

## 2. Background

### 2.1 Previous Site Investigations

Prior to this scope of work, we had previously been engaged by ISPT to complete a detailed geotechnical investigation of the site and prepare the following geotechnical documents for SSDA submission for ISPT Summit project (SSD-30628110), all of which are publicly available and published on the NSW Major Project Portal<sup>1</sup>. The works for the detail geotechnical investigation were undertaken in 2020 and 2022.



- PSM4252-002L REV5 dated 24 August 2022 – Results of detailed geotechnical investigation
- PSM4252-003S REV1 dated 22 July 2022– Bulk earthworks specification.

The geotechnical factual information documented in PSM4252-002L REV5 has been presented in this report.

Figure 1 presents the site locality plan of the previously completed site investigations.

## 2.2 Documents Reviewed

We have utilised the following documentation:

- Existing site documentation published on the NSW Major Project Portal<sup>1</sup>
- Concept design documents for SSDA submission, including:
  - Civil work package by AT&L (ref: SYD4-SITE-DRG-ATL-CIV-02000 to 02301 dated 10 November 2025)
  - Architecture work package by Greenbox Architecture (ref: SSDA-A-0000 to 6005.01 dated 7 November 2025)
  - Structural work package by WSP (ref: SYD4-SITE-DRG-WSP-STR-00000 to 08017 dated 16 October 2025).

## 3. Desktop Study

The project area for the proposed development, 706-752 Mamre Road, Kemps Creek (Lot 10 DP 1280592), constitutes the main development site with areas across the shared boundaries to the east and south (described below) utilised to facilitate roadworks and bulk earthworks:

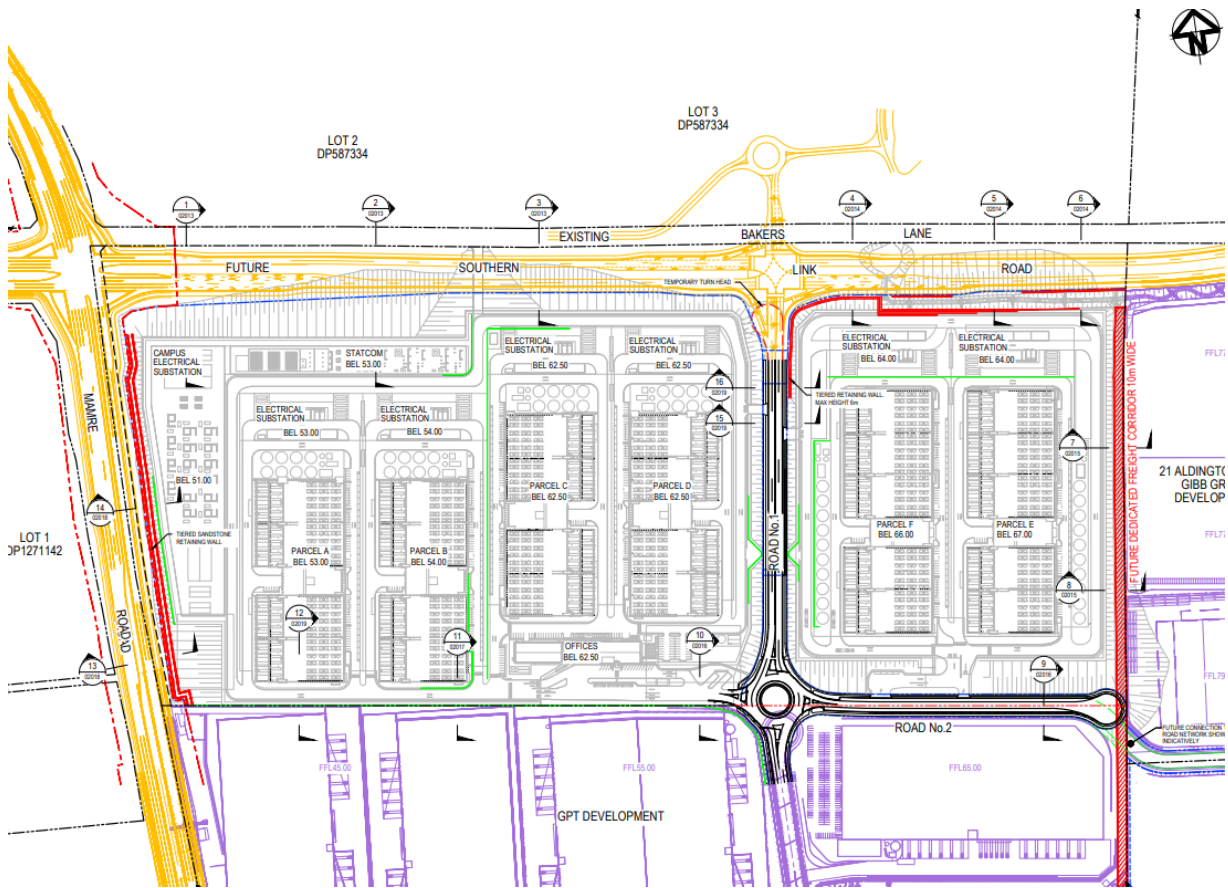
- Gibb Group site to the East known as 1-22 Bakers Lane, Kemps Creek (Lot 40 in DP 709347)
- GPT Group site to the South known as 754 Mamre Road, Kemps Creek (Lot 180 in DP 1290397).

Additionally, power supply lead-in from Sydney-West Substation is proposed as part of the development, which traverses through multiple landholdings.

Based on the available information, we understand that:

- The Site (Lot 10 DP 1280592) has an approximate area of 52 ha, bounded by Mamre Road to the west, Bakers Lane to the north and other industrial warehouse subdivisions to the east and south
- The existing Site is a greenfield site, comprising vegetated land and water dams
- ISPT previously submitted an SSDA for eight industrial warehouse developments (SSD-30628110)
- The Site is proposed for development under an SSDA as a data centre campus comprising:
  - Approximately 26 shells across four-storey data centre buildings (4x four shells and 2x five shells), including six technical office buildings, plus a campus office
  - Incoming and internal electrical substations and associated infrastructure
  - Site preparation, including earthworks, stormwater, sewer, roads, and associated infrastructure.
- The bulk earthworks plan indicates a bulk earthworks level (BEL) of RL 51 m to 67 m
  - The proposed earthworks comprise:
    - Cut depth: up to 21.0 m
    - Fill depth: up to 16.0 m.

<sup>1</sup> <https://www.planningportal.nsw.gov.au/major-projects/projects/summit-kemps-creek-706-752-mamre-road>



**Inset 1: General Arrangement Plan by AT&L (ref. SYD4-SITE-DRG-ATL-CIV-02005, dated 23 October 2025)**

### 3.1 Historical Aerial Imagery

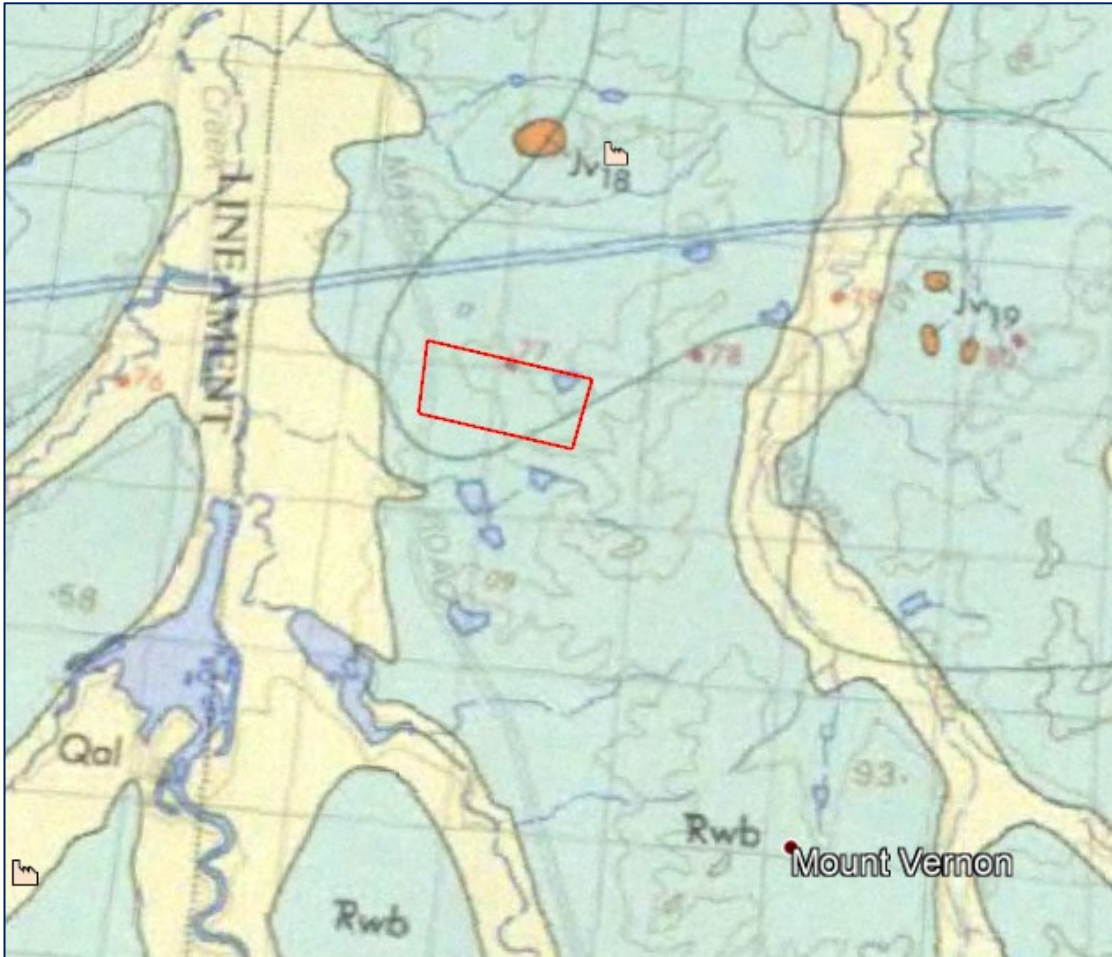
Appendix A presents a summary of the publicly available historical aerial imagery of the Site. Based on the historical aerial imagery, the following is understood regarding the Site:

- The Site comprised residual buildings, vegetated land and water dams
- The Site had had a history of farming and pastoral use since the 1940s
- The residual buildings were demolished between 2019 and 2025.

### 3.2 Geological Map

The 1:100,00 Sydney Geological Map indicates that the site is underlain by Bringelly Shale of the Wianamatta group (*Rwb*) which consists of shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

Inset 2 presents the geological map of the site.

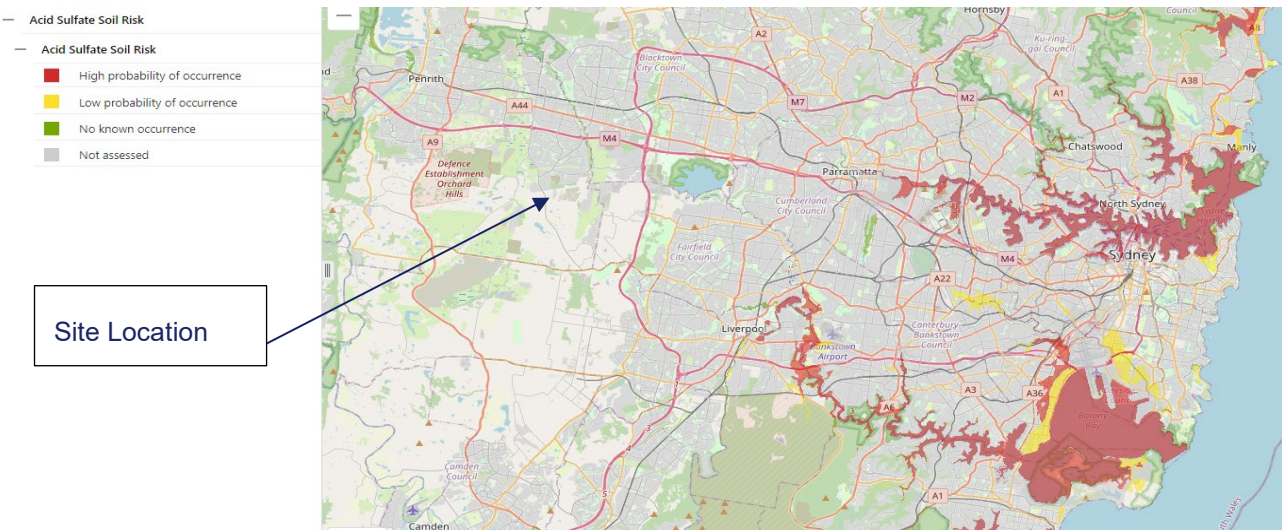
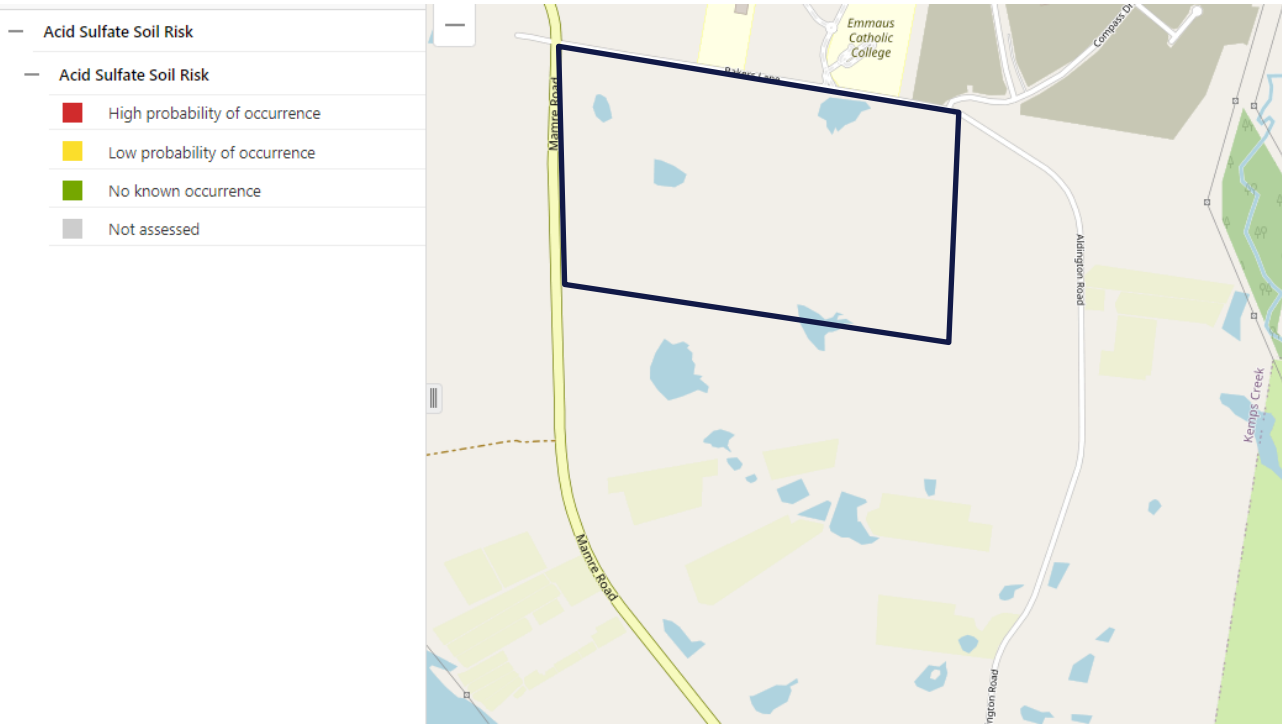


**Inset 2: 1:100,000 Sydney Geological Map indicating approximate site location in red**

### **3.3 Acid Sulphate Soil Impacts – Desktop Study**

Based on the NSW Government SEED (Sharing and Enabling Environmental Data), the site is not located within the areas covered by the Acid Sulphate Soil Risk Map Data. It is our opinion that the risk of acid sulphate soils is low within this site.

Please refer to Acid Sulfate Soil Assessment by JBS&G (ref: L01 ASS 706-752 Mamre Rd Kemp's Creek (Rev A) dated 29 October 2025) for details.



**Inset 3: Acid Sulphate Soils Map – Blue Outline Defines Approximate Site Boundary**

### 3.4 Surface Conditions

Based on the site walkover and review of the historical aerial photos, we understand that:

- The Site primarily comprises thickly vegetated areas and landscape areas, with wired fences dividing the site
- Two (2) hill sides are located in the northern-central and southern-central parts of the land at RL 83 m and RL 81.5 m, respectively
- Three (3) water dams are located at the low point areas
- A creek runs across the southern part of the Site, see Inset 4
- At the time of the fieldwork, the surfaces were dry and accessible by foot or vehicles
- Parts of the site have undergone construction work, with a dirt haul road being paved to allow for accessibility of heavy load vehicles (i.e. trucks, plant etc).



**Inset 4:** Aerial site photo (Nearmap, 2025) with the extent of the existing creek running across the Site

## 4. Geotechnical Investigations

### 4.1 Previous Geotechnical Investigations (2020 – 2022)

In past, a series of detailed geotechnical investigations were completed by PSM at the Site for a SSDA application (SSD-30628110) by ISPT (ref: PSM4252-002L REV5, dated 24 August 2022), which comprised the following works:

- Twelve (12) boreholes drilled to the depths of between 4.3 m and 20.6 m below the surface
- Six (6) cone penetration tests (CPTs) conducted to the depths of 4.8 m and 6.6 m below the surface
- Soil sampling for laboratory testing.

The borehole factual information from the previous geotechnical investigation is presented in Section 5.1 and Appendix B.

The laboratory test results are presented in Section 6 and Appendix F.

Figure 1 presents the locality plan of the site with the borehole locations.

## 4.2 PSM Geotechnical Investigation (2025)

### 4.2.1 General

The following tasks were performed under the full-time supervision of a PSM Geotechnical Engineer:

- Directed service locating, borehole drilling, standard penetration testing and piezometer installation
- Prepared engineering logs of the material encountered
- Point load testing of recovered cored samples.

Prior to borehole drilling, the investigation locations were checked by a certified service locator under the supervision of a PSM geotechnical engineer to detect the presence of underground services.

The borehole locations were recorded using a handheld GPS device with a horizontal and vertical accuracy of approximately  $\pm 15$  mm horizontally and  $\pm 20$  mm vertically.

Standard Penetration Tests (SPTs) were undertaken at regular intervals in soil units and some weathered rock. Soil samples were taken directly from the auger.

Figures 2 to 4 present some selected site photographs taken during the 2025 investigation.

### 4.2.2 Boreholes

A total of two (2) boreholes were drilled using a track mount drill rig (Comacchio Geo 300) to depths of between 12.3 m and 16.1 m below the ground surface.

Rotary auger techniques were undertaken through overlying soil and some weathered rock units with a TC-bit. Rock coring was undertaken through rock units using NMLC in borehole BH101 and HQ technique in borehole BH102. Standard penetration tests (SPTs) were undertaken through overlying soil and some weathered rock units to assist in the characterisation of soil consistency.

Point load strength index tests were performed on the rock core samples at regular intervals.

Appendix B presents the borehole logs for the 2025 investigation.

Appendix C presents the point load strength index test results for the 2025 investigation.

### 4.2.3 Groundwater Monitoring Wells

A total of two (2) standpipe piezometers (i.e. groundwater monitoring wells) were installed within the boreholes to monitor groundwater levels. The piezometers with HOBO water logger were installed in the following boreholes to allow for continuous water monitoring:

- BH101
- BH102.

During the 2025 fieldwork, we noticed two (2) existing monitoring wells on site. For clarity in this report, we have named them:

- MW01
- MW02.

We have used a water whistle to measure the groundwater levels within these existing monitoring wells to help inform our understanding of the groundwater levels on site, a summary of which is included in Section 5.2.

Figure 1 presents the location of the monitoring wells.

Appendix D presents the piezometer construction record for BH101 and BH102.

Appendix G presents the results of the groundwater monitoring from the HOBO water logger.



## 5. Site Conditions

### 5.1 Subsurface Conditions

The subsurface conditions encountered within the boreholes are summarised in Table 2 and Table 3. The observed geological conditions are consistent with the previous investigations detailed in PSM4252-002L REV5.

A better quality bedrock unit, "BEDROCK C", is inferred for the pile foundation design.

**Table 2 – Summary of Inferred Subsurface Conditions Encountered in the Boreholes**

Inferred Unit	Inferred Top of Unit (Depth Below Ground Surface [m])	Description
TOPSOIL	0.0	CLAY to Clayey SAND; brown to dark brown, low to high plasticity, fine grained sand, grass and rootlets observed, dry to moist condition and firm to stiff consistency.
NATURAL SOIL	0.1 – 0.2	CLAY to Sandy CLAY; low to high plasticity, orange and mottled grey to dark brown and red, shale fragments observed, fine grained Sand, dry to moist condition, stiff to hard consistency.
BEDROCK A	0.6 – 6.6	SHALE/SANDSTONE; dark brown and grey, poorly developed to developed rock fabric, extremely to highly weathered, very low to low strength.
BEDROCK B	3.1 – 11.8	SHALE/SANDSTONE; grey to dark grey, fine grained, developed to well developed rock fabric, thinly laminated, highly to slightly weathered, low to very high strength, moderately spaced defects greater than 60 mm spacing.  LAMINITE; SHALE (70%-90%) and SANDSTONE (10%-30%). SANDSTONE: medium coarse grained, grey, thinly bedded. SHALE: dark grey to grey, poorly developed, thinly laminated, highly to moderately weathered, low to medium strength.
BEDROCK C	9.5 – 17.6	SHALE: grey to dark grey, poorly to well developed, thinly laminated to thinly bedded, moderately to slightly weathered, medium to high strength.  LAMINITE; SHALE (30%-70%) and SANDSTONE (30% - 70%). SANDSTONE: fine to medium grained, pale grey to grey. SHALE: dark grey, poorly developed, thinly bedded to interbedded bands, moderately to slightly weathered, medium to high strength.

**Table 3 – The Reduced Level (RL) of Inferred Geotechnical Units encountered in the boreholes**

Reference	Test ID	Collar (m AHD)	The reduced level of Inferred Geotechnical Units (m)					EOH
			TOPSOIL	NATURAL SOIL	BEDROCK A	BEDROCK B	BEDROCK C	
PSM4252-003L REV5 (2020 – 2022)	AH01	74.5	74.5	74.4	72.6	-	-	68.5
	AH02	72.7	72.7	72.6	71.0	-	-	66.7
	AH03	73.0	73	72.8	71.8	-	-	67.0
	AH04	63.3	63.3	63.2	60.7	-	-	57.3
	AH05	65.6	65.6	65.5	63.8	-	-	59.6
	AH06	46.6	46.6	46.5	45.0	-	-	41.4



Reference	Test ID	Collar (m AHD)	The reduced level of Inferred Geotechnical Units (m)					
			TOPSOIL	NATURAL SOIL	BEDROCK A	BEDROCK B	BEDROCK C	EOH
	CH01	85.7	85.7	85.6	85.1	82.6	-	74.8
	CH02	73.5	73.5	73.3	71.6	66.1	-	63.3
	CH03	63.5	63.5	63.4	61.5	57.5	54.0	53.0
	CPT01	47.2	47.2	47.1	42.3*	-	-	42.3
	CPT02	43.7	43.7	43.5	37.1*	-	-	37.1
	CPT03	51.6	51.6	51.5	46.8*	-	-	46.8
	CPT04	67.6	67.6	67.5	62.6*	-	-	62.6
	CPT05	58.7	58.7	58.5	54.4*	-	-	54.4
	CPT06	57.7	57.7	57.5	51.6*	-	-	51.6
	BH01	82.0	82.0	81.9	80.5	70.2	64.4	61.4
	BH02	81.0	81.0	80.9	80.2	71.3	65.8	64.3
	BH03	74.0	74.0	73.9	73.2	67.7	62.6	61.0
2025	BH101	75.5	75.5	75.3	73.6	68.1	64.7	59.4
	BH102	78.3	78.3	78.1	73.8	71.0	68.8	66.1

Note:

\* CPT refusal is inferred as top of BEDROCK A.

## 5.2 Groundwater

Table 4 summarises the dates on which PSM engineers measured the groundwater level from the boreholes.

We note that we are not aware of the construction details for the existing monitoring wells (MW01 and MW02) and whether they have been purged of drilling fluids (or other remains during construction).

**Table 4 – Measured Groundwater Levels across the Site**

Borehole ID	Collar (m AHD)	Depth of Borehole (m)	Screen Depth (m)	17 October 2025		PSM Comment
				Depth (m)	RL (m AHD)	
MW01	83.2	20.0	-	15.5	67.7	Groundwater expected within bedrock
MW02	59.6	8.1	-	1.2	58.4	Shallow groundwater due to the adjacent water dam
BH101	75.5	16.1	13.0 to 16.0	15.2	60.3	Groundwater expected within bedrock
BH102	78.3	12.3	9.2 to 12.2	10.6	67.7	Groundwater expected within bedrock

## 6. Laboratory Testing Results

In total, the following complete suite of laboratory testing from the previous geotechnical investigations has been undertaken:

- Three (3) CBR Tests
- Six (6) Aggressivity and Salinity Tests.

The factual results from the previous geotechnical investigations (ref: PSM4252-002L, dated 24 August 2022) are replicated in this section.

### 6.1 Geotechnical Testing - 2020

Table 5 presents a summary of the CBR test results completed in 2020. Detailed results for each test are presented in Appendix F.

**Table 5 – Summary of CBR test results**

Sample ID	Borehole ID (Depth)	Material Description	Soaked CBR (%)	Moisture Content (%)	OMC (%)	Standard Maximum Dry Density (t/m <sup>3</sup> )	Swell (%)
CBR01	AH04 (0.5 m – 1.0m)	CLAY	2.5	21.4	20.5	1.64	2.5
CBR02	CH03 (0.5 m – 1.0m)	CLAY	2.0	21.7	22.1	1.63	3.5
CBR03	AH03 (0.5 m – 1.0m)	Sandy CLAY	1.5	17.6	21.1	1.64	5.5

### 6.2 Analytical Testing - 2020

#### 6.2.1 Aggressivity

Table 6 presents a summary of the analytical laboratory testing results for aggressivity in 2020. Detailed results are presented in Appendix F.

The laboratory test results summarised indicate the following:

- pH of the soil samples analysed ranged from 5.1 to 8.9, with an average of 7.1
- The concentrations of soluble sulphate in samples analysed ranged from 10 mg/kg to 190 mg/kg
- The concentrations of chlorides in samples analysed ranged from <10 mg/kg to 390 mg/kg
- The moisture content ranged from 9.1 to 19.3 %
- The resistivity of the soil samples ranged from 2,500 ohm.cm to 12,800 ohm.cm.

**Table 6 – Aggressivity Classification**

Sample ID	Material Description	BH ID (Depth)	pH	Moisture Content [%]	Chloride by Discrete Analyser [mg/kg]	Soluble Sulphate by ICPAES [mg/kg]	Resistivity [ohm.cm]
ES01	SHALE	CH01 (1.1 m)	8.4	9.1	<10	10	7,190
ES02	Sandy CLAY	CH02 (0.8 m)	8.9	14.7	280	90	2,500
ES03	CLAY	CH03 (0.7 m)	7.7	15.7	120	10	9,090
ES04	CLAY	AH06 (0.6 m)	5.8	13.7	50	90	10,100
ES05	CLAY	AH04 (0.7 m)	5.1	19.3	390	190	2,900
ES06	CLAY	AH02 (0.5 m)	6.5	16.1	90	90	12,800

Table 4.8.1 of Australian Standard AS 3600 (2009) Concrete Structures provides criteria for exposure classification for concrete in sulphate soils based on sulphate content and acidity in the soil and groundwater. Based on soil

sulphate content and pH testing completed, we assess the exposure classification for concrete in the soil to be “A1” to “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 sulphates in the soil and groundwater, soil and groundwater pH, and chlorides in groundwater. On the basis of the soil sulphates and pH testing completed we assess the exposure classification for concrete piles in the soil to be “Non-aggressive” to “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 soil chlorides, resistivity and pH testing completed we assess the exposure classification for steel piles in the soil to be “Non-aggressive”.

### 6.2.2 Salinity and Sodicity

Table 7 presents a summary of the analytical laboratory testing results for salinity and sodicity. Detailed results are provided in Appendix F.

“Site Investigations for Urban Salinity” (DLWC, 2002) classifies 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”.

**Table 7 - Salinity and Sodicity Classification**

Sample ID	BH ID (Depth)	Exchangeable Cations [meq/100g]					ESP [%]	Electric Conductivity $EC_{1:5}$ [ $\mu S/cm$ ]	M	Electric Conductivity $EC_e$ [dS/m]	Salinity Class
		Ca	Mg	K	Na	CEC					
ES01	CH01 (1.1 m)	17	3.1	<0.2	0.6	20.9	3.1	139	8 <sup>1</sup>	1.1	Non-saline
ES02	CH02 (0.8 m)	9.7	17.2	<0.2	3.7	21.3	17.2	400	9 <sup>2</sup>	3.6	Slightly saline
ES03	CH03 (0.7 m)	10.6	12.2	<0.2	2.6	21.4	12.2	110	8 <sup>1</sup>	0.9	Non-saline
ES04	AH06 (0.6 m)	3.7	14.2	0.2	1.9	15.6	14.2	99	9 <sup>2</sup>	0.9	Non-saline
ES05	AH04 (0.7 m)	0.7	18.8	0.2	2.3	12.4	18.8	345	8 <sup>1</sup>	2.8	Slightly saline
ES06	AH02 (0.5 m)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	78	8 <sup>1</sup>	0.6	Non-saline

Note:

- (1) Multiplication factor based on “Soil Texture Group” - Light medium clay is plastic and smooth to the touch and will form a ribbon of 7.5 cm.
- (2) Multiplication factor based on “Soil Texture Group” - Clay Loam can be easily rolled to a thread 3-4 mm thick but will have a number of fractures along its length. The soil is becoming plastic, capable of being moulded into a stable shape.

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 7. It is assessed that the soils on site are classified as “Non-saline” to “Slightly saline”. We have referred to Clause 4.8.2 of Australian Standard AS3600-2009 “Concrete Structures” and note that the assessed soil electrical conductivity ( $EC_e$ ) is less than the upper limit of the “A2” exposure classification.

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 the laboratory results was compared to the criteria provided in “Site Investigations for Urban Salinity” (DLWC, 2002). In the inferred NATURAL SOIL unit, the laboratory testing shows ESP ranges from < 0.1 % to 18.8%, indicating that the NATURAL SOIL on the site is classified as “Non-sodic” to “Highly sodic”, as per DLWC (2002).



## 7. Assessment of Secretary’s Environmental Assessment Requirements (SEARs) – Geotechnical Items

The following assessment of SEARs has been undertaken based on the following documents:

- Project-specific SEARs (SSD-92743706) by Department of Planning, Housing and Infrastructure dated 30 September 2025
- Civil work package by AT&L (ref. SYD4-SITE-DRG-ATL-CIV-02000 to 02301, dated 10 November 2025)
- Architectural work package by Greenbox Architecture (ref. SSDA-A-0000 to 6005.01 dated 7 November 2025)
- Structural work package by WSP (ref. SYD4-SITE-DRG-WSP-STR-00000 to 08017 dated 16 October 2025).

We have highlighted Items on Soils and Water Management. We emphasise that the SEARs items below are not all geotechnical matters and as such, it should be addressed by multiple consultants / disciplines, e.g. geotechnical consultant, ecologist, environmental consultant, civil / stormwater designer, hydraulic engineer, etc.

### 7.1 ITEM 1 – Soils

*“Soils – an assessment of potential impacts on soil resources and riparian land on and near the site, including:*

*- impacts on soil erosion, salinity and acid sulfate soils*

*- ...”*

#### **PSM Response:**

Significant earthworks on the site are expected with up to 16.0 m of fill and 21.0 m of cut to be experienced across the Site. We assess that impacts on the soil resources will be minimal. Based on AT&L’s bulk earthworks plan SYD4-SITE-DRG-ATL-CIV-02031 (ref: dated 10 November 2025), there would be excess cut material (from the earthworks balance) that will need to be exported from the Site.

With regards to riparian lands, we understand that there are minimal riparian lands present directly within the site. It is expected that appropriate erosion control will be included during construction, and the civil designer will design the stormwater system, surface gradients and landscaping requirements to control surface flows and minimise soil erosion and the effects of soil erosion. We note that the vast majority of the site will be sealed by the proposed development and appropriate surface runoff collection and disposal systems have been included in the design.

With regards to soil salinity, please refer to the salinity assessment results in Section 6.2.2 of this report and the Salinity Management Plan (ref: PSM5872-008L dated 17 October 2025).

Based on the NSW Government SEED (Sharing and Enabling Environmental Data), the site is not located within the areas covered by the Acid Sulfate Soil Risk Map Data (2013). It is our opinion that the risk of acid sulphate soils is low within this site.

Please refer to Acid Sulfate Soil Assessment by JBS&G (ref: L01 ASS 706-752 Mamre Rd Kemp Creek (Rev A) dated 29 October 2025) for details.

### 7.2 ITEM 2 – Water Management

*“Water Management – an integrated water management strategy, including:*

*- ...*

*- an assessment of potential surface and groundwater impacts (both quality and quantity) associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby in accordance with relevant EPA guidelines and the Department of Climate Change, Energy, the Environment and Water - Water Group (DCCEEW-Water) Groundwater Toolkit*

*- ...”*



## PSM Response:

### Surface water

We note that impacts on surface water resource (quality and quantity), impacts on dependent ecosystems, drainage lines, downstream assets and watercourses, these items could be addressed by a suitably qualified person(s), (e.g. ecologist, drainage/civil designer and environmental consultant or other suitably qualified persons). These items are not considered by PSM, and please refer to the following documents for details:

- Water and Stormwater Management Plan by AT&L (ref: REP-ATL-CIV-00005-01 dated 21 October 2025)
- Surface Water and Groundwater Impact Assessment by JBS&G (ref: 70548\_RevA\_Surface Water and Groundwater Impact Assessment dated 19 October 2025).

### Groundwater

We note the following:

**Table 8 – Encountered groundwater levels versus the proposed bulk earthworks level**

Piezometer	Water level recorded in the piezometers to date (m AHD)	Proposed BEL at the piezometer location (m AHD)	PSM Comment
BH101	60.3	62.5 m	Groundwater level below the BEL and within bedrock
BH102	67.7	67.0 m	Groundwater level around the BEL and within bedrock
MW01	67.7	62.5 m	Groundwater level above the BEL and within bedrock
MW02	58.4	67.0 m	Groundwater level below the BEL

Results of PSM's groundwater monitoring on the site indicate that groundwater level varies approximately between RL 58.4 m AHD and RL 67.7 m AHD. The final level of the development is proposed to vary between RL 51.0 m AHD and RL 67 m AHD.

As such, groundwater is likely to be intersected by the development, however the intercepted volumes are expected to be low and temporary in nature. These are expected to drain relatively quickly and not trigger further actions to be taken. Impacts to the local hydrogeological regime are expected to be low.

The impacts on groundwater (quality) are not considered by PSM. Please refer to the Surface Water and Groundwater Impact Assessment by JBS&G (ref: 70548\_RevA\_Surface Water and Groundwater Impact Assessment dated 19 October 2025) for details.

## 8. Discussion and Recommendations

### 8.1 Excavation Conditions

Excavation of the TOPSOIL, NATURAL SOIL, and BEDROCK A units is expected to be achievable using conventional earth-moving equipment.

Excavation of more competent BEDROCK B, and C unit which comprises low to high strength shale and laminate of medium to high strength may require the use of hydraulic rock hammers / rock breaking equipment, rock saws and/or rock grinders and must be undertaken by contractors with suitable experience in rock excavation. It is likely in areas of deeper cut that relevant rock breaking equipment will be required.

Prospective contractors should make their own assessment of excavatability on the logs and their site inspection and experience. It is our experience that excavatability is heavily dependent on both the operator and the plant used. Any contractor should satisfy itself regarding excavatability, especially in the BEDROCK B and BEDROCK C units.

We expect the existing dams will need to be drained and the sediments at the base of the dams excavated/removed prior to filling.

## 8.2 Bulk Earthworks Specification and Interim Geotechnical Design Advice

We have prepared a separate document for the following:

- An Interim Geotechnical Design Advice (IGDA) for the proposed data centre (ref. PSM5872-006L REV1, dated 21 November 2025), see Appendix H
- Bulk Earthworks Specification (ref. PSM5872-007S REV1, dated 21 November 2025), see Appendix I.

## 9. Closing

If at any time, the conditions are found to vary from those described in the report, further advice should be sought. Should you have any queries, please do not hesitate to contact the undersigned.

Yours Sincerely



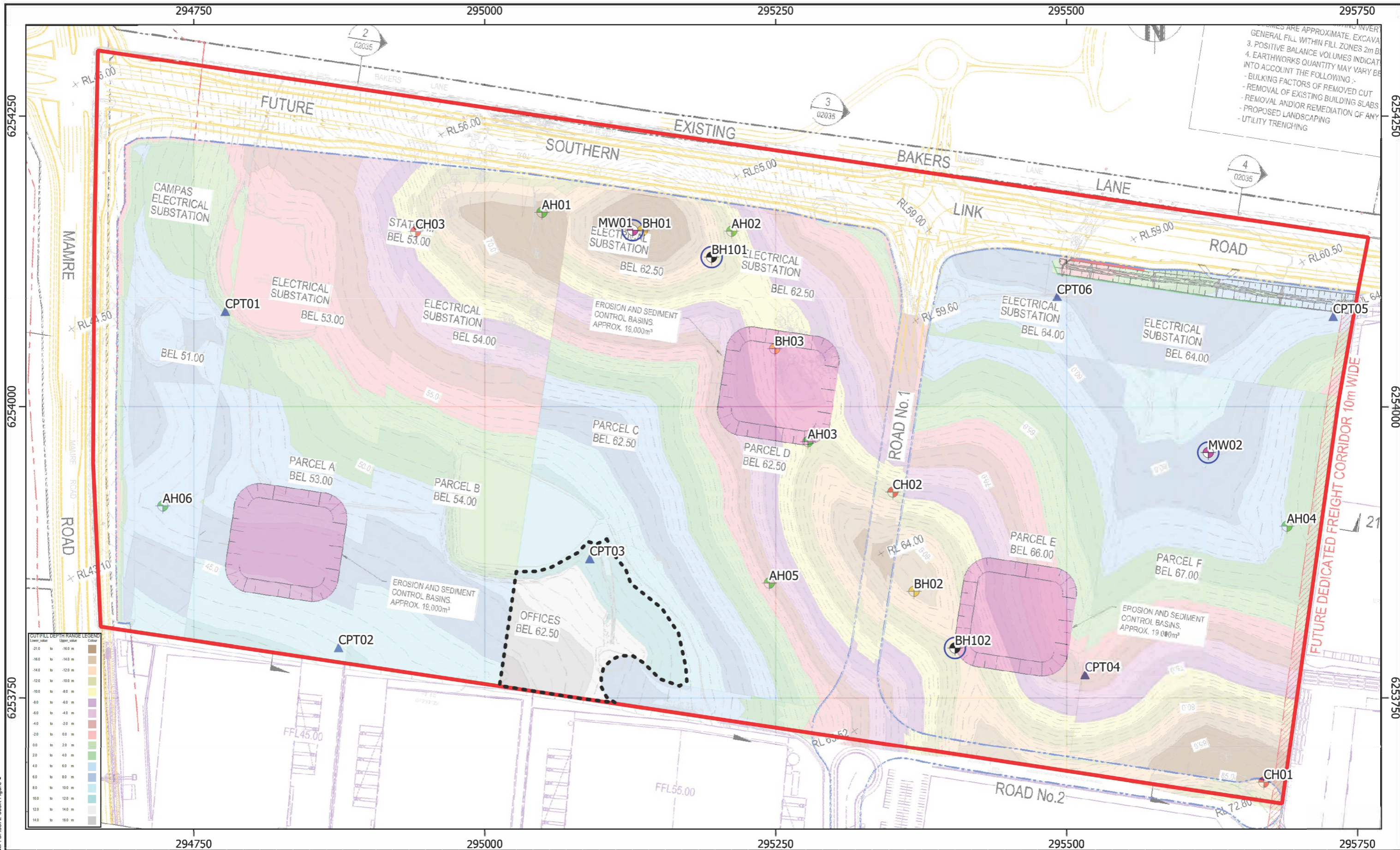
**BRENDAN TA**  
GEOTECHNICAL ENGINEER



**JUNO LIANG**  
ASSOCIATE GEOTECHNICAL ENGINEER



**AGUSTRIA SALIM**  
PRINCIPAL



NOTES ARE APPROXIMATE. EXCAVATION VOLUMES ARE APPROXIMATE. EXCAVATION VOLUMES ARE APPROXIMATE. EXCAVATION VOLUMES ARE APPROXIMATE.  
 3. POSITIVE BALANCE VOLUMES INDICATED INTO ACCOUNT THE FOLLOWING:-  
 - BULKING FACTORS OF REMOVED CUT  
 - REMOVAL OF EXISTING BUILDING SLABS  
 - REMOVAL AND/OR REMEDIATION OF ANY  
 - PROPOSED LANDSCAPING  
 - UTILITY TRENCHING

**CUT/FILL DEPTH RANGE LEGEND**

Lower Value	Upper Value	Colour
-21.0	-18.0	Dark Blue
-18.0	-15.0	Blue
-15.0	-12.0	Light Blue
-12.0	-9.0	Light Green
-9.0	-6.0	Green
-6.0	-3.0	Yellow-Green
-3.0	0.0	Yellow
0.0	3.0	Orange
3.0	6.0	Red-Orange
6.0	9.0	Red
9.0	12.0	Dark Red
12.0	15.0	Brown
15.0	18.0	Dark Brown
18.0	21.0	Black

**Legend**

AH (Auger Holes) - 2020	Existing Monitoring Wells
CH (Cored Holes) - 2020	Site Boundary
CPT (Cone Penetration Tests) - 2020	Areas comprising deep FILL (>10m)
BH (Cored Holes) - 2022	
PSM Monitoring Wells - 2025	

**Notes:**  
 1. Cut and fill plan retrieved from AT&L (ref. SYD4-SITE-DRG-ATL-CIV-02031, dated 10 November 2025)

**Scale 1:3,000**  
 25 0 25 50 75 100 m  
 EPSG:7856  
 GDA2020 / MGA zone 56

**Aurecon**  
 706-752 Mamre Road, Kemps Creek  
 Additional Geotechnical Investigation

**Site Locality Plan**

<b>PSM</b>	Created By: PSM	Revision: A
	Date: 20 Oct 2025	Paper Size: A3

**PSM5872-005R**     **Figure 1**

M:\PSM5872\Eng\GIS\PSM5872.qgz Layout: PSM5872-005R Figure 1



Photo 1 - General site conditions near BH101 facing north



Photo 2 - General site conditions near BH102 facing south-west



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**706-752 Mamre Rd, Kemps Creek NSW**

**SELECTED SITE PHOTOS 1 OF 3**

**PSM5872-005R**

**FIGURE 2**



Photo 3 - Track mount drill rig (Comacchio Geo 300)



Photo 4 - Soil material from auger drilling

**Aurecon**  
**Geotechnical Site Investigation**  
**706-752 Mamre Rd, Kempes Creek NSW**

**SELECTED SITE PHOTOS 2 OF 3**



**PSM5872-005R**

**FIGURE 3**



Photo 5 - Typical cutting from Standard Penetration Test



Photo 6 - Ground monitoring well stick-up



**Aurecon**  
**Geotechnical Site Investigation**  
**706-752 Mamre Rd, Kempers Creek NSW**

**SELECTED SITE PHOTOS 3 OF 3**

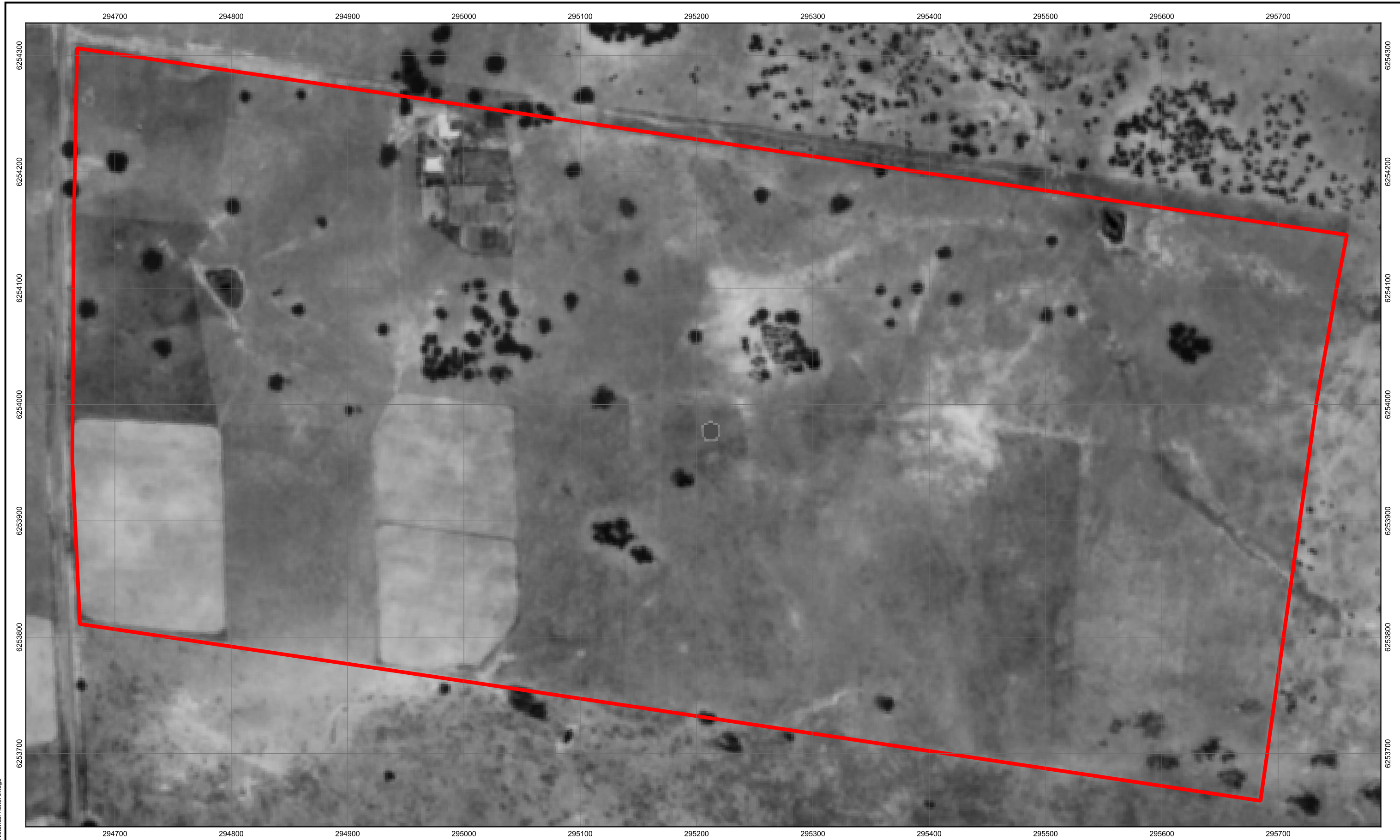
**PSM5872-005R**











**FIGURE 4**

# Appendix A

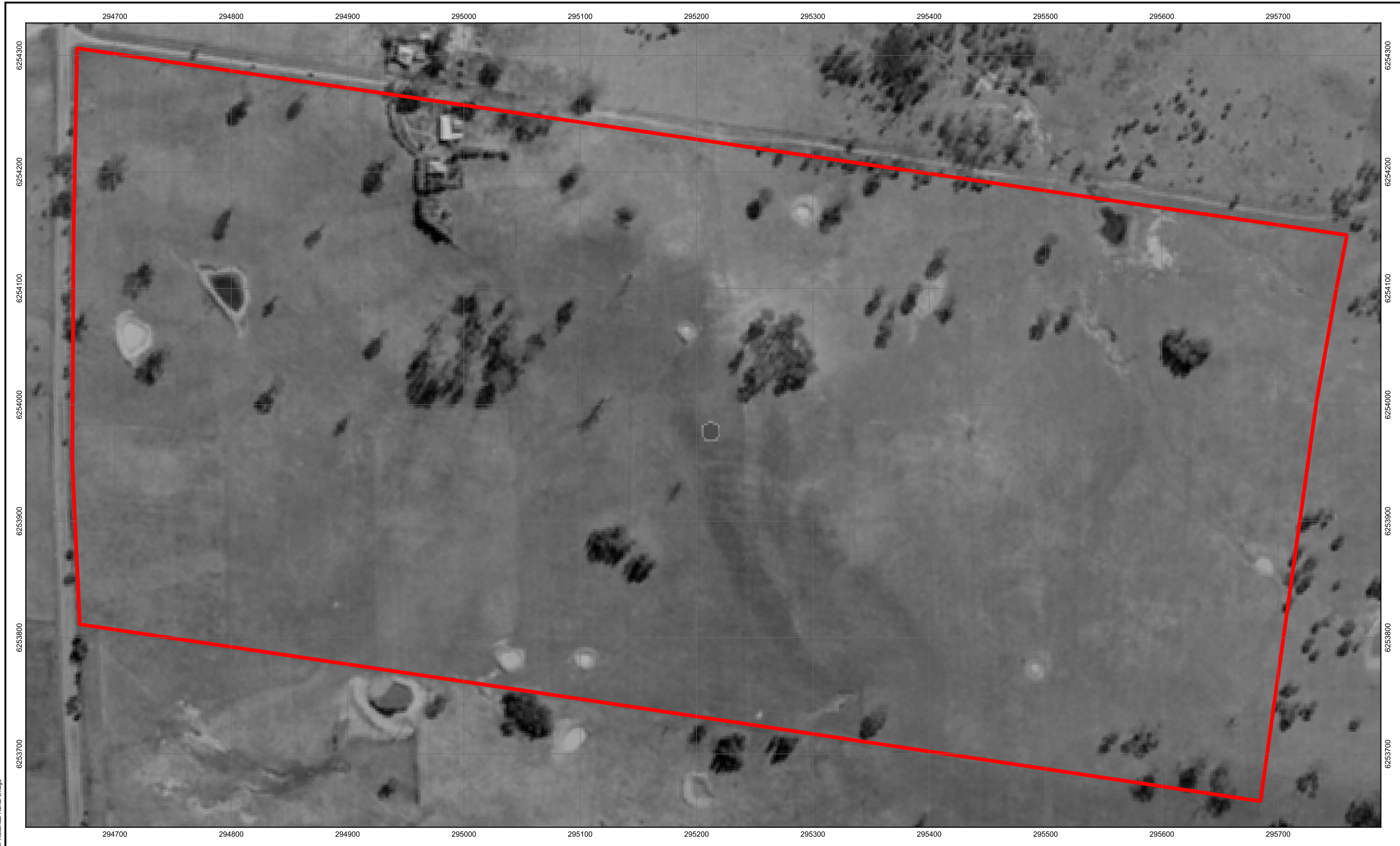
## Historical Aerial Imagery





<p><b>Legend</b></p> <p> Site Boundary</p>	<p><b>Notes:</b></p> <p>1. Aerial image sourced from NSW Historical Imagery dated 1947.</p>	<p>Scale 1:3,000</p> <p>0 25 50 75 100 m</p> <p>Map Projection: Horizontal Datum: Grid: EPSG:7856</p>	<p>Aurecon 706-752 Mamre Road, Kemps Creek Geotechnical Investigation</p> <p><b>HISTORICAL AERIAL IMAGE 1947</b></p>												
		<table border="1"> <tr> <td><b>P</b></td> <td><b>S</b></td> <td><b>M</b></td> <td>Created By: PSM</td> <td>Revision: A</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Date: 14 Oct 2025</td> <td>Paper Size: A3</td> </tr> </table>	<b>P</b>	<b>S</b>	<b>M</b>	Created By: PSM	Revision: A				Date: 14 Oct 2025	Paper Size: A3	<table border="1"> <tr> <td>PSM5872-005R</td> <td>Appendix A</td> </tr> </table>	PSM5872-005R	Appendix A
<b>P</b>	<b>S</b>	<b>M</b>	Created By: PSM	Revision: A											
			Date: 14 Oct 2025	Paper Size: A3											
PSM5872-005R	Appendix A														

M:\PSM5872\Eng\QCIS\QCIS\PSM5872.qgz Layout: Historical Aerial Image




M:\PSM5872\Eng\QCIS\QCIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from NSW Historical Imagery dated 1965.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By: PSM	Revision: A
	Date: 14 Oct 2025	Paper Size: A3

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 Geotechnical Investigation

**HISTORICAL AERIAL IMAGE  
 1965**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\QCIS\QCIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from NSW Historical Imagery dated 1975.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By: PSM	Revision: A
	Date: 14 Oct 2025	Paper Size: A3

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**HISTORICAL AERIAL IMAGE  
 1975**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\GIS\QGIS\PSM5872.qgz Layout: Historical Aerial Image


**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from NSW Historical Imagery dated 1986.

Scale 1:3,000

0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

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	PSM	A
Date:	Paper Size:	
14 Oct 2025	A3	

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**HISTORICAL AERIAL IMAGE  
 1986**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\GIS\QGIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**


 Site Boundary

Notes:  
1. Aerial image sourced from NSW Historical Imagery dated 1998.

Scale 1:3,000

0 25 50 75 100 m

Map Projection:  
Horizontal Datum:  
Grid: EPSG:7856

	Created By:	Revision:
	PSM	A
Date:	Paper Size:	
14 Oct 2025	A3	

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**HISTORICAL AERIAL IMAGE  
1998**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\GIS\GIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from NSW Historical Imagery dated 2005.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By: PSM	Revision: A
	Date: 14 Oct 2025	Paper Size: A3

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 Geotechnical Investigation

**HISTORICAL AERIAL IMAGE  
 2005**

PSM5872-005R	Appendix A
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**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from Nearmap.com dated 29 December 2009.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By:	Revision:
	PSM	A
Date:	Paper Size:	
14 Oct 2025	A3	

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**HISTORICAL AERIAL IMAGE  
 2009**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\GIS\QGIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from Nearmap.com dated 29 October 2019.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By:	Revision:
	PSM	A
Date:	Paper Size:	
14 Oct 2025	A3	

Aurecon  
 706-752 Mamre Road, Kemps Creek  
 Geotechnical Investigation

**HISTORICAL AERIAL IMAGE  
 2019**

PSM5872-005R	Appendix A
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M:\PSM5872\Eng\GIS\GIS\PSM5872.qgz Layout: Historical Aerial Image

**Legend**  
 Site Boundary

**Notes:**  
 1. Aerial image sourced from Nearmap.com dated 3 September 2025.

Scale 1:3,000  
 0 25 50 75 100 m

Map Projection:  
 Horizontal Datum:  
 Grid: EPSG:7856

	Created By:	Revision:
	PSM	A
Date:	Paper Size:	
14 Oct 2025	A3	

Aurecon  
 706-752 Mamre Road, Kemps Creek  
 Geotechnical Investigation

**HISTORICAL AERIAL IMAGE  
 2025**

PSM5872-005R	Appendix A
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# Appendix B

## Engineering Borehole Logs



# Appendix B.1

## 2020-2022 PSM Borehole Logs





**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020	
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020	
Hole Location: Mamre Road Kemps Creek	Logged By: DT	
Hole Position: 295669,4 m E 6253677,6 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 85.70 m
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N						SP CL	SAND with traces of Clay: low plasticity, brown, fine grained. Sandy CLAY: low plasticity, orange and red, fine grained.	D	F St	100 200 300 400 500	0.00: Topsoil. 0.10: Inferred Natural Soil.
AD/T		N	SPT: 1.00 - 1.16 m 9, 3/10 mm N=Refusal - ES 1.10 m		84.7	1			SHALE: pale orange and grey, extremely weathered, very low strength, ironstone fragments observed.				0.60: Inferred Bedrock. V-bit refusal. 1.00: SPT recovered: 150 / 160 mm.
					83.7	2			SANDSTONE: fine grained, brown, highly weathered, very low strength.  Becomes grey, fragments of shale observed.				
					82.7	3			Continued on cored borehole sheet				
					81.7	4							

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p>No resistance through to refusal</p>	<p><b>Water</b></p> <p>Inflow Partial Loss Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry M - Moist W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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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**

PSM 3.03.1 LIB\_A\GLB Log\_PSM\_AU\_HONICORE\_BH\_NZ\_AU\_PSM4252.GPJ -<Drawing> 10/11/2020 10:46 10:01:00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2018-05-06



**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295669,4 m E 6253677,6 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 85.70 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance						Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering			Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR		● - Axial ○ - Diametral	VL 0.1 L 0.3 M 1 H 3 VH 3 EH 10	<20 60 200 600 1000	Description, alpha/beta, infilling or coating, shape, roughness, thickness, other
					84.7	1								
					83.7	2								
					82.7	3	X	Continued from non-cored borehole sheet No Core: 200 mm.						
NMLC	Not Observed	71	3,94m Is(50) d=1,29 a=1,7 MPa  4,34m Is(50) d=0,71 a=0,01 MPa	93	81.7	4		SANDSTONE: medium grained, light brown, developed rock fabric.  Becomes well developed.						BP, 5°, FE SN, CU, RF  SM, 0°, Clay infill, 10 mm  Highly fractured BP, 5°, FE SN, CU, RF  SM, 10°, RF, 20 mm JT, 70°, FE SN, PR, S

<b>Method</b> 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	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss  <b>Graphic Log/Core Loss</b> 	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VI - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.GPJ <<DrawingFile>> 10/11/2020 10:44 10/11/2021 10:44 10/11/2021 10:44 D:\glb\psm4252\psm4252.gpj Lib: PSM 3.03.1 20180507 Pj: PSM 3.03.0 2018-05-06



### Engineering Log - Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295669.4 m E 6253677.6 m N MGA94 Zone 56	Checked By: AS

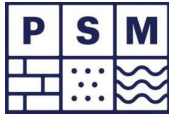
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 85.70 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering	Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR	● - Axial ○ - Diametral VL 0.1 L 0.3 M 1 H 3 VH 3 EH 10	<20 60 200 600 1000	
NMLC Not Observed		71	5.37m Is(50) d=0.75 a=0.75 5.60m MPa	93				SANDSTONE: medium grained, light brown, well developed rock fabric. (continued)				BP, 0°, FE SN, UN, RF JT, 45°, FE SN, PR, S Highly fractured BP, 0°, FE SN, PR, RF
		23	6.51m Is(50) d=1.02 a=1.13 MPa	35	79.7	6	X	No Core: 850 mm.				
		100	6.90m C-3			78.7	7	SANDSTONE: medium grained, light brown, well developed rock fabric, indistinct bedding. SHALE: pale brown and grey, poorly developed rock fabric, iron staining observed.				Highly fractured BP, 5°, FE SN, UN, S Highly fractured with clay infill
		86	7.23m Is(50) d=0.12 a=0.35 MPa	100	77.7	8		Becomes grey.				BP, 0°, FE SN, ST, S BP, 0°, FE SN, PR, S
		79	8.33m Is(50) d=0.08 a=0.04 MPa	100	76.7	9		Becomes grey and orange.				BP, 20°, FE SN, UN, RF BP, 0°, FE SN, PR, S JT, 70°, FE SN, PR, S Highly fractured JT, 45°, FE SN, PR, S JT, 45°, FE SN, PR, S BP, 0°, FE SN, PR, RF BP, 5°, FE SN, UN, RF BP, 0°, FE SN, ST, S

<b>Method</b> 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	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss  <b>Graphic Log/Core Loss</b> [Hatched] Core recovered (hatching indicates material) [X] No core recovery	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VI - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Silken-sided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.GPJ <<DrawingFile>> 10/11/2020 10:44 10:01:00:11 Dwg\Force and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj: PSM 3.03.0 2018-05-06



Borehole ID  
**CH01**  
Page 4 of 4

### Engineering Log - Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295669.4 m E 6253677.6 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 85.70 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering	Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR	VL 0.1 L 0.3 M 1 H 3 VH 3 EH 10	<20 60 200 600 1000	
NMLC	Not Observed	79	10.75m Is(50) d=0.07 a=0.18 MPa	100				SHALE: grey orange, poorly developed rock fabric, iron staining observed. (continued)  Becomes dark grey.				Highly fractured BP, 10°, FE SN, PR, S BP, 0°, FE SN, PR, S Highly fractured
					74.7	11		Hole Terminated at 10.90 m Target depth				
					73.7	12						
					72.7	13						
					71.7	14						

<b>Method</b> 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	<b>Water</b> Inflow Partial Loss Complete Loss  <b>Graphic Log/Core Loss</b> Core recovered (hatching indicates material) No core recovery	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VE - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB\_A\GLB Log PSM AU CORE BH PSM4252.PJ <<DrawingFile>> 10/11/2020 10:44 1021L0011 Dwg\Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj | PSM 3.03.0 2018-05-06



JOB NO: PSM4252  
PROJECT: Mamre Road  
LOCATION: Kemps Creek  
DATE: 22/10/2020

BH ID: CH01  
FROM: 2.9 m  
TO: 7.0 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS CH01  
(Core Photo 1 of 2)

PSM4252-002L	Appendix A
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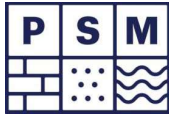
JOB NO: PSM4252  
PROJECT: Mamre Road  
LOCATION: Kemps Creek  
DATE: 22/10/2020

BH ID: CH01  
FROM: 7.0 m  
TO: 10.9 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS CH01  
(Core Photo 2 of 2)

PSM4252-002L	Appendix A
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## Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295350,6 m E 6253926,7 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 73,50 m
	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	
ADV		N	- ES 0.80 m SPT: 1.00 - 1.45 m 3, 10, 14 N = 24		72.5	1		SP	SAND: dark brown, fine grained, rootlets observed.	F			0.00: Topsoil.
								CL-CI	Sandy CLAY: low to medium plasticity, dark brown, fine grained.	St			0.20: Inferred Natural Soil.
								CI	CLAY: medium plasticity, grey and pale orange.	D			1.00: SPT recovered: 450/450 mm.
										VSt			
					71.5	2			SHALE: grey and pale orange, extremely weathered, very low strength.				1.90: Inferred Bedrock. V-bit refusal.
									Becomes grey.				
					70.5	3							
									Becomes low strength.				
					69.5	4							4.00: Based on increased drilling resistance.
									Becomes dark grey.				

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1; LIB\_A\G.LB Log PSM AU HONICORE BH NZ AU\_PSM4252.GPJ -<Drawing> 10/11/2020 10:46:10.00.00.11; Digital Fence and Map Tool | Lib: PSM 3.03.1; 2018-05-07 Pj: PSM 3.03.0 2018-05-06



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295350,6 m E 6253926,7 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 73,50 m
	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 Observed		67.5	6	66.5	7	[Hatched Pattern]	SHALE: grey and pale orange, extremely weathered, very low strength. (continued)			100 200 300 400 500	
					65.5	8			Continued on cored borehole sheet				
					64.5	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB\_A\G.LB Log PSM AU HONICORE BH NZ AU PSM4252.GPJ <-DrawingFile--> 10/11/2020 10:46 10/01/00111 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2019-05-06



**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295350,6 m E 6253926,7 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 73.50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering	Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR	● - Axial ○ - Diametral VL 0.1 L 0.3 M 1 H 3 VH 3 EH 10	<20 60 200 600 1000	
					67.5	6						
					66.5	7		Continued from non-cored borehole sheet				
								No core: 250 mm.				
					65.5	8		SANDSTONE: medium grained, dark brown, developed rock fabric.				
								SHALE: dark grey, poorly developed rock fabric, thinly laminated bedding.				Highly fractured JT, 60°, FE SN, PR, S BP, 20°, FE SN, CU, S
					64.5	9						BP, 5°, FE SN, PR, S SM, 0°, RF, 10 mm BP, 0°, FE SN, PR, RF BP, 5°, FE SN, PR, S BP, 5°, FE SN, CU, RF BP, 0°, FE SN, CU, S BP, 10°, FE SN, UN, RF BP, 0°, FE SN, UN, S

<b>Method</b> 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	<b>Water</b> ▽ Inflow ▴ Partial Loss ▲ Complete Loss  <b>Graphic Log/Core Loss</b> Core recovered (hatching) indicates material No core recovery	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VE - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.GPJ <<DrawingFile>> 10/11/2020 12:20 10/11/2020 12:20 Dwg\Fence and Map Tool | Lib: PSM 3.03.1 20180507 Pj: PSM 3.03.0 20180506



Borehole ID  
**CH02**  
Page 4 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 22/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 22/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295350,6 m E 6253926,7 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 73.50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects					
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering XW HW MW SW FR	Strength Is(50) ● - Axial ○ - Diametral VL 0.1 L 0.3 M 1 H 3 VH 3 EH 10	Defect Spacing (mm) <20 60 200 600 1000	Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other	
		79	10.20m Is(50) d=0.05 a=0.72 MPa	92				SANDSTONE: medium grained, dark brown, developed rock fabric.(continued)					BP, 0°, FE SN, PR, S
					62.5	11		Hole Terminated at 10.20 m Target depth					
					61.5	12							
					60.5	13							
					59.5	14							

<b>Method</b> 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	<b>Water</b> ▽ Inflow ▴ Partial Loss ▲ Complete Loss  <b>Graphic Log/Core Loss</b> Core recovered (hatching indicates material) No core recovery	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VL - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.GPJ <<DrawingFile>> 10/11/2020 12:20 10.01.00.11 Dwg\Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj: PSM 3.03.0 2018-05-06



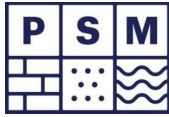
JOB NO: PSM4252  
PROJECT: Mamre Road  
LOCATION: Kemps Creek  
DATE: 22/10/2020

BH ID: CH02  
FROM: 7.2 m  
TO: 10.2 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS CH02  
(Core Photo 1 of 1)

PSM4252-002L	Appendix A
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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020	
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020	
Hole Location: Mamre Road Kemps Creek	Logged By: DT	
Hole Position: 294940,6 m E 6254150,8 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 63,50 m
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
													100 200 300 400 500	
ADV		N		1 LB 0.50-1.00 m - ES 0.70 m  SPT: 1.00 - 1.45 m 2, 4, 12 N = 16		62.5	1		CI	Sandy CLAY: medium plasticity, dark brown, fine grained sand, rootlets observed. CLAY: medium plasticity, brown and orange.	F	F		0.00: Topsoil. 0.10: Inferred Natural Soil.
									CI	Becomes brown and light orange.	M	St		1.00: SPT recovered: 300 / 450 mm.
									CI	Fragments of shale observed.		VSt		
			Not Observed			61.5	2			SHALE: grey with pale orange, extremely weathered, very low strength.  Becomes grey.				2.00: Inferred Bedrock. V-bit refusal.
						60.5	3							
						59.5	4							
Continued on cored borehole sheet														

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b>  No resistance through to refusal	<b>Water</b> ▽ Inflow △ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONCORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> -> 10/11/2020 10:46 10/01/00:11 Digital Fence and Map Tool | Lib: PSM 3.03.1; 2018-05-07 Proj: PSM 3.03.0 2018-05-06



Borehole ID  
**CH03**  
Page 2 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 294940,6 m E 6254150,8 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 63,50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance						Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering			Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR		VL 0.1 L 0.3 M 1 H 3 VH 10 EH 10	<20 60 200 600 1000		
NMLC	Not Observed	76	4.50m C-1	93	62.5 61.5 60.5 59.5	1 2 3 4		Continued from non-cored borehole sheet No core: 200 mm.						
								SHALE: grey, poorly developed rock fabric, thinly laminated bedding.						Highly fractured

<b>Method</b> 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	<b>Water</b> ▽ Inflow ▴ Partial Loss ▲ Complete Loss  <b>Graphic Log/Core Loss</b> Core recovered (hatching indicates material) No core recovery	<b>Weathering</b> XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh  <b>Strength</b> VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High	<b>Defect Type</b> FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VE - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break	<b>Infilling/Coating</b> 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	<b>Roughness</b> SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough  <b>Shape</b> PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.PJ <-DrawingFile> 10/11/2020 10:44 10:21:00:11 Dwg\Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj | PSM 3.03.0 2018-05-06





Borehole ID  
**CH03**  
Page 4 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 294940,6 m E 6254150,8 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 63,50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	RQD (%)	SAMPLES & FIELD TESTS	TCR (%)	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable), inclusions and minor components	Weathering	Strength Is(50)	Defect Spacing (mm)	Defect Descriptions / Comments
									XW HW MW SW FR	VL 0.1 L 0.3 M 1 H 3 VH 10 EH 10	<20 60 200 600 1000	
NMLC	Not Observed	85	10,13m Is(50) d=1,86 a=2,76 MPa 10,50m	100				SHALE: grey, poorly developed rock fabric, thinly laminated bedding. (continued)				BP, 5°, FE SN, PL, S BP, 5°, FE SN, PL, RF
						11		Hole Terminated at 10.50 m Target depth				
					52.5							
					51.5							
					50.5							
					49.5							

<p><b>Method</b></p> <p>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</p>	<p><b>Water</b></p> <p>▽ Inflow △ Partial Loss ▲ Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p> Core recovered (hatching indicates material)  No core recovery</p>	<p><b>Weathering</b></p> <p>XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered FR - Fresh</p> <p><b>Strength</b></p> <p>VL - Very Low L - Low M - Medium H - High VH - Very High EH - Extremely High</p>	<p><b>Defect Type</b></p> <p>FT - Fault SS - Shear Surface SZ - Shear Zone BP - Bedding parting SM - Seam IS - Infilled Seam JT - Joint CO - Contact CZ - Crushed Zone VJ - Vein FZ - Fracture Zone BSH - Bedding Shear DB - Drilling Break</p>	<p><b>Infilling/Coating</b></p> <p>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</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished S - Smooth RF - Rough VR - Very Rough</p> <p><b>Shape</b></p> <p>PR - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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See Explanatory Notes for details of abbreviations and basis of descriptions.

PSM 3.03.1 LIB-A\GLB Log PSM AU CORE BH PSM4252.PJ <<DrawingFile>> 10/11/2020 10:44 10:21:00:11 Dwg\Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj | PSM 3.03.0 2018-05-06



JOB NO: PSM4252  
PROJECT: Mamre Road  
LOCATION: Kemps Creek  
DATE: 23/10/2020

BH ID: CH03  
FROM: 4.5 m  
TO: 9.0 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS CH03  
(Core Photo 1 of 2)

PSM4252-002L	Appendix A
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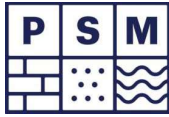
JOB NO: PSM4252  
PROJECT: Mamre Road  
LOCATION: Kemps Creek  
DATE: 23/10/2020

BH ID: CH03  
FROM: 9.0 m  
TO: 10.5 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS CH03  
(Core Photo 2 of 2)

PSM4252-002L	Appendix A
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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020	
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020	
Hole Location: Mamre Road Kemps Creek	Logged By: DT	
Hole Position: 295049,2 m E 6254167,3 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 74,50 m
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N	SPT: 1,00 - 1,37 m 7, 12, 8/70 mm N=Refusal		73.5	1		SC CI	Clayey SAND: low plasticity, brown, fine grained. CLAY: medium plasticity, brown and orange.	F		100 200 300 400 500	0.00: Topsoil. 0.10: Inferred Natural Soil.
								CI	Becomes pale orange, shale fragments observed, up to 6 mm.	D	St		1.00: SPT recovered: 370 / 370 mm.
					72.5	2		CI	Becomes grey. SHALE: grey, extremely weathered, very low strength.		H		1.90: Inferred Bedrock. V-bit refusal.
AD/T		N	Not Observed		71.5	3							
					70.5	4			Becomes dark grey, highly weathered, low strength.				

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal	<b>Water</b> ▽ Inflow △ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB\_A\GLB Log PSM AU HONICORE BH NZ AU PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10:01:00:11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Proj: PSM 3.03.0 2018-05-06



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295049,2 m E 6254167,3 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 74,50 m
	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	
AD/T		N	Not Observed			68.5	6			SHALE: dark grey, highly weathered, low strength. (continued)				
						67.5	7			Hole Terminated at 6.00 m Target depth				
						66.5	8							
						65.5	9							

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p> No resistance through to refusal</p>	<p><b>Water</b></p> <p> Inflow  Partial Loss  Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry M - Moist W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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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**

PSM 3.03.1 LIB\_A\G.LB Log PSM AU HONICORE BH NZ AU PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/0011 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Pj: PSM 3.03.0 2018-05-06



**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

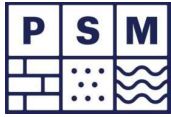
Client: Aliro Group	Commenced: 23/10/2020		
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020		
Hole Location: Mamre Road Kemps Creek	Logged By: DT		
Hole Position: 295212.2 m E 6254151.2 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 72.70 m	
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
ADV		N	- ES 0.50 m					SC	Clayey SAND: medium plasticity, dark brown, fine grained sand, rootlets observed.	M	F	100	0.00: Topsoil.
			SPT: 1.00 - 1.45 m 5, 9, 12 N = 21			71.7		CI	CLAY: medium plasticity, dark brown.			200	0.10: Inferred Natural Soil.
								CI	Becomes brown.	D	St	300	1.00: SPT recovered: 450 / 450 mm.
											VSt	400	
									SHALE: grey and pale orange, extremely weathered, very low strength.			500	1.70: Inferred Bedrock. V-bit refusal.
						70.7							
						69.7							
									Becomes grey.				
						68.7							

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p>No resistance through to refusal</p>	<p><b>Water</b></p> <p>▽ Inflow △ Partial Loss ◼ Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry M - Moist W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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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**

PSM 3.03.1 LIB\_A\G.LB Log PSM-AU\HONICORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10.00.00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1, 2019-05-07 Proj: PSM 3.03.0 2019-05-06



### Engineering Log - Non Cored Borehole

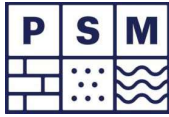
Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295212.2 m E 6254151.2 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 72.70 m
	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 Observed			66.7	6			SHALE: grey, extremely weathered, very low strength. (continued)  Becomes dark grey.			100 200 300 400 500	
						65.7	7			Hole Terminated at 6.00 m Target depth				
						64.7	8							
						63.7	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b>  No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONCORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/0011 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2018-05-06  
See Explanatory Notes for details of abbreviations and basis of descriptions. **Soil and rock descriptions in accordance with AS 1726:2017**



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020	
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020	
Hole Location: Mamre Road Kemps Creek	Logged By: DT	
Hole Position: 295277.6 m E 6253970.0 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 73.00 m
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
												100 200 300 400 500	
AD/V		N	- LB 0.50-1.00 m		72.0	1		SP	SAND: dark brown, fine grained.	F			0.00: Topsoil.
			SPT: 1.00 - 1.25 m 4, 8/100 mm N=Refusal					CL-CI	Sandy Clay: low to medium plasticity, orange and red, fine grained.	D	St		0.20: Inferred Natural Soil.
										H			1.00: SPT recovered: 250 / 250 mm.
		Not Observed			71.0	2			SANDSTONE: light brown, fine grained, highly weathered, very low strength.				1.20: Inferred Bedrock, V-bit refusal.
AD/T		N			70.0	3			SHALE: grey, extremely weathered, very low strength.				
					69.0	4							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> 	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONICORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10.00.00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1, 2019-05-07 Pj: PSM 3.03.0 2019-05-06



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295277.6 m E 6253970.0 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 73.00 m
	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	N	Not Observed		67.0	6	6	[Hatched Box]		SHALE: grey, extremely weathered, very low strength. <i>(continued)</i>			100 200 300 400 500	
						66.0	7			Hole Terminated at 6.00 m Target depth				
						65.0	8							
						64.0	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONCORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Pj: PSM 3.03.0 2018-05-06  
See Explanatory Notes for details of abbreviations and basis of descriptions. **Soil and rock descriptions in accordance with AS 1726:2017**



**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020		
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020		
Hole Location: Mamre Road Kemps Creek	Logged By: DT		
Hole Position: 295689,3 m E 6253897,5 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 63,30 m	
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N	- LB 0.50-1.00 m - ES 0.70 m SPT: 1.00 - 1.45 m 5, 12, 16 N = 28		62.3	1		CI	CLAY with Sand: medium plasticity, dark brown, fine grained sand.	D	F	100 200 300 400 500	0.00: Topsoil. 0.10: Inferred Natural Soil.
		Not Observed			61.3	2		CI	CLAY: medium plasticity, pale orange and grey.	M	VSt		1.00: SPT recovered: 450 / 450 mm.
					60.3	3		CI	Becomes red mottled grey.	D			
AD/T		N			59.3	4			SHALE: pale orange, extremely weathered, very low strength.  Becomes grey.				2.60: Inferred Bedrock. V-bit refusal.

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB\_A\G.LB Log PSM AU HONICORE BH NZ AU\_PSM4252.GPJ -<Drawing> -> 10/11/2020 11:02 10:00:00:11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2018-05-06



**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

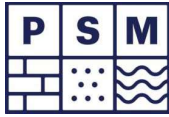
Client: Aliro Group	Commenced: 23/10/2020		
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020		
Hole Location: Mamre Road Kemps Creek	Logged By: DT		
Hole Position: 295689,3 m E 6253897,5 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 63,30 m	
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations	
AD/T		N	Not Observed			57.3	6			SHALE: grey, extremely weathered, very low strength. (continued)			100 200 300 400 500		
						56.3	7			Hole Terminated at 6.00 m Target depth					
						55.3	8								
						54.3	9								

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p>No resistance through to refusal</p>	<p><b>Water</b></p> <p>Inflow Partial Loss Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry M - Moist W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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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**

PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONICORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/0011 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2018-05-06



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

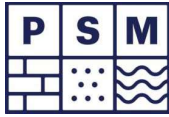
Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295237.0 m E 6253839.0 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 65.60 m
	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
ADV		N	SPT: 1.00 - 1.45 m 3, 6, 11 N = 17		64.6	1		CL CL-CI CL-CI	Sandy CLAY: low plasticity, dark brown, fine grained. CLAY: low to medium plasticity, dark brown and red. Becomes orange. Becomes light brown mottled grey.	F St M VSt		100 200 300 400 500	0.00: Topsoil. 0.10: Inferred Natural Soil.  1.00: SPT recovered: 450 / 450 mm.  1.80: Inferred Bedrock. V-bit refusal.
AD/T		N			63.6	2			SHALE: grey, extremely weathered, very low strength.				
					62.6	3							
					61.6	4							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b>  No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1; LIB\_A\GLB Log\_PSM\_AU\_HONICORE\_BH\_NZ\_AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10.01.00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1; 2019-05-07 Proj: PSM 3.03.0 2019-05-06



### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020
Hole Location: Mamre Road Kemps Creek	Logged By: DT
Hole Position: 295237.0 m E 6253839.0 m N MGA94 Zone 56	Checked By: AS
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°
Hole Diameter: 100 mm	Bearing:
	RL Surface: 65.60 m
	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	Water observed. ▽			59.6	6			SHALE: grey, extremely weathered, very low strength. (continued)  Becomes low strength.			100 200 300 400 500	
						58.6	7			Hole Terminated at 6.00 m Target depth				
						57.6	8							
						56.6	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal Partial Loss Complete Loss	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB-A\G.LB Log PSM-AU\HONICORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1, 2019-05-07 Proj: PSM 3.03.0 2019-05-06



Borehole ID  
**AH06**  
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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020	
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020	
Hole Location: Mamre Road Kemps Creek	Logged By: DT	
Hole Position: 294723.4 m E 6253914.8 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 46.60 m
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N	- ES 0.60 m SPT: 1.00 - 1.45 m 8, 7, 10 N = 17		45.6	1		SP	SAND: dark brown, fine grained.		F		0.00: Topsoil.
								CL-CI	CLAY: low to medium plasticity, orange mottled grey.	D	St		0.10: Inferred Natural Soil.
											VSt		1.00: SPT recovered: 250 / 450 mm.
AD/T		N	Not Observed		44.6	2		CL-CI	Becomes orange and grey.				1.60: Inferred Bedrock. V-bit refusal.
					43.6	3			SHALE: grey, extremely weathered, very low strength.				
					42.6	4							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance through to refusal Partial Loss Complete Loss	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB-A\GLB Log PSM-AU\HONICORE\BHNZ-AU\_PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10.00.00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2018-05-07 Pj: PSM 3.03.0 2018-05-06



Borehole ID  
**AH06**  
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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 23/10/2020		
Project Name: Mamre Road, Kemps Creek	Completed: 23/10/2020		
Hole Location: Mamre Road Kemps Creek	Logged By: DT		
Hole Position: 294723.4 m E 6253914.8 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 24 tonnes truck mounted	Inclination: -90°	RL Surface: 46.60 m	
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: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
													100 200 300 400 500	
AD/T		N								SHALE: grey, extremely weathered, very low strength. (continued) Becomes low strength. Hole Terminated at 5.25 m Target depth				5.25: T-bit refusal.
						40.6	6							
						39.6	7							
						38.6	8							
						37.6	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b>  No resistance through to refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ◼ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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**

PSM 3.03.1 LIB\_A\G.LB Log PSM AU HONICORE BH NZ AU PSM4252.GPJ -<Drawing> 10/11/2020 11:02 10/01/00.11 Digital Fence and Map Tool | Lib: PSM 3.03.1 2019-05-07 Proj: PSM 3.03.0 2018-05-06



Borehole ID  
**BH01**  
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### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 25/05/2022		
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022		
Hole Location: Refer to Figure 1	Logged By: JBL		
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m	
Hole Diameter: 120 mm	Bearing:	Datum: AHD	Operator: Matrix 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	SPT@0.5m 3,8,28 N=36		81.0	1		CH	Silty CLAY: high plasticity, dark brown.	M	F to St	100 200 300 400 500	0.00: TOPSOIL: grass on surface 0.10: NATURAL
AD/T		N	Not Observed		80.0	2			SHALE: dark brown and grey, extremely weathered to highly weathered, inferred very low to low strength		D		1.35: V-bit refusal Bedrock
					79.0	3							
					78.0	4							

<b>Method</b>	<b>Penetration</b>	<b>Water</b>	<b>Samples and Tests</b>	<b>Moisture Condition</b>	<b>Consistency/Relative Density</b>
AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	No resistance Refusal	Inflow Partial Loss Complete Loss	U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	D - Dry M - Moist W - Wet	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 LIBGLB Log PSM AU NONCORE BH NZ AU PSM4252 (25052022)GPI <<DrawingFile>> 06/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-06 Pj: PSM 3.02.2 2018-05-06  
Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID  
**BH01**  
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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 25/05/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022	
Hole Location: Refer to Figure 1	Logged By: JBL	
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m
Hole Diameter: 120 mm	Bearing:	Datum: AHD
		Operator: Matrix 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 Observed		76.0	6			SHALE: dark brown and grey, extremely weathered to highly weathered, inferred very low to low strength ( <i>continued</i> )			100 200 300 400 500	
					75.0	7							
					74.0	8							
					73.0	9							

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p> No resistance  Refusal</p>	<p><b>Water</b></p> <p> Inflow  Partial Loss  Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry M - Moist W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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PSM 3.02.2 LIBGLB Log PSM AU NONCORE BH NZ AU PSM4252 (25052022)GPI <<DrawingFile>> 06/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-06 Pj: PSM 3.02.2 2018-05-06  
Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

**BH01**

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**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 25/05/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022	
Hole Location: Refer to Figure 1	Logged By: JBL	
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m
Hole Diameter: 120 mm	Bearing:	Datum: AHD
		Operator: Matrix 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 Observed		71.0	11			SHALE: dark brown and grey, extremely weathered to highly weathered, inferred very low to low strength (continued)			100 200 300 400 500	
					70.0	12			Continued on cored borehole sheet				
					69.0	13							
					68.0	14							

<p><b>Method</b></p> <p>AD/T - Auger drilling TC bit          AD/V - Auger drilling V bit          WB - Washbore          SPT - Standard penetration test          PT - Push tube          AS - Auger Screwing</p>	<p><b>Penetration</b></p> <p> No resistance   Refusal</p>	<p><b>Water</b></p> <p>▽ Inflow          ▽ Partial Loss          ▲ Complete Loss</p>	<p><b>Samples and Tests</b></p> <p>U - Undisturbed Sample          D - Disturbed Sample          SPT - Standard Penetration Test          ES - Environmental Sample          TW - Thin Walled          LB - Large Disturbed Sample</p>	<p><b>Moisture Condition</b></p> <p>D - Dry          M - Moist          W - Wet</p>	<p><b>Consistency/Relative Density</b></p> <p>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</p>
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PSM 3.02.2 LIB:GLB Log PSM AU NONCORE BH NZ AU PSM4252 (25052022)GPI <DrawingFile> 06/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-06 Pj: PSM 3.03.0 2018-05-06



Borehole ID

**BH01**

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**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 25/05/2022
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022
Hole Location: Refer to Figure 1	Logged By: JBL
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: Matrix Drilling

Drilling Information					Rock Substance					Rock Mass Defects																		
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering					Strength Is(50)		Defect Spacing (mm)			Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)									
									RS	XW	HW	MW	SW	FR	EL	L	M	H	VH	EH	<20	60	200	600	1000			
					71.0	11																						
								Continued from non-cored borehole sheet																				
								LAMINITE: SHALE (90%) and SANDSTONE (10%) SANDSTONE: medium coarse grained, grey SHALE: dark grey, well developed, thinly bedded, spaced 1-3mm																			BP, 5°, CL, UN, S BP, 5°, CL, UN, S BP, 5°, CL, UN, S BP, 5°, CL, UN, S BP, 0°, CL, PR, S CZ, 45°, CL, IR, RF	
								LAMINITE: SHALE (70%) and SANDSTONE (30%) SANDSTONE: medium coarse grained, grey, thinly bedded SHALE: grey, thinly bedded, spaced 2-5mm																				BP, 0°, CL, UN, S JT, 60°, CL, PR, S JT, 60°, CL, PR, S CZ, 3mm
																												BP, 30°, CN, UN, RF

<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test</p>	<p><b>Water</b></p> <p>Level (Date) Inflow Partial Loss Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p>Core recovered (hatching indicates material) No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Coating</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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PSM 3.02.2 Lib:GLB Log PSM AU CORE BH NZ PSM4252 (25052022).GPI <<DrawingFile>> 21/07/2022 09:57 10:22:00.04 Dwg: Fence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Pj: PSM 3.03.0 2019-05-06



Borehole ID

**BH01**

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**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 25/05/2022
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022
Hole Location: Refer to Figure 1	Logged By: JBL
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: Matrix Drilling

Drilling Information					Rock Substance					Rock Mass Defects									
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering				Strength Is(50)		Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)			
									RS XW HW MW SW FR	EL L M H VH EH	● - Axial ○ - Diametral	<20 60 200 600 1000							
NMLC	Not Observed	92	92	Is(50) d=0 MPa Is(50) a=0.37 MPa	66.0	16		LAMINITE:SANDSTONE (70%) and SHALE (30%) SANDSTONE: medium-coarse grained, grey SHALE: dark grey, thinly bedded, spaced 2-5mm(continued) Becomes grey at 15.40m						BP, 30°, CN, UN, RF BP, 5°, CN, PR, RF BP, 5°, CN, PR, S BP, 10°, CN, PR, S					
					65.0	17									SHALE: dark grey, well developed, thinly bedded				JT, 85°, CN, PR, S BP, 10°, CL, UN, RF
					64.0	18													
63.0	19				SM, CL, 3mm CZ, RF, 5mm BP, 0°, CL, PR, S, 3mm														

<b>Method</b> AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test	<b>Water</b> Level (Date) Inflow Partial Loss Complete Loss <b>Graphic Log/Core Loss</b> Core recovered (hatching indicates material) No core recovery	<b>Weathering and Strength</b> RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong	<b>Defect Type</b> BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam <b>Coating</b> KL - Clean SN - Stain VN - Veneer	<b>Defect Type</b> CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous	<b>Roughness</b> SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough <b>Planarity</b> PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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PSM 3.02.2 LibGLB Log PSM AU CORE BH NZ PSM4252 (25052022).GPI <<DrawingFile>> 21/07/2022 09:57 10/22/00/04 Dwggl Fence and Map Tool | Lib: PSM 3.02.1 2019/03/06 Pj: PSM 3.03.0 2019/05/06



Borehole ID  
**BH01**  
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### Engineering Log - Cored Borehole

Project No.: PSM4252

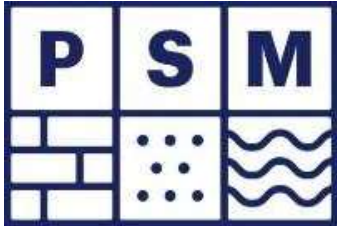
Client: Aliro Group	Commenced: 25/05/2022
Project Name: Mamre Road, Kemps Creek	Completed: 25/05/2022
Hole Location: Refer to Figure 1	Logged By: JBL
Hole Position: 295135.4 m E 6254151.5 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 3-tonne track mounted	Inclination: -90°	RL Surface: 82.00 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: Matrix Drilling

Drilling Information					Rock Substance					Rock Mass Defects																	
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering				Strength Is(50)			Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)										
									RS	XW	HW	MW	SW	FR	EL	L	M	H	VH	EH	<20	60	200	600	1000		
NMLC	Not Observed		100	Is(50) d=0.2 a=0.5 MPa				SHALE: dark grey, well developed, thinly bedded(continued)																			
						21		Hole Terminated at 20.60 m																			
					61.0																						
					60.0																						
					59.0																						
					58.0																						

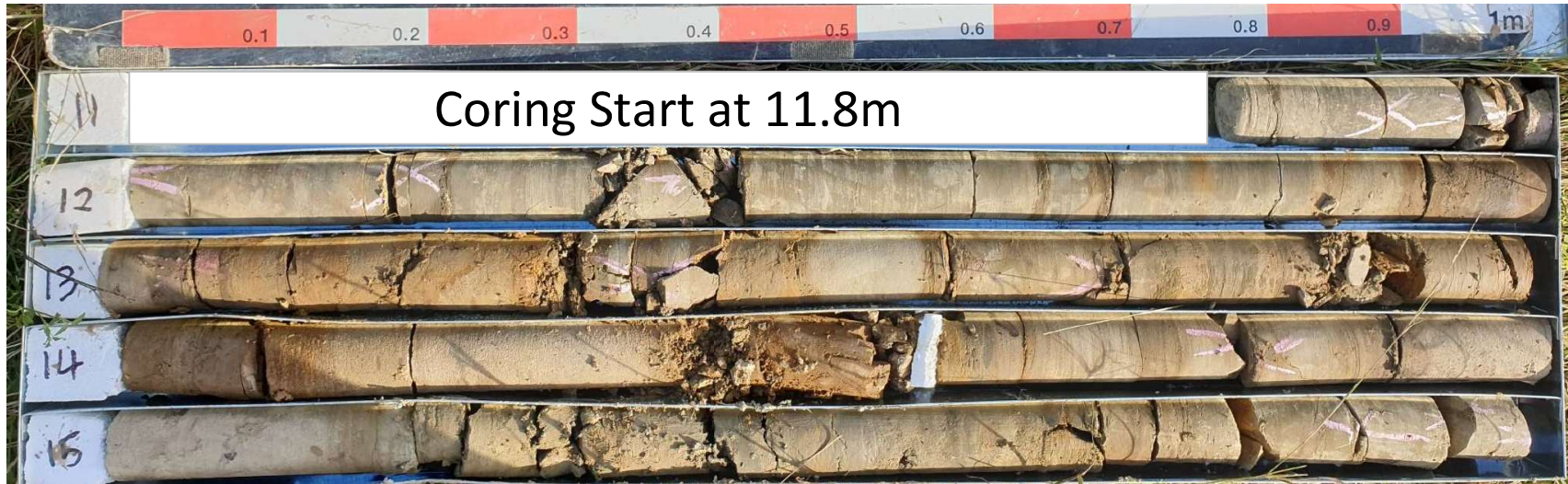
<b>Method</b> AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test	<b>Water</b> Level (Date) Inflow Partial Loss Complete Loss <b>Graphic Log/Core Loss</b> Core recovered (hatching indicates material) No core recovery	<b>Weathering and Strength</b> RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong	<b>Defect Type</b> BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam <b>Coating</b> KL - Clean SN - Stain VN - Veneer	<b>Defect Type</b> CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous	<b>Roughness</b> SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough <b>Planarity</b> PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular
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PSM 3.02.2 LIB.GLB Log\_PSM\_AU\_CORE\_EH\_NZ\_PSM4252 (25052022).GPJ <<DrawingFile>> 21/07/2022 09:57 10/22/00/04\_DrillFence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Proj: PSM 3.03.0 2019-05-06



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 25/05/2022

**BH ID:** BH01  
**FROM:** 11.8 m  
**TO:** 16.0 m

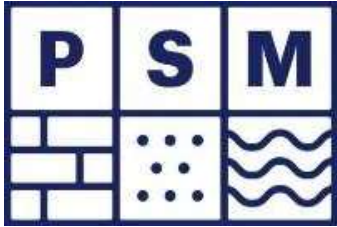


Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH01  
(Core Photo 1 of 2)



PSM4252-002L Rev 4

Appendix A2



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 25/05/2022

**BH ID:** BH01  
**FROM:** 16.0 m  
**TO:** 20.6 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH01  
(Core Photo 2 of 2)



PSM4252-002L Rev 4

Appendix A2



Borehole ID

**BH02**

Page 1 of 5

**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 07/06/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 07/06/2022	
Hole Location: Refer to Figure 1	Logged By: JBL	
Hole Position: 295368.8 m E 625384.1.6 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 81.00 m
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	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/V		N	SPT@0.5m 5,12,13 N=25		80.0	1		CH	CLAY: high plasticity, dark brown.	VSt		100 200 300 400 500	0.00: TOPSOIL: grass on surface 0.10: NATURAL
AD/V		N	SPT@1.5m 6,7,8 N=15		79.0	2			Becomes pale grey	D			1.00: Clay lumps up to gravel size (easily breakable)
AD/T		N	SPT@3.0m, 13,7, HB 25/150mm		78.0	3				H			3.30: V-bit refusal Bedrock
AD/T		N			77.0	4			SHALE: pale grey, extremely weathered to highly weathered.				4.50: Thin laminations observed in rock fragments

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance Refusal	<b>Water</b> ▽ Inflow △ Partial Loss ▲ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.02.2 LIBGLB Log PSM AU NONCORE BH NZ AU PSM4252 (25052022)GPI <<DrawingFile>> 06/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-06 Pj: PSM 3.02.0 2018-05-06



Borehole ID  
**BH02**  
 Page 2 of 5

### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 07/06/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 07/06/2022	
Hole Location: Refer to Figure 1	Logged By: JBL	
Hole Position: 295368.8 m E 625384.16 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 81.00 m
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	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Observed		75.0	6			SHALE: pale grey, extremely weathered to highly weathered. (continued)			100 200 300 400 500	
					74.0	7							
					73.0	8			Becomes brown				
					72.0	9			Inferred strength becomes low to medium				

**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  
 Refusal

**Water**  
 ▽ Inflow  
 ▽ Partial Loss  
 ▲ Complete Loss

**Classification 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 LIBGLB Log PSM AU NONCORE BH NZ AU PSM4252 (295368.8,625384.16) <DrawingFile> 06/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1, 2019-06-06 Pj: PSM 3.03.0 2018-05-06  
 Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID

**BH02**

Page 3 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 07/06/2022		
Project Name: Mamre Road, Kemps Creek	Completed: 07/06/2022		
Hole Location: Refer to Figure 1	Logged By: JBL		
Hole Position: 295368.8 m E 625384.16 m N MGA94 Zone 56	Checked By: AS		
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 81.00 m	
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD	Operator: JK Drilling

Drilling Information					Rock Substance					Rock Mass Defects																
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering				Strength Is(50)		Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)										
									RS	XW	HW	MW	SW	FR	EL	L	M	H	VH	EH	<20	60	200	600	1000	
NMLC					Continued from non-cored borehole sheet					SHALE: grey, poorly developed, laminated																
Not Observed					Is(50) d=0,05 a=0,24 MPa										CZ, 10mm											
					70.0										BP, 0°, CL, PR, S, 5mm											
					69.0					LAMINITE: SHALE (75%) and SANDSTONE (25%) SANDSTONE: fine grained, pale grey, thinly laminated SHALE: dark grey, poorly developed					BP, 5°, CL, PR, S, 2mm											
					68.0										BP, 0°, CL, UN, S											
					67.0										SM, CL, 30 mm											
					Is(50) d=0,11 MPa										CZ, PR, RF, 10 mm											
					Is(50) d=0,08 a=0,23 MPa										BP, 0°, CL, PR, S, 3 mm											
					Is(50) d=0,1 a=0,33 MPa										JT, 85°, CL, UN, PR, S											
					Is(50) d=0,06 a=0,88 MPa										BP, 0°, CL, UN, PR, S											

<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test</p>	<p><b>Water</b></p> <p>Level (Date) Inflow Partial Loss Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p>Core recovered (hatching indicates material) No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Defect Type</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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PSM 3.02.2 Lib:G.LB Log PSM AU CORE BH NZ PSM4252 (25062022).GPI <<DrawingFile>> 21/07/2022 09:57 10/22/00/04 Dwg:G.Fence and Map Tool Lib: PSM 3.02.1 2019-09-06 P1: PSM 3.03.0 2019-05-06



**Engineering Log - Cored Borehole**

Project No.: PSM4252

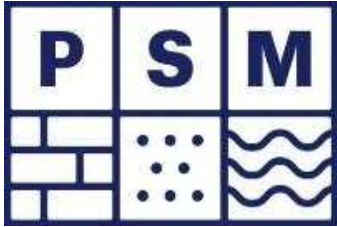
Client: Aliro Group	Commenced: 07/06/2022
Project Name: Mamre Road, Kemps Creek	Completed: 07/06/2022
Hole Location: Refer to Figure 1	Logged By: JBL
Hole Position: 295368.8 m E 625384.16 m N MGA94 Zone 56	Checked By: AS

Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 81.00 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information					Rock Substance					Rock Mass Defects																	
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering				Strength Is(50)			Defect Spacing (mm)		Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)									
									RS	XW	HW	MW	SW	FR	EL	L	M	H	VH	EH	<20	60	200	600	1000		
NMLC	Not Observed		99	Is(50) d=1.27 a=1.98 MPa	65.0	16		LAMINITE: SHALE (75%) and SANDSTONE(25%) SANDSTONE: fine grained, pale grey, thinly laminated SHALE: dark grey, poorly developed(continued)																			BP, 5°, CN, PR, S
			96	Is(50) d=1.1 a=2.65 MPa	64.0	17		LAMINITE: SANDSTONE (60%) and SHALE (40%) SANDSTONE: fine grained, pale grey, thinly laminated SHALE: dark grey, poorly developed																			BP, 5°, CN, PR, S
					63.0	18																					BP, 0°, CL, PR, S, 2 mm
					62.0	19																					BP, 0°, CN, PR, S
								Hole Terminated at 16.71 m																			BP, 15°, CN, ST, S JT, 60°, CN, ST, S

<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT- standard penetration test</p>	<p><b>Water</b></p> <p>Level (Date) Inflow Partial Loss Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p> Core recovered (hatching indicates material)  No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Defect Type</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL- Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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PSM 3.02.2 Lib:GLB Log PSM AU CORE BH NZ PSM4252 (25062022).GPI <<DrawingFile>> 21/07/2022 09:57 10/22/00/04 Dwg\Fence and Map Tool | Lib: PSM 3.02.1 2019-04-06 Pj: PSM 3.03.0 2019-05-06



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 7/06/2022

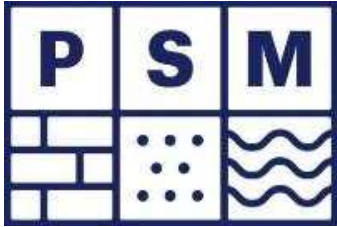
**BH ID:** BH02  
**FROM:** 10.0 m  
**TO:** 15.0 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH02  
(Core Photo 1 of 2)

PSM4252-002L Rev 4

Appendix A2



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 7/06/2022

**BH ID:** BH02  
**FROM:** 15.0 m  
**TO:** 16.71 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH02  
(Core Photo 2 of 2)

PSM4252-002L Rev 4

Appendix A2



Borehole ID

**BH03**

Page 1 of 4

**Engineering Log - Non Cored Borehole**

Project No.: PSM4252

Client: Aliro Group	Commenced: 08/06/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 08/06/2022	
Hole Location: Refer to Figure 1	Logged By: TO	
Hole Position: 295256.0 m E 6254060.0 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 74.00 m
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	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
ADV		N	SPT@0.5m 2,7,14 N=21		73.0	1			Silty CLAY: medium to high plasticity, dark brown CLAY: high plasticity, orange mottled grey and brown	M	F	100 200 300 400 500	0.00: TOPSOIL: grass on surface 0.05: NATURAL
			SPT@1.5m 11+, refusal		72.0	2			SHALE: pale grey, extremely weathered to highly weathered, inferred very low strength.				0.80: Inferred Bedrock
ADT		N	Not Observed		71.0	3			SHALE: pale grey, extremely weathered to highly weathered, inferred low strength.				1.70: V-bit refusal
					70.0	4			Becomes highly weathered				

<b>Method</b>	<b>Penetration</b>	<b>Water</b>	<b>Samples and Tests</b>	<b>Moisture Condition</b>	<b>Consistency/Relative Density</b>
AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	No resistance Refusal	Inflow Partial Loss Complete Loss	U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	D - Dry M - Moist W - Wet	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 PSM4252 (2950202)GPI <DrawingFile> 08/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-08 Pj: PSM 3.03.0 2018-09-08  
Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID  
**BH03**  
 Page 2 of 4

### Engineering Log - Non Cored Borehole

Project No.: PSM4252

Client: Aliro Group	Commenced: 08/06/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 08/06/2022	
Hole Location: Refer to Figure 1	Logged By: TO	
Hole Position: 295256.0 m E 6254060.0 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 74.00 m
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	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa)	Structure, Zoning, Origin, Additional Observations
AD/T		N	Not Observed			68.0	6			Becomes highly weathered (continued)			100 200 300 400 500	
						67.0	7			Continued on cored borehole sheet				
						66.0	8							
						65.0	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance Refusal	<b>Water</b> ▽ Inflow ▽ Partial Loss ▲ Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.02.2 LIB:GLB Log PSM AU NONCORE BH NZ AU PSM4252 (29525622).GPJ <DrawingFile> 08/07/2022 17:20 10.02.00.04 Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-09-06 Pj: PSM 3.03.0 2018-05-06  
 Logged in accordance with AS 1726:2017 Geotechnical site investigations





Borehole ID

**BH03**

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**Engineering Log - Cored Borehole**

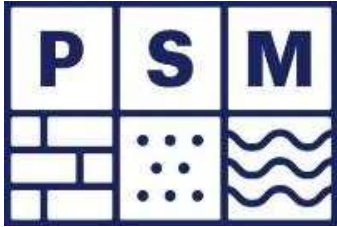
Project No.: PSM4252

Client: Aliro Group	Commenced: 08/06/2022	
Project Name: Mamre Road, Kemps Creek	Completed: 08/06/2022	
Hole Location: Refer to Figure 1	Logged By: TO	
Hole Position: 295256.0 m E 6254060.0 m N MGA94 Zone 56	Checked By: AS	
Drill Model and Mounting: 5.4-tonne track mounted	Inclination: -90°	RL Surface: 74.00 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: JK Drilling

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	TCR (%)	RQD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering	Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)
NMLC	Not Observed	100	100	Is(50) d=0,19 a=0,22 MPa	63.0	11		LAMINITE: pale grey and dark grey, thinly laminated, developed, Laminite; Shale (80%), Sandstone (20%), sandstone is fine grained.				BP, 0°, FE, PR, S
				Is(50) d=0,38 a=0,49 MPa	62.0	12		Becomes Shale (60%), Sandstone(40%), sandstone is fine grained, indistinct laminations, developed				BP, 0°, CN, PR, S BP, 10°, FE, PR, S BP, 5°, CL & RF, PR, RF JT, 90°, CL, PR, RF
		100	100	Is(50) d=0,46 a=1,79 MPa	61.0	13		SHALE: dark grey & pale grey, thinly laminated, developed.				BP, 0°, CL, PR, RF BP, 0°, CN, PR, RF BP, 0°, CL, PR, RF
					60.0	14		Hole Terminated at 13.00 m				

<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.5 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test</p>	<p><b>Water</b></p> <p>Level (Date) Inflow Partial Loss Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p>Core recovered (hatching indicates material) No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil CW - Completely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered UW - Unweathered VW - Very Weak W - Weak MS - Moderately Strong S - Strong VS - Very Strong ES - Extremely Strong</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Defect Type</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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PSM 3.02.2 Lib:G.LB Log\_PSM\_AU\_CORE\_EH\_NZ\_PSM4252 (25062022).GPI <<DrawingFile>> 21/07/2022 09:57 10/22/00/04\_Digital Fence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Pj: PSM 3.03.0 2019-05-06



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 8/06/2022

**BH ID:** BH03  
**FROM:** 6.2 m  
**TO:** 11.0 m

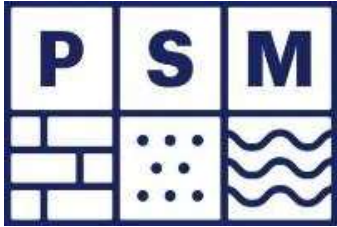


Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH03  
(Core Photo 1 of 2)



PSM4252-002L Rev 4

Appendix A2



**JOB NO:** PSM4252  
**PROJECT:** Mamre Road  
**LOCATION:** Kemps Creek  
**DATE:** 8/06/2022

**BH ID:** BH03  
**FROM:** 11.0 m  
**TO:** 13.0 m



Aliro Group  
Mamre Road  
Kemps Creek  
CORE PHOTOS BH03  
(Core Photo 2 of 2)

PSM4252-002L Rev 4

Appendix A2

# Appendix B.2

## 2025 PSM Borehole Logs





### Engineering Log - Non Cored Borehole

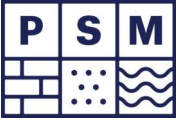
Project No.: PSM5872-005R

Client: Aurecon	Commenced: 02/10/2025
Project Name: Geotechnical Site Investigation	Completed: 02/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295195.0 m E 6254129.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 75.50 m	
Hole Diameter: 125 mm	Bearing:	Datum: AHD	Operator: Stratacore

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	Not Encountered	SPT 0.50-0.95 m 3,5,7 N=12 CR:450/450mm	74.5	1	1	[Symbol]		CLAY: high plasticity, dark brown; rootlets and vegetation observed. CLAY: high plasticity, dark brown and grey.	w < PL	S	100 200 300 400 500	0.00: TOPSOIL  0.20: Probably NATURAL		
				SPT 1.50-1.95 m 11,22, HB N=R CR:300/300mm	73.5	2	2	[Symbol]		SHALE (extremely weathered); dark brown and grey, probably very low to low strength.	w < PL	St to VSt			1.90: TOP OF BEDROCK	
				SPT 3.00-3.45 m 13,22, HB N=R CR:300/300mm	72.5	3	3	[Symbol]		Becomes dark grey and dark brown.						
				SPT 4.50 m HB N=R CR: No core recovery	71.5	4	4	[Symbol]								

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	[Symbol] No resistance [Symbol] Refusal	▽ Inflow △ Partial Loss ▲ Complete Loss	U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample HB - Hammer Bouncing R - Refusal CR - Core Recovery	D - Dry M - Moist W - Wet	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



Borehole ID  
**BH101**  
Page 2 of 5

**Engineering Log - Non Cored Borehole**

Project No.: PSM5872-005R

Client: Aurecon	Commenced: 02/10/2025
Project Name: Geotechnical Site Investigation	Completed: 02/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295195.0 m E 6254129.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 75.50 m
Hole Diameter: 125 mm	Bearing:	Datum: AHD Operator: Stratacore

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			69.5	6			SHALE (extremely weathered): dark brown and grey, probably very low to low strength. (continued)				
						68.5	7							7.35: Practical refusal on TC-Bit
						67.5	8			Continued on cored borehole sheet				
						66.5	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance Refusal	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample HB - Hammer Bouncing R - Refusal CR - Core Recovery	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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**Engineering Log - Cored Borehole**

Project No.: PSM5872-005R

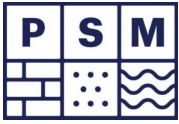
Client: Aurecon	Commenced: 02/10/2025
Project Name: Geotechnical Site Investigation	Completed: 02/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295195.0 m E 6254129.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 75.50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD
		Operator: Stratacore

Drilling Information					Rock Substance					Rock Mass Defects																
Method	Water	TCR (%)	ROD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering					Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)										
									RS	XV	HW	MW	SW	FR	VL	L	M	H	VH	EH	<20	60	200	600	1000	
					69.5	6																				
					68.5	7		Continued from non-cored borehole sheet																		
					67.5	8		SHALE: dark grey, developed, thinly bedded.																		FZ, RF
					67.5	8																				FZ, RF
					67.5	8																				BP, 4°, CL CO, PR, S, 2 mm
					67.5	8																				BP, 1°, CN, ST, RF
					66.5	9																				FZ, RF
					66.5	9		LAMINITE (30% SANDSTONE AND 70% SHALE): SANDSTONE: medium to coarse grained, brown-grey. SHALE: dark grey, thinly bedded.																		BP, 0°, CN, PR, RF
					66.5	9																				FZ, RF
					66.5	9																				BP, 3°, CL VN, PR, RF, 1 mm
					66.5	9																				BP, 8°, CN, ST, RF
					66.5	9																				JT, 45°, RF, PR, RF

<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.6 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test</p>	<p><b>Water</b></p> <p>Level (Date) Inflow Partial Loss Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p>Core recovered (hatching indicates material) No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered Fr - Fresh VL - Very Low Strength L - Low Strength M - Medium Strength H - High Strength VH - Very High Strength EH - Extremely High Strength</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Defect Type</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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PSM 3.02.2 LIB.GLB Log\_PSM\_AU\_CORE\_BH\_NZ\_PSM5872.GPJ ->DrawingFile -> 14/10/2025 11:34 10.03.00.09 Digial Fence and Map Tool (Lib: PSM 3.02.1, 2019-03-06 PJ): PSM 3.03.0 2019-05-06



**Engineering Log - Cored Borehole**

Project No.: PSM5872-005R

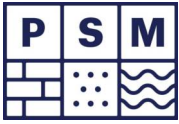
Client: Aurecon	Commenced: 02/10/2025
Project Name: Geotechnical Site Investigation	Completed: 02/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295195.0 m E 6254129.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 75.50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: Stratacore

Drilling Information				Rock Substance				Rock Mass Defects				
Method	Water	TCR (%)	ROD (%)	Is(50) d=0.12 a=1.15 MPa	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering RS XW HW MW SW FR VL L M H VH EH	Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)
NMLC	Not Encountered	100	83	Is(50) d=0.04 a=0.44 MPa	64.5	11	[Hatched]	LAMINITE (30% SANDSTONE AND 70% SHALE): SANDSTONE: medium to coarse grained, brown-grey. SHALE: dark grey, thinly bedded. (continued)	[Diagonal]	○ ●	[Hatched]	FZ, RF SM, 0°, CL, 20 mm FZ, RF
					63.5	12	[Hatched]	LAMINITE (50% SANDSTONE AND 50% SHALE): SANDSTONE: medium grain, grey. SHALE: dark grey, thinly laminated.	[Diagonal]	○ ●	[Hatched]	JT, 88°, RF, CU, RF
		62.5	13	[Hatched]	SHALE: grey and dark grey, massive to poorly developed.	[Diagonal]	○ ●	[Hatched]	CZ, CL BP, 2°, RF, PR, RF, 2 mm			
		61.5	14	[Hatched]	SHALE: grey and dark grey, massive to poorly developed.	[Diagonal]	○ ●	[Hatched]	BP, 0°, CN, PR, RF BP, 0°, CN, PR, RF BP, 2°, CN, PR, RF			

PSM 3.02.2 LIB.GLB Log PSM.AU CORE BH NZ PSM5872.GPJ <-DrawingFile>> 14/10/2025 11:34 10.03.00.09 Digdel Fence and Map Tool [Lib: PSM 3.02.1 2019-03-06 PJ] PSM 3.03.0 2018-05-06

<p><b>Method</b></p> <ul style="list-style-type: none"> <li>AS - auger screwing</li> <li>AD - auger drilling</li> <li>CB - claw of blade bit</li> <li>WB - washbore</li> <li>NMLC - wireline core (51.9 mm)</li> <li>NQ - wireline core (47.6 mm)</li> <li>HQ - wireline core (63.5 mm)</li> <li>PQ - wireline core (85.0 mm)</li> <li>SPT - standard penetration test</li> </ul>	<p><b>Water</b></p> <ul style="list-style-type: none"> <li>Level (Date)</li> <li>Inflow</li> <li>Partial Loss</li> <li>Complete Loss</li> </ul> <p><b>Graphic Log/Core Loss</b></p> <ul style="list-style-type: none"> <li>Core recovered (hatching indicates material)</li> <li>No core recovery</li> </ul>	<p><b>Weathering and Strength</b></p> <ul style="list-style-type: none"> <li>RS - Residual Soil</li> <li>XW - Extremely Weathered</li> <li>HW - Highly Weathered</li> <li>MW - Moderately Weathered</li> <li>SW - Slightly Weathered</li> <li>Fr - Fresh</li> <li>VL - Very Low Strength</li> <li>L - Low Strength</li> <li>M - Medium Strength</li> <li>H - High Strength</li> <li>VH - Very High Strength</li> <li>EH - Extremely High Strength</li> </ul>	<p><b>Defect Type</b></p> <ul style="list-style-type: none"> <li>BS - Bedding Shear</li> <li>PT - Parting</li> <li>JT - Joint</li> <li>SZ - Shear Zone</li> <li>SS - Shear Surface</li> <li>CO - Contact</li> <li>CS - Crushed Seam</li> <li>L - Low Strength</li> <li>M - Medium Strength</li> <li>H - High Strength</li> <li>VH - Very High Strength</li> <li>EH - Extremely High Strength</li> </ul> <p><b>Coating</b></p> <ul style="list-style-type: none"> <li>KL - Clean</li> <li>SN - Stain</li> <li>VN - Veneer</li> </ul>	<ul style="list-style-type: none"> <li>CO - Coating</li> <li>SU - Sulphides</li> <li>RF - Rock fragments</li> <li>G - Gravel</li> <li>S - Sand</li> <li>Z - Silt</li> <li>CA - Calcite</li> <li>CL - Clay</li> <li>FE - Iron</li> <li>KT - Chlorite</li> <li>QZ - Quartz</li> <li>X - Carbonaceous</li> </ul>	<p><b>Roughness</b></p> <ul style="list-style-type: none"> <li>SL - Slickensided</li> <li>POL - Polished</li> <li>SO - Smooth</li> <li>RO - Rough</li> <li>VR - Very Rough</li> </ul> <p><b>Planarity</b></p> <ul style="list-style-type: none"> <li>PL - Planar</li> <li>CU - Curved</li> <li>UN - Undulating</li> <li>ST - Stepped</li> <li>IR - Irregular</li> </ul>
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Borehole ID  
**BH101**  
Page 5 of 5

**Engineering Log - Cored Borehole**

Project No.: PSM5872-005R

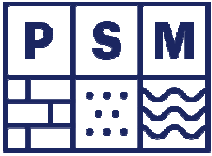
Client: Aurecon	Commenced: 02/10/2025
Project Name: Geotechnical Site Investigation	Completed: 02/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295195.0 m E 6254129.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 75.50 m
Barrel Type and Length: NMLC 3 m	Bearing:	Datum: AHD Operator: Stratacore

Drilling Information					Rock Substance					Rock Mass Defects		
Method	Water	TCR (%)	ROD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering	Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)
NMLC	Not Encountered	100	100	Is(50) d=0.28 a=0.46 MPa	59.5	16		SHALE: grey and dark grey, massive to poorly developed. (continued)	RS XW HW MW SW FR	VL L M H VH EH	<20 60 200 600 1000	BP, 10°, CN, PR, RF BP, 1°, CL VN, PR, S, 1 mm BP, 3°, CN, PR, RF
				Is(50) d=0.04 a=0.29 MPa	58.5	17		Hole Terminated at 16.10 m Target depth				
					57.5	18						
					56.5	19						

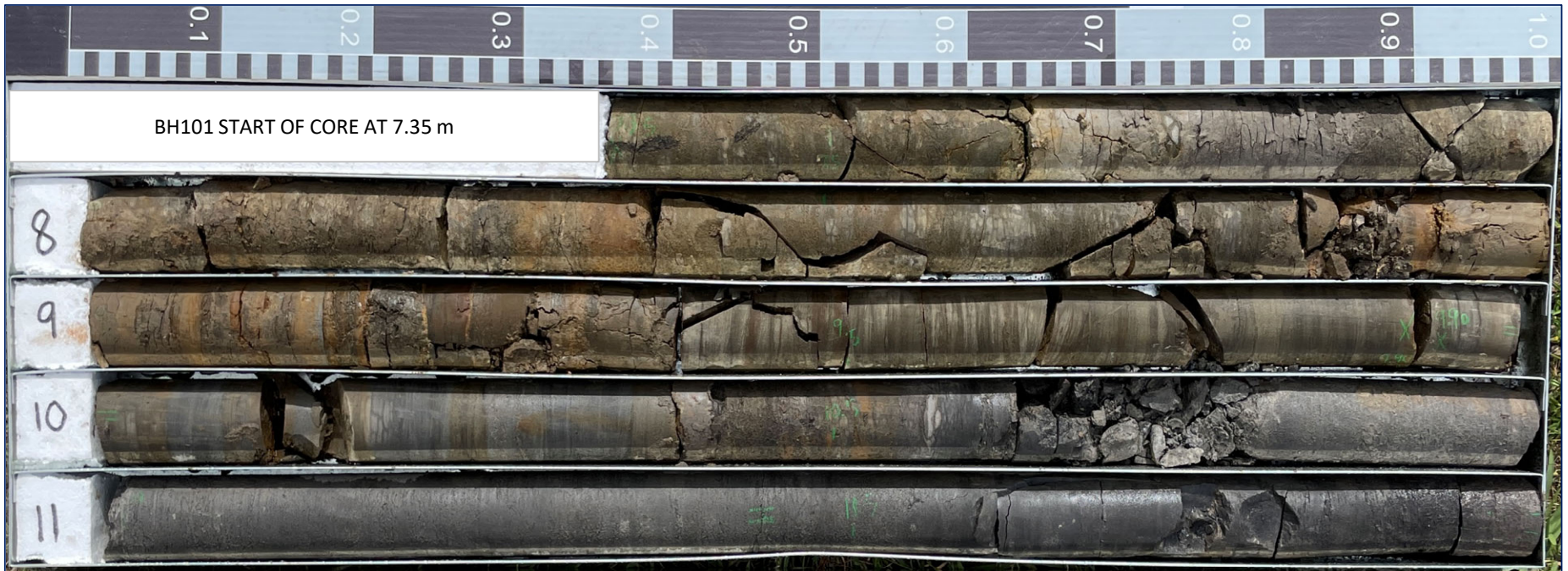
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<p><b>Method</b></p> <p>AS - auger screwing AD - auger drilling CB - claw of blade bit WB - washbore NMLC - wireline core (51.9 mm) NQ - wireline core (47.6 mm) HQ - wireline core (63.5 mm) PQ - wireline core (85.0 mm) SPT - standard penetration test</p>	<p><b>Water</b></p> <p> Level (Date)  Inflow  Partial Loss  Complete Loss</p> <p><b>Graphic Log/Core Loss</b></p> <p> Core recovered (hatching indicates material)  No core recovery</p>	<p><b>Weathering and Strength</b></p> <p>RS - Residual Soil XW - Extremely Weathered HW - Highly Weathered MW - Moderately Weathered SW - Slightly Weathered Fr - Fresh VL - Very Low Strength L - Low Strength M - Medium Strength H - High Strength VH - Very High Strength EH - Extremely High Strength</p>	<p><b>Defect Type</b></p> <p>BS - Bedding Shear PT - Parting JT - Joint SZ - Shear Zone SS - Shear Surface CO - Contact CS - Crushed Seam SM - Seam</p> <p><b>Coating</b></p> <p>KL - Clean SN - Stain VN - Veneer</p>	<p><b>Defect Type</b></p> <p>CO - Coating SU - Sulphides RF - Rock fragments G - Gravel S - Sand Z - Silt CA - Calcite CL - Clay FE - Iron KT - Chlorite QZ - Quartz X - Carbonaceous</p>	<p><b>Roughness</b></p> <p>SL - Slickensided POL - Polished SO - Smooth RO - Rough VR - Very Rough</p> <p><b>Planarity</b></p> <p>PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular</p>
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**Job No:** PSM5872-005R  
**Project:** Geotechnical Site Investigation  
**Location:** 706-752 Mamre Rd, Kemps Creek NSW  
**Date:** 2/10/2025

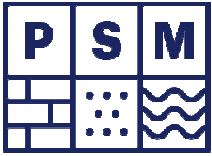
**Borehole ID:** BH101  
**From:** 7.35 m  
**To:** 12.00 m



Aurecon  
706-752 Mamre Rd, Kemps Creek NSW  
Geotechnical Site Investigation  
CORE PHOTOS BH101: 7.35 m to 12.00 m  
(CORE PHOTO 1 OF 2)

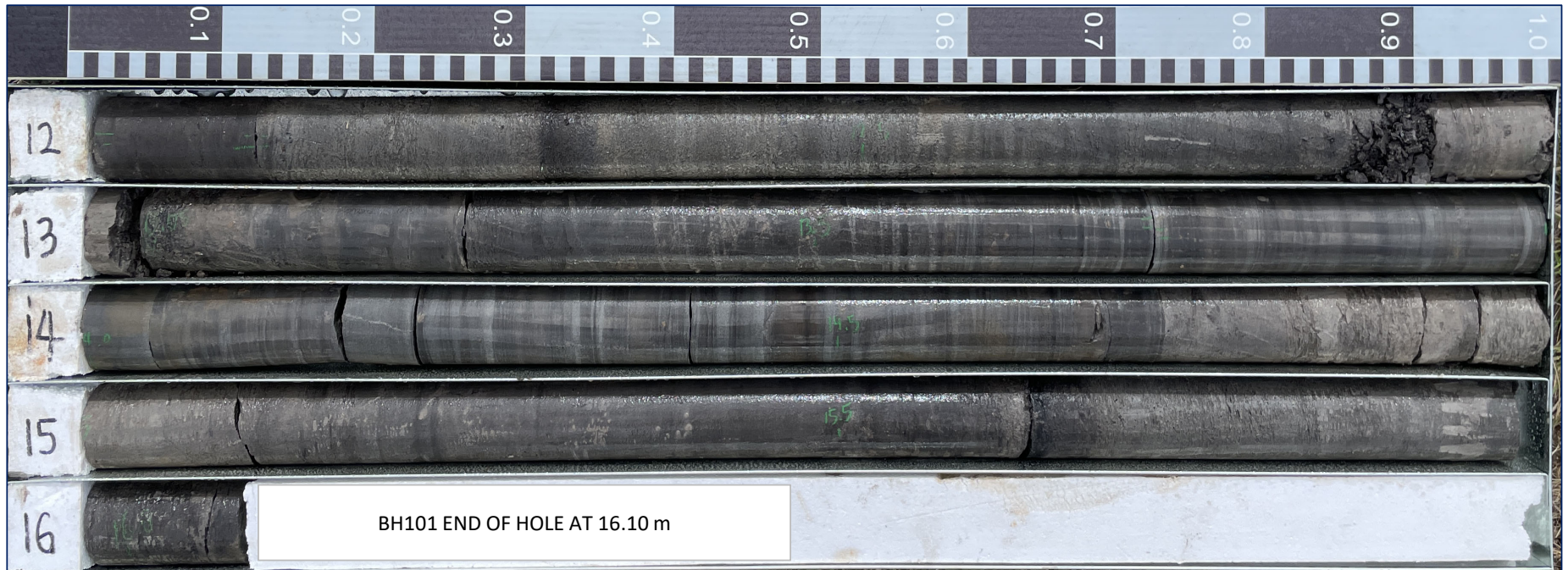
PSM5872-005R	Appendix A
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**Job No:** PSM5872-005R  
**Project:** Geotechnical Site Investigation  
**Location:** 706-752 Mamre Rd, Kemps Creek NSW  
**Date:** 2/10/2025

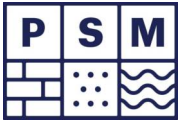
**Borehole ID:** BH101  
**From:** 12.00 m  
**To:** 16.10 m



Aurecon  
706-752 Mamre Rd, Kemps Creek NSW  
Geotechnical Site Investigation  
CORE PHOTOSBH101: 12.00 m to 16.10 m  
(CORE PHOTO 2 OF 2)

PSM5872-005R	Appendix A
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### Engineering Log - Non Cored Borehole

Project No.: PSM5872-005R

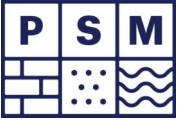
Client: Aurecon	Commenced: 03/10/2025
Project Name: Geotechnical Site Investigation	Completed: 03/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295404.0 m E 6253793.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 78.30 m	
Hole Diameter: 125 mm	Bearing:	Datum: AHD	Operator: Stratacore

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	w < PL	SPT 0.50-0.95 m 7,6,5 N=11 CR:450/450mm	77.3	1				CLAY: high plasticity, dark brown; some rootlets and vegetation observed.	w < PL	S		0.00: TOPSOIL	
				SPT 1.50-1.95 m 9,9,9 N=18 CR:450/450mm	76.3	2			CLAY: high plasticity, dark brown mottled black.	w < PL	St			0.20: Probably NATURAL	
				SPT 3.00-3.45 m 7,11,15 N=26 CR:450/450mm	75.3	3				w < PL	VSt				
				SPT 4.50 m HB N=R CR: No core recovery	74.3	4			SHALE (extremely weathered): pale grey and brown, probably very low to low strength.						

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance Refusal	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample HB - Hammer Bouncing R - Refusal CR - Core Recovery	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.02.2 LIB.GLB Log\_PSM\_AU\_NONCORE\_BH\_NZ\_AU\_PSM5872.GPJ -<DrawingFile> 17/10/2025 15:42 10.03.00.09 Datagel Fence and Map Tool | Lib: PSM 3.02.1 2019-03-06 Pjg | PSM 3.03.0 2019-05-06  
Logged in accordance with AS 1726:2017 Geotechnical site investigations



Borehole ID  
**BH102**  
Page 2 of 4

**Engineering Log - Non Cored Borehole**

Project No.: PSM5872-005R

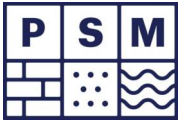
Client: Aurecon	Commenced: 03/10/2025
Project Name: Geotechnical Site Investigation	Completed: 03/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295404.0 m E 6253793.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 78.30 m
Hole Diameter: 125 mm	Bearing:	Datum: AHD Operator: Stratacore

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			72.3	6			SHALE (extremely weathered): pale grey and brown, probably very low to low strength. (continued)				
						71.3	7							7.30: Practical refusal on TC-Bit
						70.3	8			Continued on cored borehole sheet				
						69.3	9							

<b>Method</b> AD/T - Auger drilling TC bit AD/V - Auger drilling V bit WB - Washbore SPT - Standard penetration test PT - Push tube AS - Auger Screwing	<b>Penetration</b> No resistance Refusal	<b>Water</b> Inflow Partial Loss Complete Loss	<b>Samples and Tests</b> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test ES - Environmental Sample TW - Thin Walled LB - Large Disturbed Sample HB - Hammer Bouncing R - Refusal CR - Core Recovery	<b>Moisture Condition</b> D - Dry M - Moist W - Wet	<b>Consistency/Relative Density</b> 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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PSM 3.02.2 LIB.GLB Log\_PSM\_AU\_NONCORE\_BH\_NZ\_AU\_PSM5872.GPJ <<DrawingFile>> 14/10/2025 11:35 10.03.00.09 Datagel Fence and Map Tool [Lib: PSM 3.02.1, 2019-03-06 Proj: PSM 3.03.0, 2019-05-06]



Borehole ID  
**BH102**  
Page 3 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM5872-005R

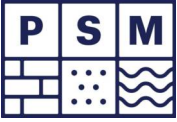
Client: Aurecon	Commenced: 03/10/2025
Project Name: Geotechnical Site Investigation	Completed: 03/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295404.0 m E 6253793.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 78.30 m
Barrel Type and Length: HQ 3 m	Bearing:	Datum: AHD
		Operator: Stratacore

Drilling Information					Rock Substance					Rock Mass Defects																	
Method	Water	TCR (%)	ROD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering					Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)											
									RS	XV	HW	MW	SW	FR	VL	L	M	H	VH	EH	<20	60	200	600	1000		
					72.3	6																					
					71.3	7																					
								Continued from non-cored borehole sheet																			
		100	100					SHALE: brown, poorly developed.																		FZ, RF	
		100	68	Is(50) d=0.02 a=0.46 MPa	70.3	8																				BP, 20°, CL VN, CU, S, 1 mm BP, 0°, CN, PR, RF BP, 0°, CN, PR, RF SM, 0°, CL, 5 mm	
		100	86	Is(50) d=0.14 a=2.09 MPa	69.3	9																				BP, 20°, CN, ST, RF BP, 0°, CL VN, PR, S, 1 mm BP, 2°, CN, PR, RF	
				Is(50) d=0.37 a=2.88 MPa				LAMINITE (70% SANDSTONE AND 30% SHALE) SANDSTONE: grey, medium grained. SHALE: dark grey; interbedded shale bands up to 50mm thick.																			FZ, RF BP, 0°, CN, PR, RF BP, 0°, CN, PR, RF BP, 0°, CN, PR, RF BP, 0°, CL VN, PR, S, 2 mm BP, 0°, RF, PR, RF, 10 mm
																										BP, 0°, CN, PR, RF	

<p><b>Method</b></p> <ul style="list-style-type: none"> <li>AS - auger screwing</li> <li>AD - auger drilling</li> <li>CB - claw of blade bit</li> <li>WB - washbore</li> <li>NMLC - wireline core (51.9 mm)</li> <li>NQ - wireline core (47.6 mm)</li> <li>HQ - wireline core (63.5 mm)</li> <li>PQ - wireline core (85.0 mm)</li> <li>SPT - standard penetration test</li> </ul>	<p><b>Water</b></p> <ul style="list-style-type: none"> <li>Level (Date)</li> <li>Inflow</li> <li>Partial Loss</li> <li>Complete Loss</li> </ul> <p><b>Graphic Log/Core Loss</b></p> <ul style="list-style-type: none"> <li>Core recovered (hatching indicates material)</li> <li>No core recovery</li> </ul>	<p><b>Weathering and Strength</b></p> <ul style="list-style-type: none"> <li>RS - Residual Soil</li> <li>XW - Extremely Weathered</li> <li>HW - Highly Weathered</li> <li>MW - Moderately Weathered</li> <li>SW - Slightly Weathered</li> <li>Fr - Fresh</li> <li>VL - Very Low Strength</li> <li>L - Low Strength</li> <li>M - Medium Strength</li> <li>H - High Strength</li> <li>VH - Very High Strength</li> <li>EH - Extremely High Strength</li> </ul>	<p><b>Defect Type</b></p> <ul style="list-style-type: none"> <li>BS - Bedding Shear</li> <li>PT - Parting</li> <li>JT - Joint</li> <li>SZ - Shear Zone</li> <li>SS - Shear Surface</li> <li>CO - Contact</li> <li>CS - Crushed Seam</li> <li>SM - Seam</li> </ul> <p><b>Coating</b></p> <ul style="list-style-type: none"> <li>KL - Clean</li> <li>SN - Stain</li> <li>VN - Veneer</li> </ul>	<p><b>Defect Type</b></p> <ul style="list-style-type: none"> <li>CO - Coating</li> <li>SU - Sulphides</li> <li>RF - Rock fragments</li> <li>G - Gravel</li> <li>S - Sand</li> <li>Z - Silt</li> <li>CA - Calcite</li> <li>CL - Clay</li> <li>FE - Iron</li> <li>KT - Chlorite</li> <li>QZ - Quartz</li> <li>X - Carbonaceous</li> </ul>	<p><b>Roughness</b></p> <ul style="list-style-type: none"> <li>SL - Slickensided</li> <li>POL - Polished</li> <li>SO - Smooth</li> <li>RO - Rough</li> <li>VR - Very Rough</li> <li>PL - Planar</li> <li>CU - Curved</li> <li>UN - Undulating</li> <li>ST - Stepped</li> <li>IR - Irregular</li> </ul>
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PSM 3.02.2 LIB.GLB Log\_PSM\_AU\_CORE\_BH\_NZ\_PSM5872.GPJ ->DrawingFile>> 14/10/2025 11:34 10.03.00.09 Diggle Fence and Map Tool [Lib: PSM 3.02.1 2019-03-06 PJ]: PSM 3.03.0 2019-05-06



Borehole ID  
**BH102**  
Page 4 of 4

**Engineering Log - Cored Borehole**

Project No.: PSM5872-005R

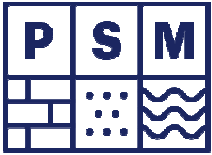
Client: Aurecon	Commenced: 03/10/2025
Project Name: Geotechnical Site Investigation	Completed: 03/10/2025
Hole Location: Refer to Figure 1	Logged By: BTA
Hole Position: 295404.0 m E 6253793.0 m N MGA2020 Zone 56H	Checked By: JL

Drill Model and Mounting: Comacchio Geo 300	Inclination: -90°	RL Surface: 78.30 m
Barrel Type and Length: HQ 3 m	Bearing:	Datum: AHD
		Operator: Stratacore

Drilling Information					Rock Substance					Rock Mass Defects		
Method	Water	TCR (%)	ROD (%)	Samples and Field Tests	RL (m)	Depth (m)	Graphic Log	Material Description Colour, Fabric, Rock Name, Discontinuities, Additional	Weathering	Strength Is(50) ● - Axial ○ - Diametral	Defect Spacing (mm)	Defect Description Type, Inclination, Shape, Roughness, Coating/Infilling, Thickness (Inclination normal to core axis)
HQ	Not Encountered	100	86	Is(50) d=0.21 a=0.75 MPa	67.3	11		LAMINITE (70% SANDSTONE AND 30% SHALE) SANDSTONE: grey, medium grained. SHALE: dark grey; interbedded shale bands up to 50mm thick.(continued)	RS XW HW MW SW FR	VL L M H VH EH	<20 60 200 600 1000	BP, 0°, CN, PR, RF BP, 0°, CN, PR, RF BP, 7°, CN, CU, RF BP, 0°, CN, PR, RF BP, 5°, CN, CU, RF BP, 0°, CN, PR, RF BP, 4°, CN, PR, RF BP, 0°, CN, PR, VR BP, 0°, CN, PR, VR BP, 1°, CN, PR, VR
				Is(50) d=0.83 a=0.96 MPa	66.3	12		Hole Terminated at 12.25 m Target depth				
				Is(50) d=0.72 a=0.88 MPa	65.3	13						
					64.3	14						

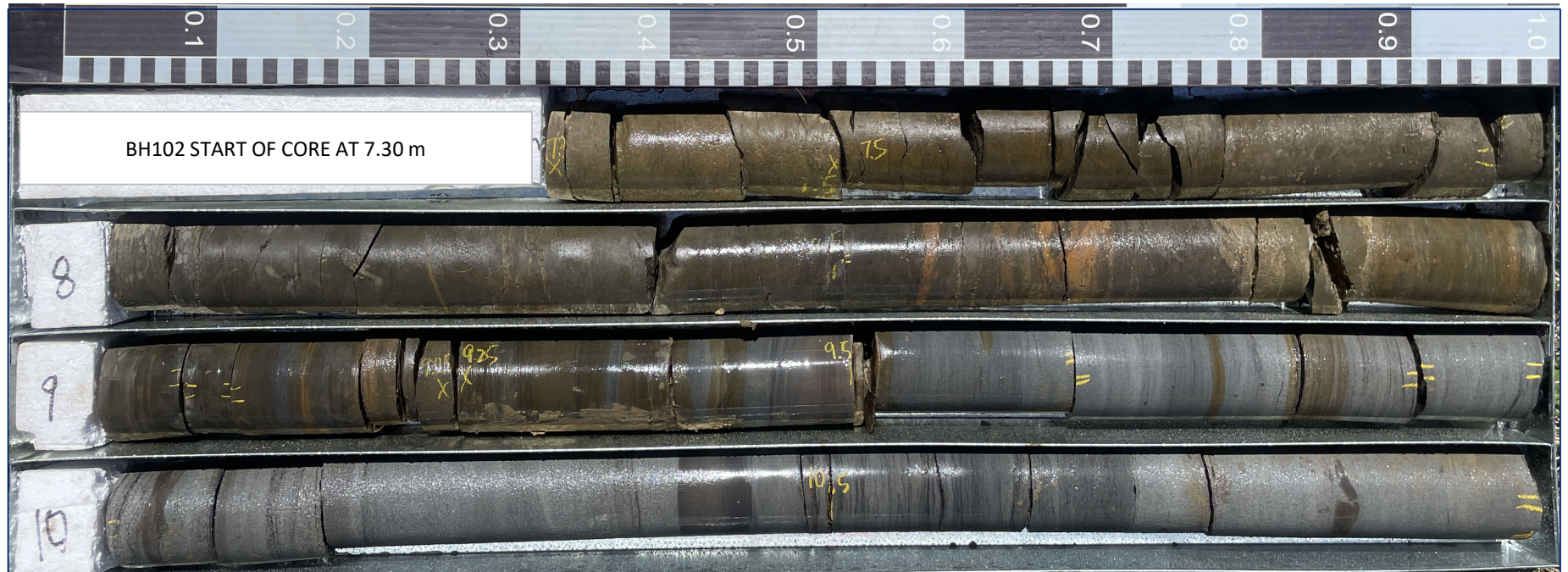
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<p><b>Method</b></p> <ul style="list-style-type: none"> <li>AS - auger screwing</li> <li>AD - auger drilling</li> <li>CB - claw of blade bit</li> <li>WB - washbore</li> <li>NMLC - wireline core (51.9 mm)</li> <li>NQ - wireline core (47.6 mm)</li> <li>HQ - wireline core (63.5 mm)</li> <li>PQ - wireline core (85.0 mm)</li> <li>SPT - standard penetration test</li> </ul>	<p><b>Water</b></p> <ul style="list-style-type: none"> <li>Level (Date)</li> <li>Inflow</li> <li>Partial Loss</li> <li>Complete Loss</li> </ul> <p><b>Graphic Log/Core Loss</b></p> <ul style="list-style-type: none"> <li>Core recovered (hatching indicates material)</li> <li>No core recovery</li> </ul>	<p><b>Weathering and Strength</b></p> <ul style="list-style-type: none"> <li>RS - Residual Soil</li> <li>XW - Extremely Weathered</li> <li>HW - Highly Weathered</li> <li>MW - Moderately Weathered</li> <li>SW - Slightly Weathered</li> <li>Fr - Fresh</li> <li>VL - Very Low Strength</li> <li>L - Low Strength</li> <li>M - Medium Strength</li> <li>H - High Strength</li> <li>VH - Very High Strength</li> <li>EH - Extremely High Strength</li> </ul>	<p><b>Defect Type</b></p> <ul style="list-style-type: none"> <li>BS - Bedding Shear</li> <li>PT - Parting</li> <li>JT - Joint</li> <li>SZ - Shear Zone</li> <li>SS - Shear Surface</li> <li>CO - Contact</li> <li>CS - Crushed Seam</li> <li>SM - Seam</li> <li>KL - Clean</li> <li>SN - Stain</li> <li>VN - Veneer</li> </ul>	<ul style="list-style-type: none"> <li>CO - Coating</li> <li>SU - Sulphides</li> <li>RF - Rock fragments</li> <li>G - Gravel</li> <li>S - Sand</li> <li>Z - Silt</li> <li>CA - Calcite</li> <li>CL - Clay</li> <li>FE - Iron</li> <li>KT - Chlorite</li> <li>QZ - Quartz</li> <li>X - Carbonaceous</li> </ul>	<p><b>Roughness</b></p> <ul style="list-style-type: none"> <li>SL - Slickensided</li> <li>POL - Polished</li> <li>SO - Smooth</li> <li>RO - Rough</li> <li>VR - Very Rough</li> </ul> <p><b>Planarity</b></p> <ul style="list-style-type: none"> <li>PL - Planar</li> <li>CU - Curved</li> <li>UN - Undulating</li> <li>ST - Stepped</li> <li>IR - Irregular</li> </ul>
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**Job No:** PSM5872-005R  
**Project:** Geotechnical Site Investigation  
**Location:** 706-752 Mamre Rd, Kemps Creek NSW  
**Date:** 3/10/2025

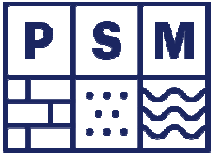
**Borehole ID:** BH102  
**From:** 7.30 m  
**To:** 11.00 m



Aurecon  
706-752 Mamre Rd, Kemps Creek NSW  
Geotechnical Site Investigation  
CORE PHOTOS BH102: 7.30 m to 11.00 m  
(CORE PHOTO 1 OF 2)

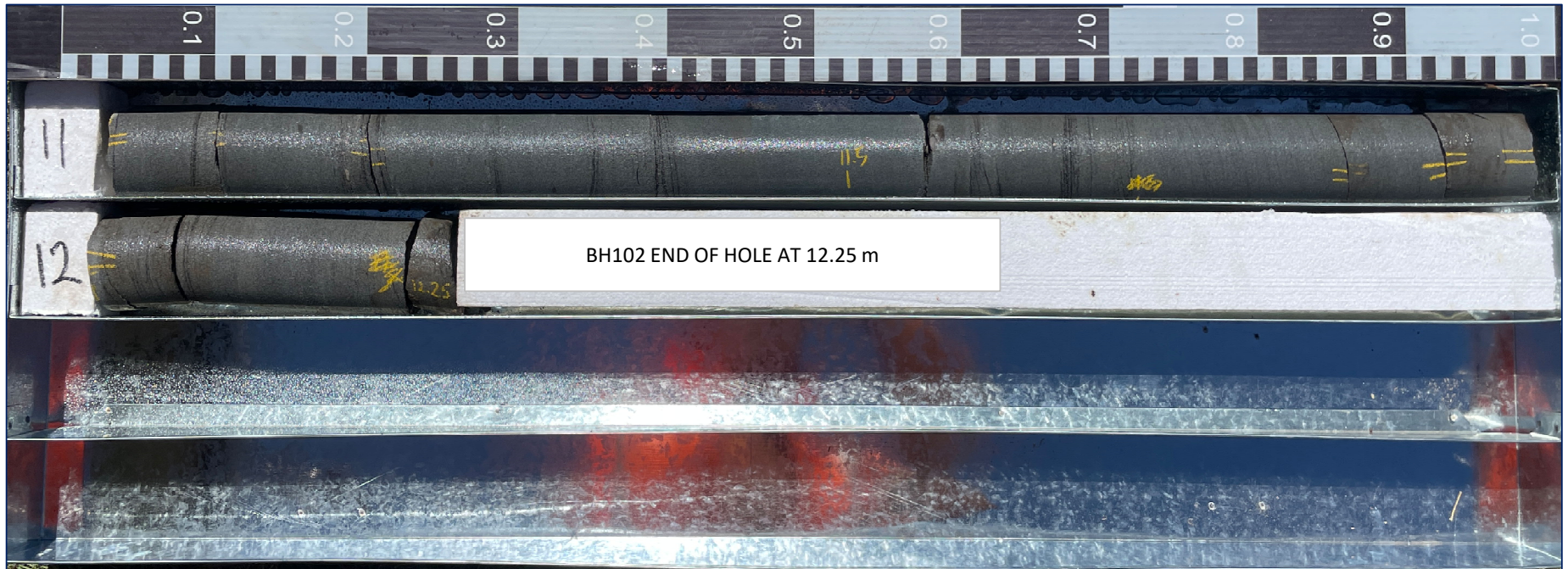
PSM5872-005R	Appendix A
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**Job No:** PSM5872-005R  
**Project:** Geotechnical Site Investigation  
**Location:** 706-752 Mamre Rd, Kemps Creek NSW  
**Date:** 3/10/2025

**Borehole ID:** BH102  
**From:** 11.00 m  
**To:** 12.25 m



Aurecon  
706-752 Mamre Rd, Kemps Creek NSW  
Geotechnical Site Investigation  
CORE PHOTOS BH102: 11.00 m to 12.25 m  
(CORE PHOTO 2 OF 2)

PSM5872-005R	Appendix A
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# Appendix C

## Point Load Test Results





**APPENDIX B - POINT LOAD STRENGTH INDEX TEST RESULTS**

Job No. **PSM4252** Sheet **1** of **1**

Project **Mamre Road, Kemps Creek**

Test Method <b>AS 4133.4.1 - 1993 Methods of Testing Rocks for Engineering Purposes, Determination of Point Load Strength Index</b>	Sampling Technique <b>HQ3</b>	Storage History <b>In Field</b>	Sampling Date <b>22 - 23/10/2020</b>
Test Machine <b>HMA 6510</b>	Moisture Condition <b>Natural</b>	Loading Rate <b>&lt; 30 seconds</b>	Testing Date <b>22 - 23/10/2020</b>
Calibration Date <b>16/08/2018, 28/08/2020</b>			Tested By <b>DT</b>

Rock Type	Location	Depth (m)	Diametral Tests				Axial, Block, and Irregular Lump Tests								AS 1726 Strength Class
			D (mm)	L (mm)	P (kN)	I <sub>s(50)</sub> (MPa)	Failure Mode	W (mm)	D (mm)	L (mm)	P (kN)	I <sub>s</sub> (MPa)	I <sub>s(50)</sub> (MPa)	Failure Mode	
Sandstone	CH01	3.94	50	62	3.2	1.28	Parallel to bedding	50	24		2.9	1.9	1.7	Through substance	H
Sandstone	CH01	4.34	50	67	1.8	0.71	Parallel to bedding	50	20		0	0	0.01	Along defect	VL
Sandstone	CH01	5.37	50	67	1.9	0.75	Parallel to bedding	50	39		1.9	0.7	0.75	Through substance	M
Sandstone	CH01	6.51	50	48	2.6	1.02	Parallel to bedding	50	21		1.7	1.3	1.13	Through substance	H
Shale	CH01	7.23	50	66	0.3	0.12	Parallel to bedding	50	32		0.8	0.4	0.35	Through substance	VL / L
Shale	CH01	8.33	50	58	0.2	0.08	Parallel to bedding	50	30		0.1	0	0.04	Along defect	L
Shale	CH01	9.50	50	57	0	0.01	Along defect	50	35		0.2	0.1	0.08	Along defect	VL
Shale	CH01	10.75	50	57	0.2	0.07	Along defect	50	31		0.4	0.2	0.18	Through substance	VL / L
Shale	CH02	7.68	50	74	4	1.6	Parallel to bedding	50	38		3.5	1.4	1.43	Through substance	L / M
Shale	CH02	8.55	50	69	0.4	0.15	Parallel to bedding	50	33		1.1	0.5	0.49	Through substance	L / M
Shale	CH02	9.58	50	48	0	0.01	Along defect	50	26		0.7	0.4	0.36	Through substance	M
Shale	CH02	10.00	50	70	0.1	0.05	Along defect	50	39		1.8	0.7	0.72	Through substance	VL / H
Shale	CH03	5.86	50	74	0.1	0.04	Along defect	50	39		0.5	0.2	0.22	Through substance	VL / L
Shale	CH03	6.17	50	52	0.7	0.27	Parallel to bedding	50	36		0.1	0.1	0.06	Along defect	VL / L
Shale	CH03	7.41	50	63	0.6	0.25	Parallel to bedding	50	30		0.7	0.4	0.34	Through substance	L / M
Shale	CH03	8.74	50	72	0.2	0.06	Along defect	50	40		0.5	0.2	0.19	Through substance	VL / L
Shale	CH03	9.71	50	70	1.2	0.46	Parallel to bedding	50	46		1.4	0.5	0.48	Through substance	M
Shale	CH03	10.13	50	71	4.7	1.86	Parallel to bedding	50	44		7.5	2.7	2.76	Through substance	H

By: **DT** Checked: **AS** Date: **22 - 23/10/2020**



**APPENDIX B - POINT LOAD STRENGTH INDEX TEST RESULTS**

Job No. **PSM4252**

Sheet **1** of **1**

Project **Mamre Road, Kemps Creek Kemps Creek - Additional Geotechnical Investigation**

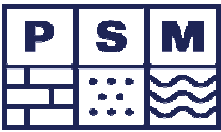
Test Method	AS 4133.4.1 - 1993 Methods of Testing Rocks for Engineering Purposes, Determination of Point Load Strength Index	Sampling Technique	HQ3	Sampling Date	25/05/2022 - 08/06/2022
Test Machine	HMA 6510	Storage History	In Field	Testing Date	25/05/2022 - 08/06/2022
Calibration Date	16/08/2018, 28/08/2020	Moisture Condition	Natural	Tested By	TO & JBL
		Loading Rate	< 30 seconds		

Rock Type	Location	Depth (m)	Diametral Tests					Axial, Block, and Irregular Lump Tests					AS 1726 Strength Class	
			D (mm)	L (mm)	P (kN)	I <sub>s(50)</sub> (MPa)	Failure Mode	W (mm)	D (mm)	P (kN)	I <sub>s</sub> (MPa)	I <sub>s(50)</sub> (MPa)		Failure Mode
Shale	BH01	11.80	50	35	0.2	0.08	Parallel to bedding	50	48	1.5	0.5	0.5	Through substance	VL / M
Shale	BH01	12.58	50	40	0.2	0.09	Parallel to bedding	50	40	0.7	0.3	0.27	Through substance	VL
Shale	BH01	13.15	50	40	0.1	0.04	Parallel to bedding	50	40	0.2	0.1	0.08	Through substance	VL
Laminite	BH01	14.76	50	50	0.5	0.18	Parallel to bedding	50	47	0.7	0.2	0.25	Through substance	VL
Laminite	BH01	15.78	50	40	0	0	Parallel to bedding	50	46				Bad break	
Laminite	BH01	16.00	50	45			Bad break	50	40	0.9	0.4	0.37	Through substance	VL
Shale	BH01	17.60	50	55	0	0	Parallel to bedding	50	45	1	0.3	0.36	Through substance	M
Shale	BH01	18.00	50	60	1.3	0.52	Parallel to bedding	50	48	1.4	0.4	0.47	Through substance	M
Shale	BH01	19.28	50	60	1	0.4	Parallel to bedding	50	40	1	0.4	0.41	Through substance	M
Shale	BH01	20.33	50	45	0.5	0.2	Parallel to bedding	50	45	1.4	0.5	0.5	Through substance	L / M
Shale	BH02	10.46	50	50	0.1	0.05	Parallel to bedding	50	45	0.7	0.2	0.24	Through substance	VL / L
Laminite	BH02	11.82	50	55	0.2	0.08	Parallel to bedding	50	45	0.7	0.2	0.23	Through substance	VL / L
Laminite	BH02	12.28	50	45	0.3	0.11	Parallel to bedding	50	45				Bad break	L
Laminite	BH02	13.28	50	50	0.3	0.1	Parallel to bedding	50	45	0.9	0.3	0.33	Through substance	L / M
Laminite	BH02	14.35	50	65	0.2	0.06	Parallel to bedding	50	40	2.2	0.9	0.88	Through substance	VL / M
Laminite	BH02	15.22	50	55	3.2	1.27	Parallel to bedding	50	45	5.5	1.9	1.98	Through substance	H
Laminite	BH02	16.46	50	45	2.7	1.1	Parallel to bedding	50	40	6.7	2.6	2.65	Through substance	H
Shale	BH03	6.92	50	40	0.9	0.35	Parallel to bedding	50	45	1	0.3	0.36	Through substance	M
Shale	BH03	7.22	50	55	0.6	0.25	Parallel to bedding	50	45	0.5	0.2	0.18	Through substance	L
Shale	BH03	8.75	50	55	0.5	0.21	Parallel to bedding	50	45	0.5	0.2	0.19	Through substance	L
Shale	BH03	9.34	50	40	0.1	0.03	Parallel to bedding	50	35	0.4	0.2	0.16	Through substance	VL / L
Shale	BH03	10.56	50	45	0.5	0.19	Parallel to bedding	50	40	0.6	0.2	0.22	Through substance	L
Shale	BH03	11.32	50	45	1	0.38	Parallel to bedding	50	40	1.2	0.5	0.49	Through substance	M
Shale	BH03	12.00	50	50	1.1	0.46	Parallel to bedding	50	30	3.6	1.9	1.79	Through substance	M / H

By: **TO & JBL**

Checked: **AS**

Date: **08/06/2022**



**POINT LOAD STRENGTH INDEX TEST RESULTS**

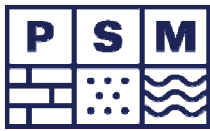
Job No. **PSM5872-005R** Sheet **1** of **2**

Project **Geotechnical Site Investigation**

Test Method	AS 4133.4.1-2007 Methods of testing rocks for engineering purposes - Determination of point load strength index	Sampling Technique	NLMC	Sampling Date	2/10/2025
Test Machine	GSA 6510-0304	Storage History	North Ryde office storage	Testing Date	7/10/2025
Calibration Date	31/7/2024	Moisture Condition	Natural	Tested By	BG
		Loading Rate	< 30 seconds		

Rock Type	Location	Depth (m)	Diametral Tests					Axial Tests					AS 1726:2017 Strength Class	
			D (mm)	L (mm)	P (kN)	I <sub>s(50)</sub> (MPa)	Failure Mode	W (mm)	D (mm)	P (kN)	I <sub>s</sub> (MPa)	I <sub>s(50)</sub> (MPa)		Failure Mode
LAMINITE	BH101	7.70	50	40	0.2	0.1	Parallel to bedding	50	40	0.7	0.3	0.3	Through substance	VL / L
LAMINITE	BH101	8.32	50	35	0.3	0.1	Parallel to bedding	50	35	0.5	0.2	0.2	Through substance	L
LAMINITE	BH101	9.71	50	40	0.9	0.4	Parallel to bedding	50	40	1.8	0.7	0.7	Through substance	M
LAMINITE	BH101	10.17	50	45	0.3	0.1	Parallel to bedding	50	45	3.2	1.1	1.1	Through substance	L / H
SHALE	BH101	12.12	50	30	0.1	0.0	Parallel to bedding	50	30	0.9	0.5	0.5	Through substance	VL/L
SHALE	BH101	13.19	50	35	0.4	0.2	Parallel to bedding	50	35	1.0	0.4	0.4	Through substance	L / M
LAMINITE	BH101	14.26	50	33	1.0	0.4	Parallel to bedding	50	33	0.9	0.4	0.4	Through substance	M
SHALE	BH101	15.05	50	42	0.7	0.3	Parallel to bedding	50	42	1.2	0.5	0.5	Through substance	L / M
SHALE	BH101	16.06	50	38	0.1	0.0	Parallel to bedding	50	38	0.7	0.3	0.3	Through substance	VL / L

By: **BG** Checked: **AS** Date: **14/10/2025**



**POINT LOAD STRENGTH INDEX TEST RESULTS**

Job No. **PSM5872-005R** Sheet **2** of **2**

Project **Geotechnical Site Investigation**

Test Method	AS 4133.4.1-2007 Methods of testing rocks for engineering purposes - Determination of point load strength index	Sampling Technique	HQ	Sampling Date	3/10/2025
Test Machine	GSA 6510-0304	Storage History	North Ryde office storage	Testing Date	7/10/2025
Calibration Date	31/7/2024	Moisture Condition	Natural	Tested By	BG
		Loading Rate	< 30 seconds		

Rock Type	Location	Depth (m)	Diametral Tests					Axial Tests					AS 1726:2017 Strength Class	
			D (mm)	L (mm)	P (kN)	I <sub>s(50)</sub> (MPa)	Failure Mode	W (mm)	D (mm)	P (kN)	I <sub>s</sub> (MPa)	I <sub>s(50)</sub> (MPa)		Failure Mode
SHALE	BH102	8.00	60	42	0.1	0.0	Parallel to bedding	60	42	1.4	0.4	0.5	Through substance	VL/L
SHALE	BH102	9.43	60	43	1.2	0.4	Parallel to bedding	60	43	8.9	2.7	2.9	Through substance	M / H
LAMINITE	BH102	10.15	60	40	0.7	0.2	Parallel to bedding	60	40	2.2	0.7	0.7	Through substance	L / M
LAMINITE	BH102	11.14	60	40	2.7	0.8	Parallel to bedding	60	40	2.8	0.9	1.0	Through substance	M
LAMINITE	BH102	12.11	60	45	2.4	0.7	Parallel to bedding	60	45	2.8	0.8	0.9	Through substance	M

By: **BG** Checked: **AS** Date: **14/10/2025**

# Appendix D

## Piezometer Construction Record





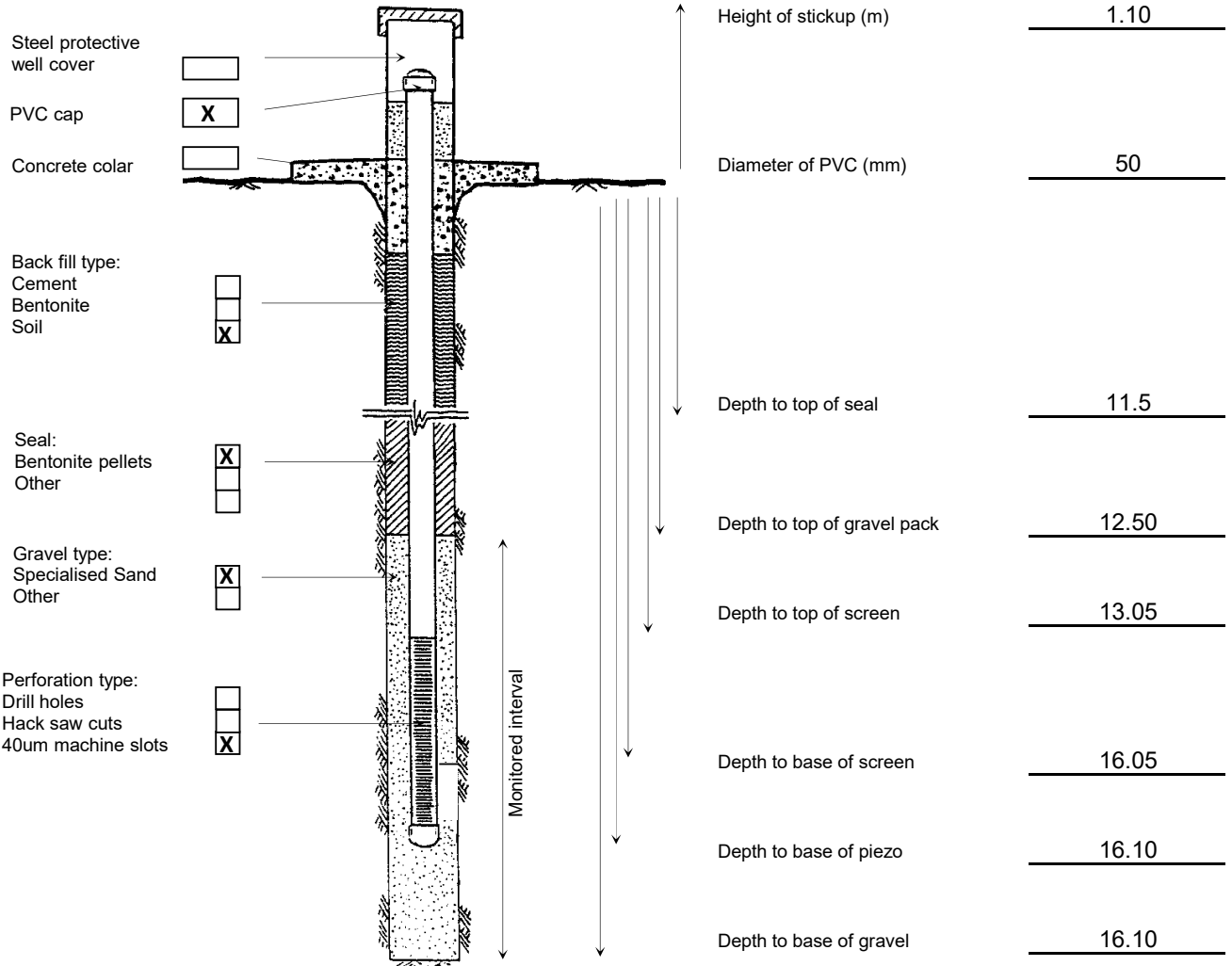
### PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH101  
PIEZOMETER: BH101  
COLLAR EASTING: 295195  
COLLAR NORTHING: 6254129  
COLLAR RL(m): 75.5  
DATUM: AHD

DRILLING CONTRACTOR: Stratacore  
RIG: Comacchio Geo 300  
DEPTH OF HOLE (m): 16.10  
BOREHOLE INCLINATION: -90  
PIEZO INSTALLATION DATE: 3/10/2025  
SUPERVISED BY: BTA

*Tick boxes*

*Complete dimensions if appropriate*



COMMENTS:

HOBO data logger installed on 3/10/2025 logging at 30 minute intervals.

Length of HOBO string is 17.0 m from top of PVC cap.



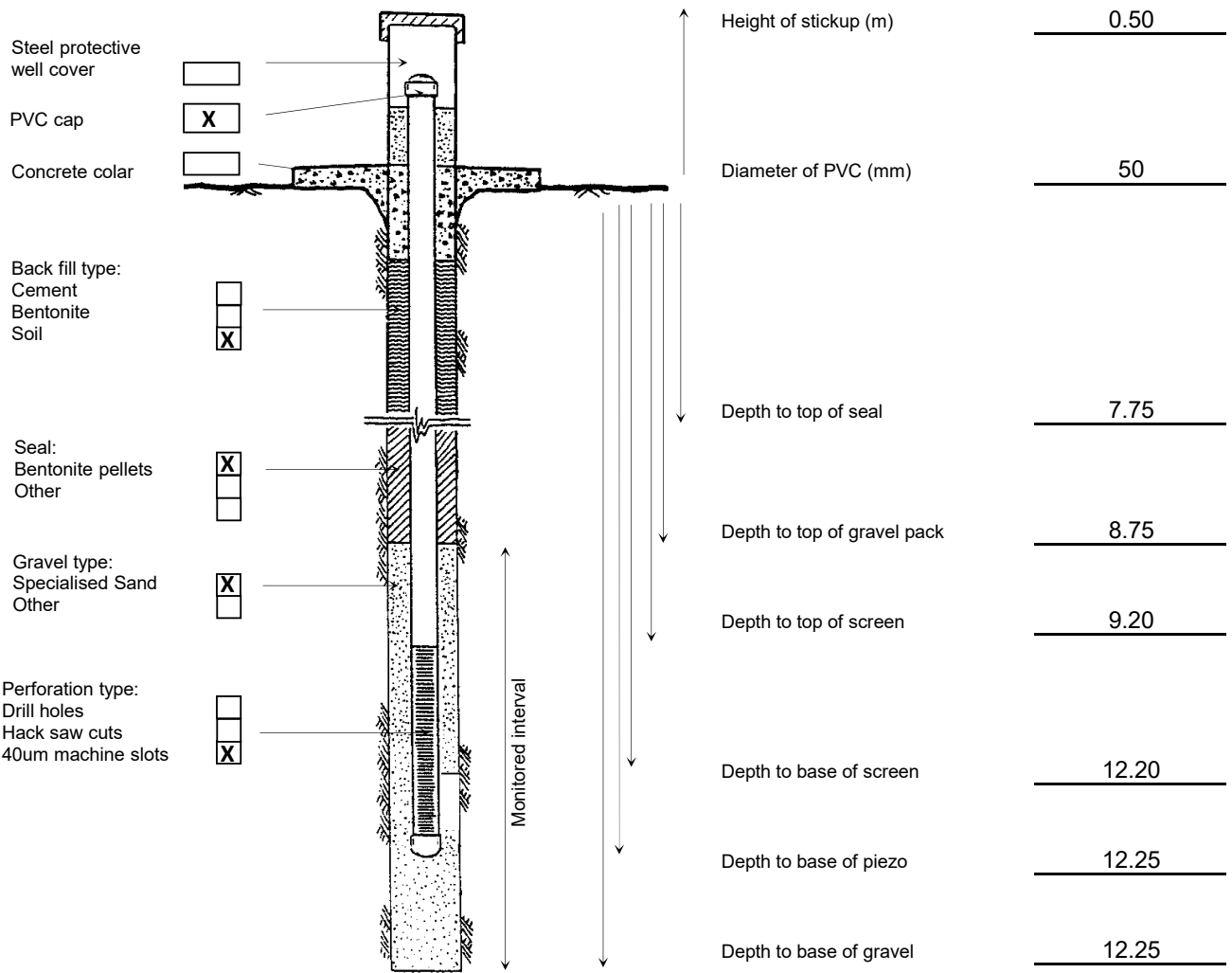
### PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH102  
PIEZOMETER: BH102  
COLLAR EASTING: 295404  
COLLAR NORTHING: 6253793  
COLLAR RL(m): 78.3  
DATUM: AHD

DRILLING CONTRACTOR: Stratacore  
RIG: Comacchio Geo 300  
DEPTH OF HOLE (m): 12.25  
BOREHOLE INCLINATION: -90  
PIEZO INSTALLATION DATE: 3/10/2025  
SUPERVISED BY: BTA

Tick boxes

Complete dimensions if appropriate



COMMENTS:

HOBO data logger installed on 3/10/2025 logging at 30 minute intervals.  
Length of HOBO string is 12.30 m from the top of PVC cap.

Empty lines for additional comments.

# Appendix E

## Cone Penetration Test Results



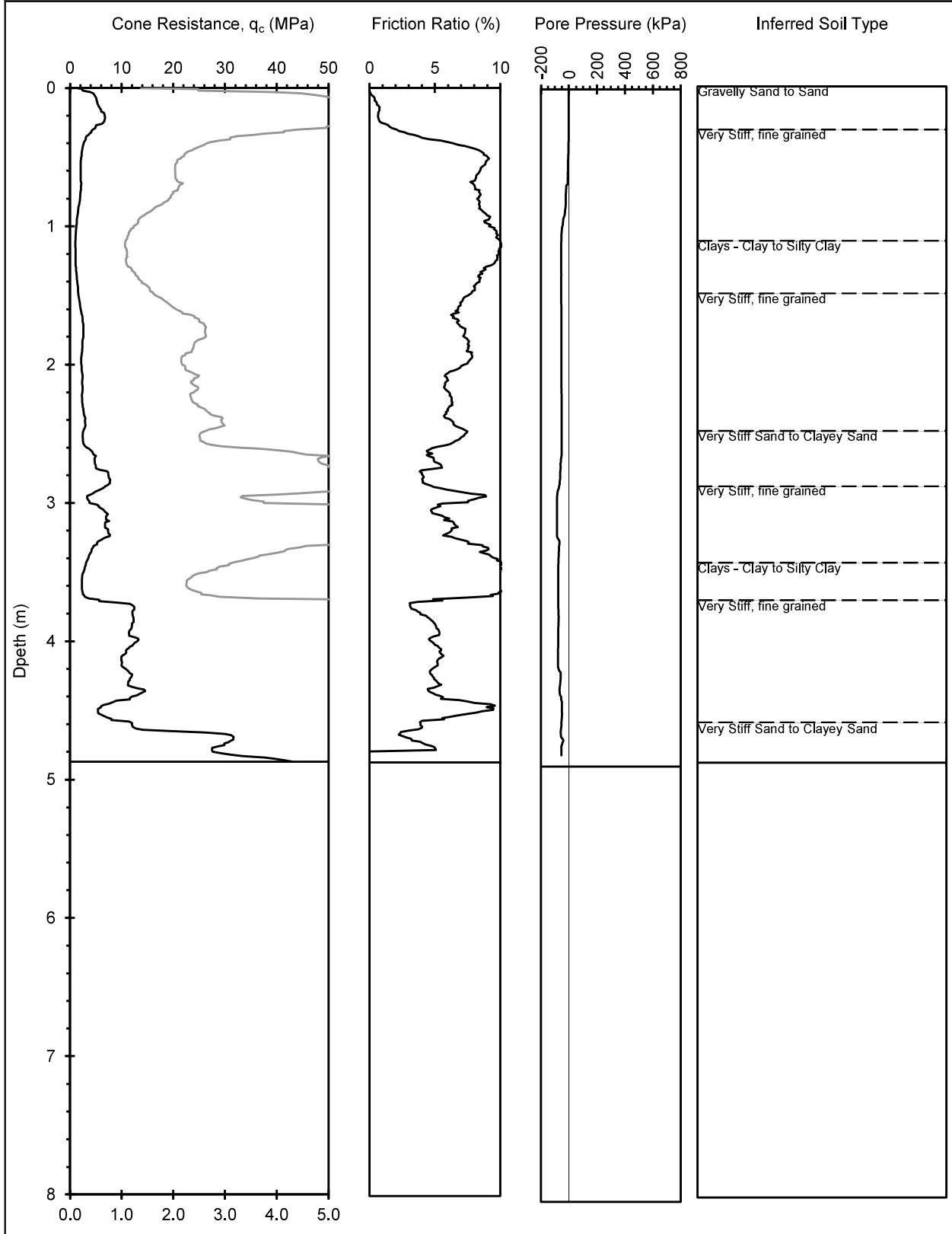


**CONE PENETRATION TEST - INFERRED SOIL TYPE**

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT01</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	294761 m E, 6254077 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	47.2 m	Field work	JK Drilling



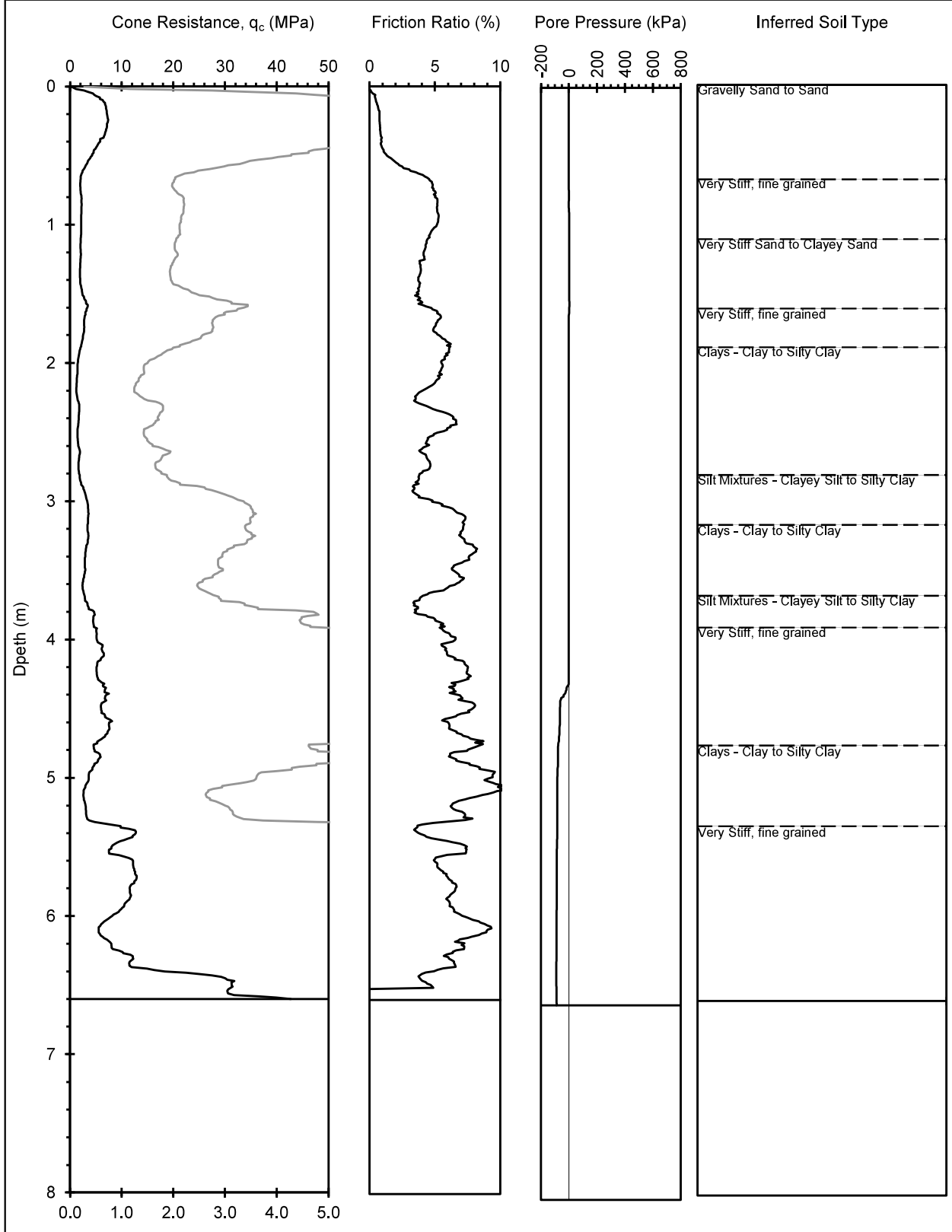


**CONE PENETRATION TEST - INFERRED SOIL TYPE**

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT02</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	294873 m E, 6253786 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	43.8 m	Field work	JK Drilling



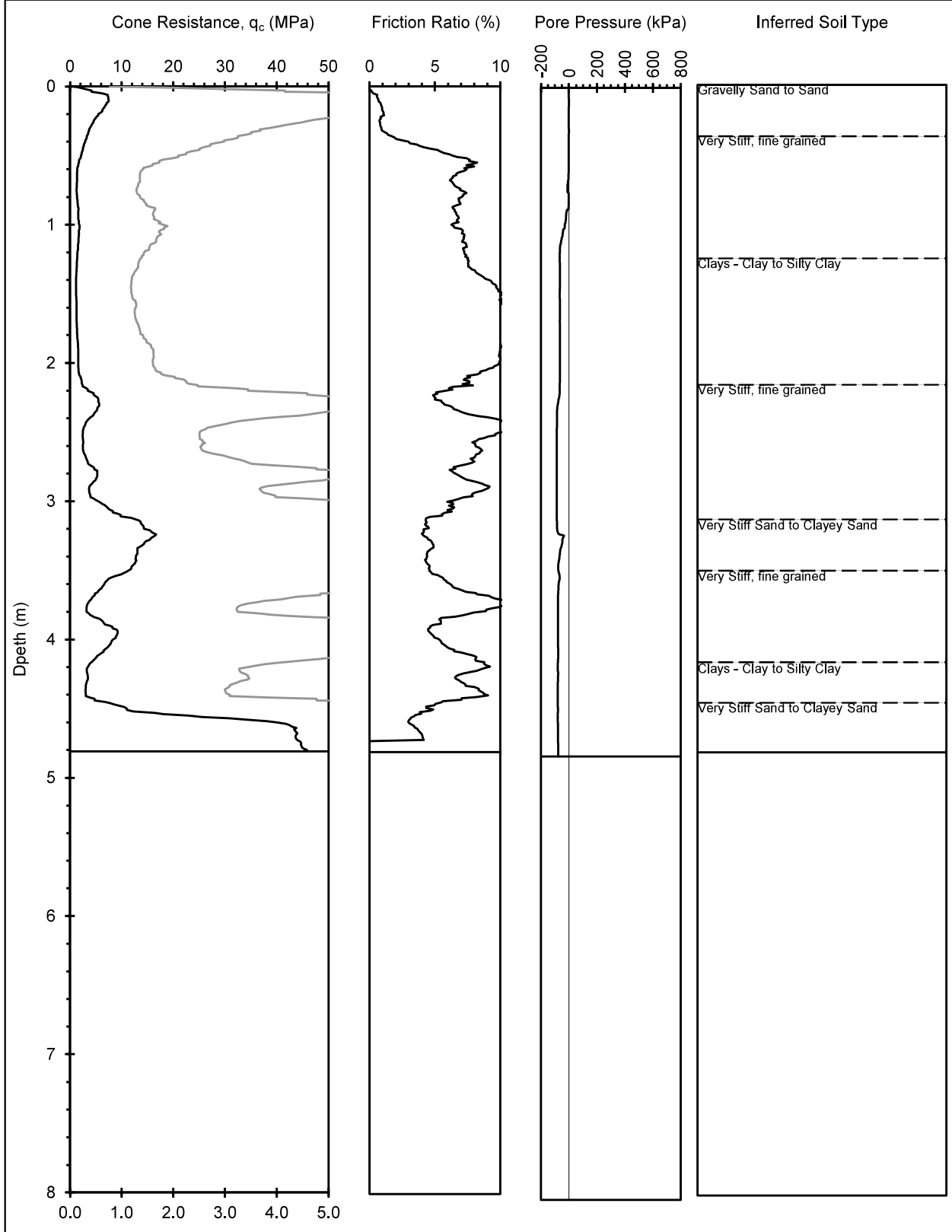


## CONE PENETRATION TEST - INFERRED SOIL TYPE

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT03</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	295093 m E, 6253872 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	51.7 m	Field work	JK Drilling



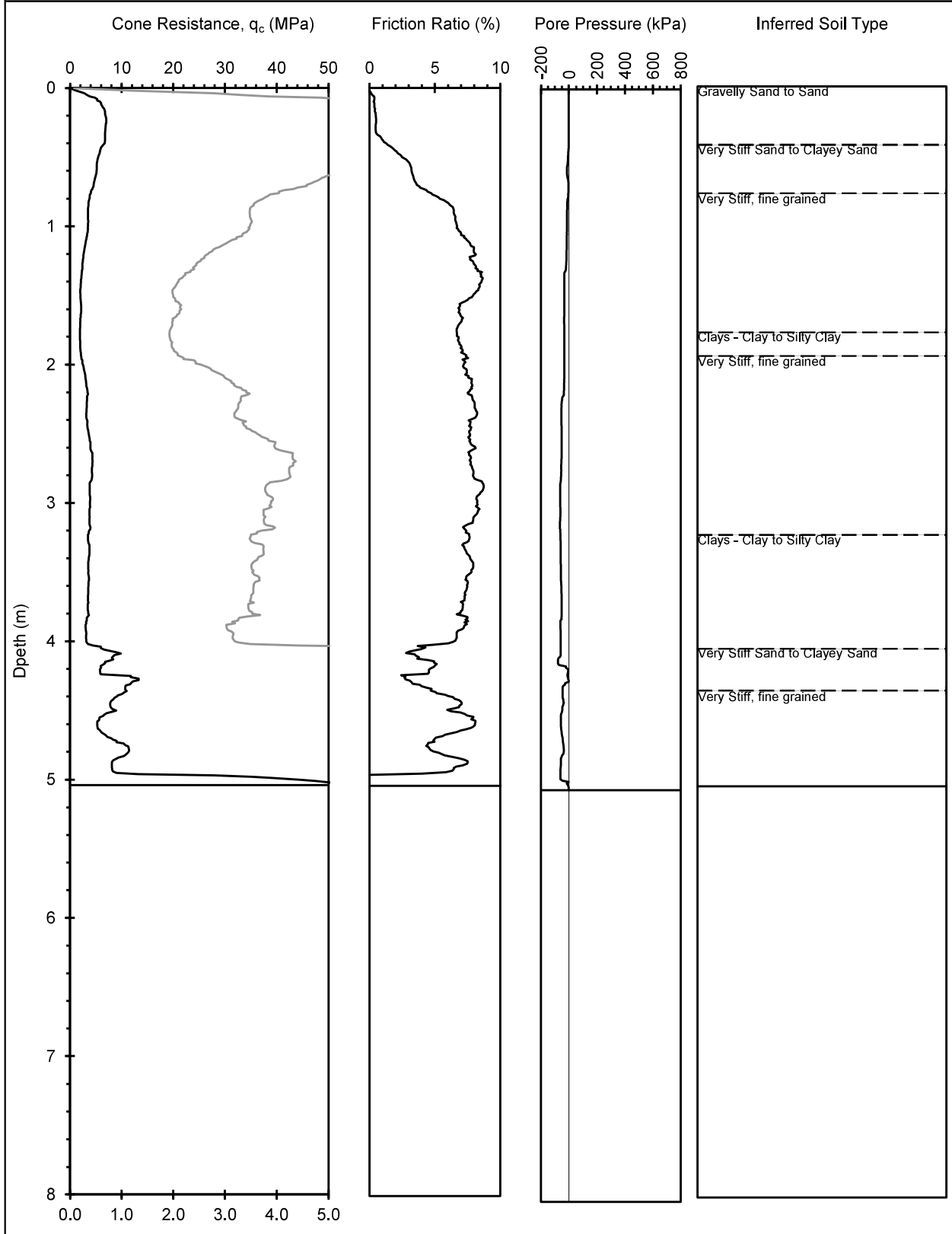


## CONE PENETRATION TEST - INFERRED SOIL TYPE

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT04</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	295507 m E, 6253781 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	67.6 m	Field work	JK Drilling



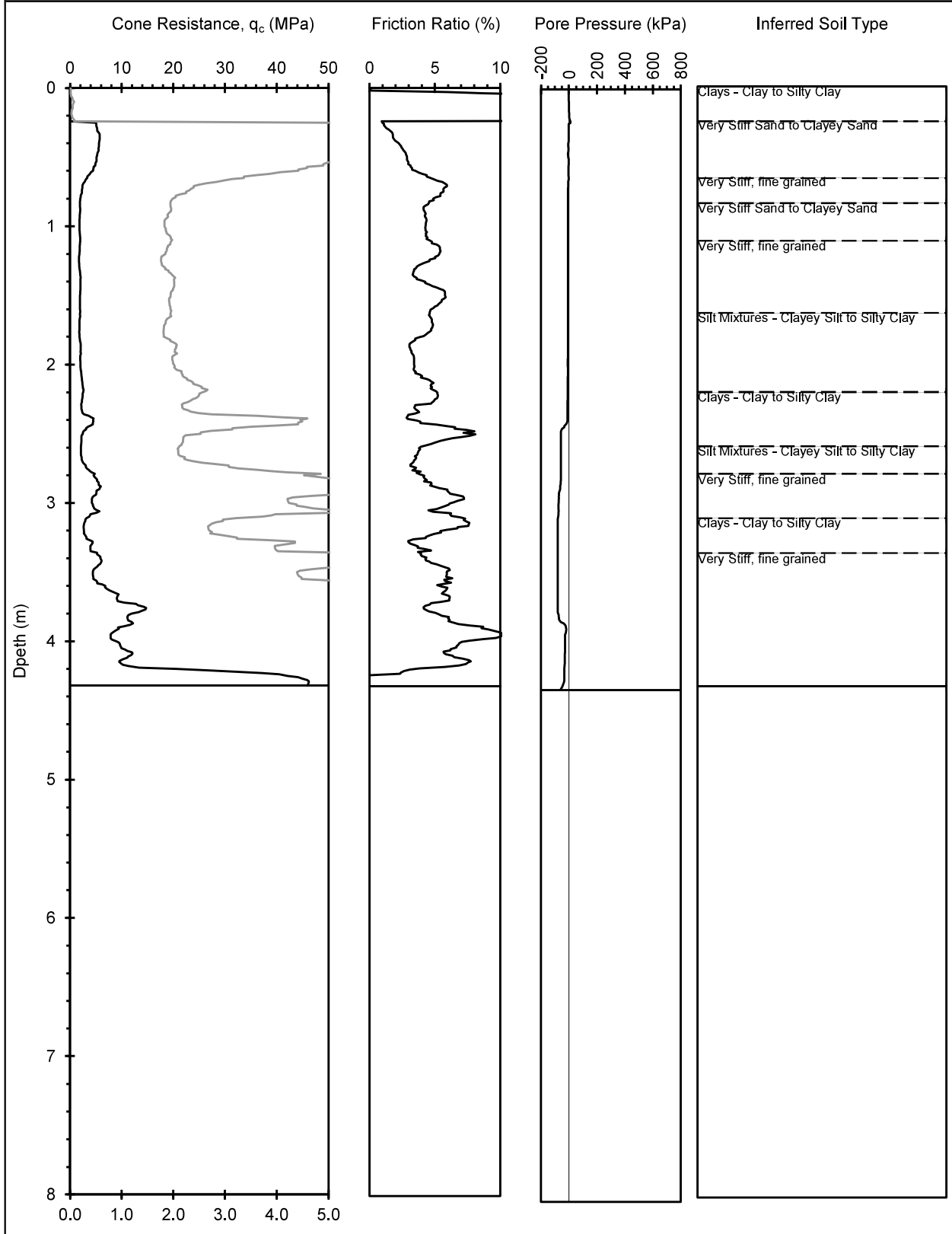


**CONE PENETRATION TEST - INFERRED SOIL TYPE**

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT05</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	295727 m E, 6254083 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	58.8 m	Field work	JK Drilling



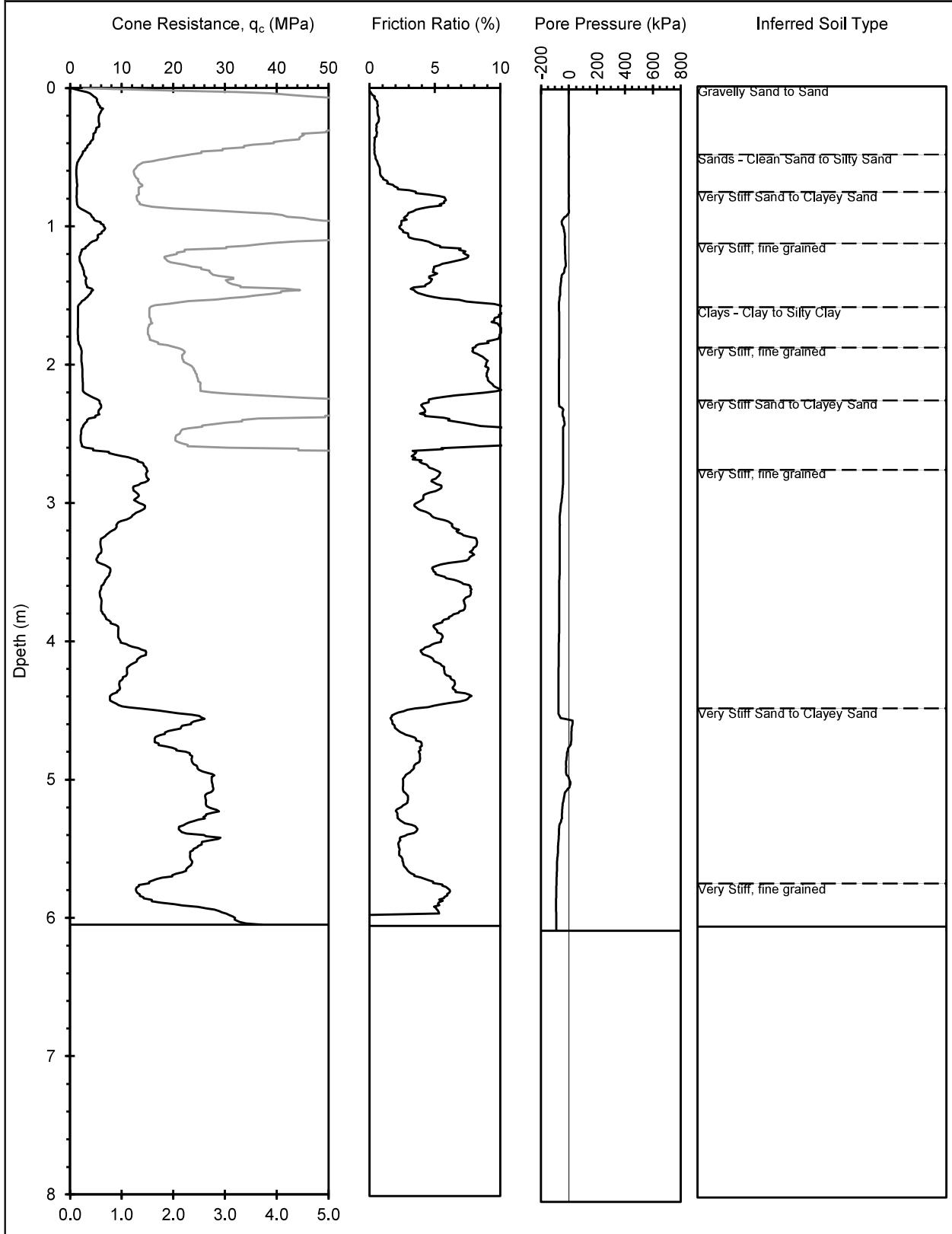


## CONE PENETRATION TEST - INFERRED SOIL TYPE

<b>Job No.</b>	<b>PSM4252</b>	<b>Test No.</b>	<b>CPT06</b>
----------------	----------------	-----------------	--------------

<b>Project</b>	<b>Mamre Road, Kemps Creek</b>	<b>Page</b>	<b>1 of 1</b>
----------------	--------------------------------	-------------	---------------

Pushing rig	24-tonne truck	Test date	22/10/2020
Location	295500 m E, 6254092 m N	Cone I.D.	S15CFIIP.S09162
Surface R.L.	57.7 m	Field work	JK Drilling



# Appendix F

## Laboratory Test Results



**FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT**

**Client:** Pells Sullivan Meynink  
**PSM Job No.:** PSM4252

**Ref No:** L4509E  
**Report:** 1  
**Report Date:** 3/11/2020  
**Page 1 of 1**

SAMPLE NUMBER	CBR01 AH04	CBR02 CH03	CBR03 AH03
DEPTH (m)	0.50 - 1.00	0.50 - 1.00	0.50 - 1.00
Surcharge (kg)	4.5	4.5	4.5
Maximum Dry Density (t/m <sup>3</sup> )	1.64 STD	1.63 STD	1.64 STD
Optimum Moisture Content (%)	20.5	22.1	21.1
Moulded Dry Density (t/m <sup>3</sup> )	1.61	1.59	1.61
Sample Density Ratio (%)	99	98	98
Sample Moisture Ratio (%)	99	102	99
Moisture Contents			
Insitu (%)	21.4	21.7	17.6
Moulded (%)	20.3	22.6	20.8
After soaking and			
After Test, Top 30mm(%)	32.0	38.4	40.3
Remaining Depth (%)	24.9	26.7	28.0
Material Retained on 19mm Sieve (%)	0	0	0
Swell (%)	2.5	3.5	5.5
<b>C.B.R. value:</b> @2.5mm penetration	2.5	2.0	1.5

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

- Refer to appropriate notes for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.



NATA Accredited Laboratory  
 Number:1327

Accredited for compliance with ISO/IEC 17025 - Testing.  
 This document shall not be reproduced except  
 in full without approval of the laboratory. Results relate only to  
 the items tested or sampled.

*[Signature]* 3/11/20  
 Authorized Signature / Date  
 (T. Pinnegan)



CERTIFICATE OF ANALYSIS

Work Order : ES2037509
Amendment : 1
Client : PELLIS SULLIVAN MEYNINK T/A PSM Admin PTY LTD
Contact : DANIEL TAN
Address : G3, 56 DELHI ROAD
NORTH RYDE NSW, AUSTRALIA 2113
Telephone : ----
Project : PSM4252
Order number : ----
C-O-C number : ----
Sampler : Daniel Tan
Site : ----
Quote number : EN/333
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 26-Oct-2020 13:30
Date Analysis Commenced : 29-Oct-2020
Issue Date : 06-Nov-2020 11:28



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

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

This Certificate of Analysis contains the following information:

- General Comments
Analytical Results

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

Signatories

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

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Ankit Joshi (Inorganic Chemist), Dian Dao (Senior Chemist - Inorganics), and Wisam Marassa (Inorganics Coordinator).



## 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  
∅ = 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.
- Amendment (06/11/2020): This report has been amended and re-released to allow the reporting of additional analytical data.
- 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<sup>+</sup> + Al<sup>3+</sup>).



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	CH01	CH02	CH03	AH06	AH04
Client sampling date / time				22-Oct-2020 00:00	22-Oct-2020 00:00	23-Oct-2020 00:00	23-Oct-2020 00:00	23-Oct-2020 00:00	
Compound	CAS Number	LOR	Unit	ES2037509-001	ES2037509-002	ES2037509-003	ES2037509-004	ES2037509-005	
				Result	Result	Result	Result	Result	
<b>EA002: pH 1:5 (Soils)</b>									
pH Value	----	0.1	pH Unit	8.4	8.9	7.7	5.8	5.1	
<b>EA010: Conductivity (1:5)</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	139	400	110	99	345	
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>									
Moisture Content	----	1.0	%	9.1	14.7	15.7	13.7	19.3	
<b>EA080: Resistivity</b>									
Resistivity at 25°C	----	1	ohm cm	7190	2500	9090	10100	2900	
<b>ED006: Exchangeable Cations on Alkaline Soils</b>									
Exchangeable Calcium	----	0.2	meq/100g	17.0	9.7	10.6	----	----	
Exchangeable Magnesium	----	0.2	meq/100g	3.2	8.0	8.1	----	----	
Exchangeable Potassium	----	0.2	meq/100g	<0.2	<0.2	<0.2	----	----	
Exchangeable Sodium	----	0.2	meq/100g	0.6	3.7	2.6	----	----	
Cation Exchange Capacity	----	0.2	meq/100g	20.9	21.3	21.4	----	----	
Exchangeable Sodium Percent	----	0.2	%	3.1	17.2	12.2	----	----	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	3.7	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	7.4	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	0.2	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	1.9	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	15.6	----	
Exchangeable Sodium Percent	----	0.1	%	----	----	----	14.2	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	0.7	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	9.1	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	0.2	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	2.3	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	12.4	
Exchangeable Sodium Percent	----	0.1	%	----	----	----	----	18.8	
<b>ED040S : Soluble Sulfate by ICPAES</b>									
Sulfate as SO4 2-	14808-79-8	10	mg/kg	10	90	10	90	190	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	10	mg/kg	<10	280	120	50	390	

Page : 4 of 4  
 Work Order : ES2037509 Amendment 1  
 Client : PELLIS SULLIVAN MEYNINK T/A PSM Admin PTY LTD  
 Project : PSM4252



### Analytical Results

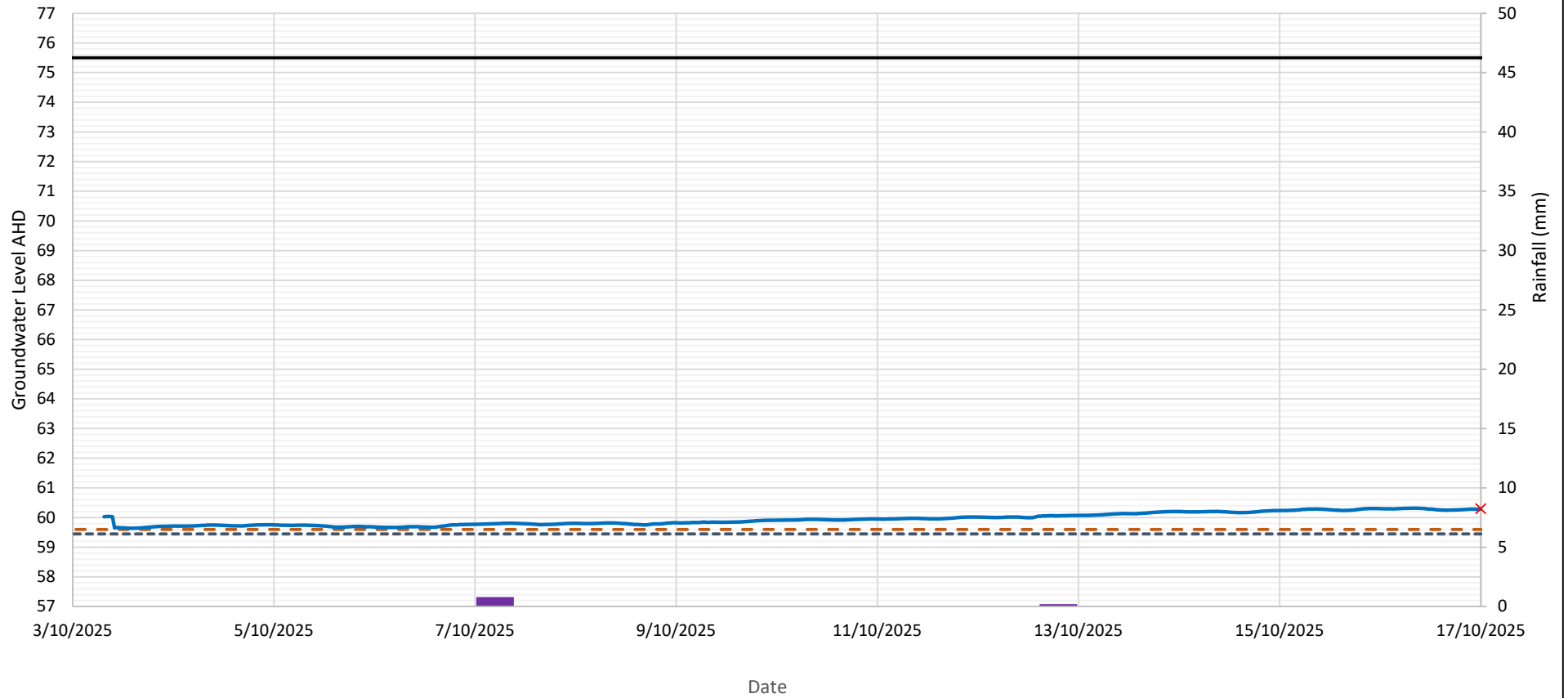
Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID			AH02	----	----	----	----
		Client sampling date / time			23-Oct-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2037509-006	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
<b>EA002: pH 1:5 (Soils)</b>									
pH Value	----	0.1	pH Unit	6.5	----	----	----	----	----
<b>EA010: Conductivity (1:5)</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	78	----	----	----	----	----
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>									
Moisture Content	----	1.0	%	16.1	----	----	----	----	----
<b>EA080: Resistivity</b>									
Resistivity at 25°C	----	1	ohm cm	12800	----	----	----	----	----
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	<0.1	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	<0.1	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----	----
<b>ED040S : Soluble Sulfate by ICPAES</b>									
Sulfate as SO4 2-	14808-79-8	10	mg/kg	10	----	----	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	10	mg/kg	90	----	----	----	----	----

# Appendix G

## Groundwater Monitoring Results



### Groundwater Level in BH101



**Notes:**

1. Ground Surface Elevation (m AHD) 75.5
2. Instrument Elevation (m AHD) 59.6
3. Data Logger Instrument Installed on 3/10/2025
4. Bottom of Seal (m AHD) 63.0
5. Bottom of Screen (m AHD) 59.5
6. Rainfall data from BOM station 67108, downloaded 17/10/2025

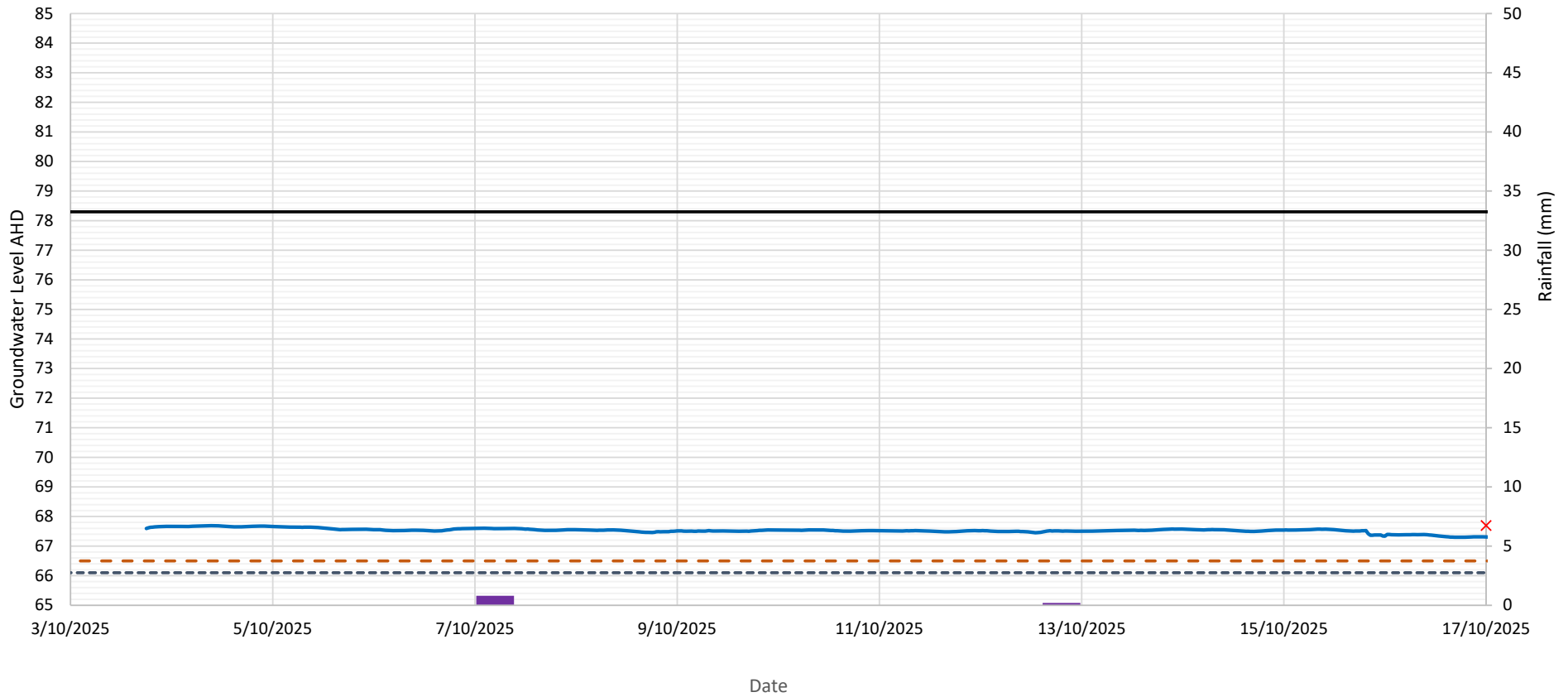
- Rainfall
- GW Level
- Ground Surface
- Instrument Level
- Bottom of Screen
- Manual Water Reading



**Aurecon**  
**Geotechnical Investigation**  
**706-752 Mamre Road, Kemps Creek**  
**GROUNDWATER MONITORING RESULTS**  
**BH101**

<b>PSM5872-005R</b>	<b>Appendix G</b>
---------------------	-------------------

### Groundwater Level in BH102



**Notes:**

1. Ground Surface Elevation (m AHD) **78.3**
2. Instrument Elevation (m AHD) **66.5** +0.2 m adjustment
3. Data Logger Instrument Installed on 3/10/2025
4. Bottom of Seal (m AHD) **69.6**
5. Bottom of Screen (m AHD) **66.1**
6. Rainfall data from BOM station 67108, downloaded 17/10/2025

- Rainfall
- GW Level
- Ground Surface
- Instrument Level
- Bottom of Screen
- Manual Water Reading



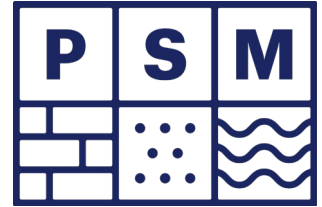
**Aurecon**  
**Geotechnical Investigation**  
**706-752 Mamre Road, Kemps Creek**  
**GROUNDWATER MONITORING RESULTS**  
**BH102**

<b>PSM5872-005R</b>	<b>Appendix G</b>
---------------------	-------------------

# **Appendix H**

## **Interim Geotechnical Design Advice (ref: PSM5872-006L)**





Our Ref: PSM5872-006L REV1

21 November 2025

Technical Director  
Aurecon Australasia Pty Ltd  
Level 11  
73 Miller Street  
North Sydney 2060  
Juan.Lewis@aurecongroup.com

G3 56 Delhi Road  
North Ryde NSW 2113

P +61-2 9812 5000  
E mailbox@psm.com.au

[www.psm.com.au](http://www.psm.com.au)

Attention: Juan Lewis

Dear Juan

**RE: MAMRE ROAD DATA CENTRE CAMPUS (706-752 MAMRE ROAD, KEMPS CREEK)  
INTERIM GEOTECHNICAL DESIGN ADVICE**

## 1. Introduction

This letter presents the interim geotechnical design advice (IGDA) for the proposed data centre development at 706-752 Mamre Road, Kemps Creek NSW (the Site).

The IGDA in this letter has been prepared on the following basis:

- The site is proposed for development under a State Significant Development Application (SSDA) as a data centre campus comprising:
  - Approximately 26 shells across four-storeys data centre buildings (4x four shells and 2x five shells), including six technical office buildings, plus a campus office.
  - Incoming and internal electrical substations and associated infrastructure
  - Site preparation, including earthworks, stormwater, sewer, roads, and associated infrastructure.
- The subsurface conditions encountered are as logged and inferred from the site investigations (ref: PSM5872-005R REV1, dated 21 November 2025)
- The proposed earthworks are completed in accordance with the Bulk Earthworks Specification (ref: PSM5872-007S REV1, dated 21 November 2025).

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

Figure 1 presents the site locality plan.

## 2. Bulk Earthworks

We have been provided with the following documents with regards to the proposed bulk earthworks:

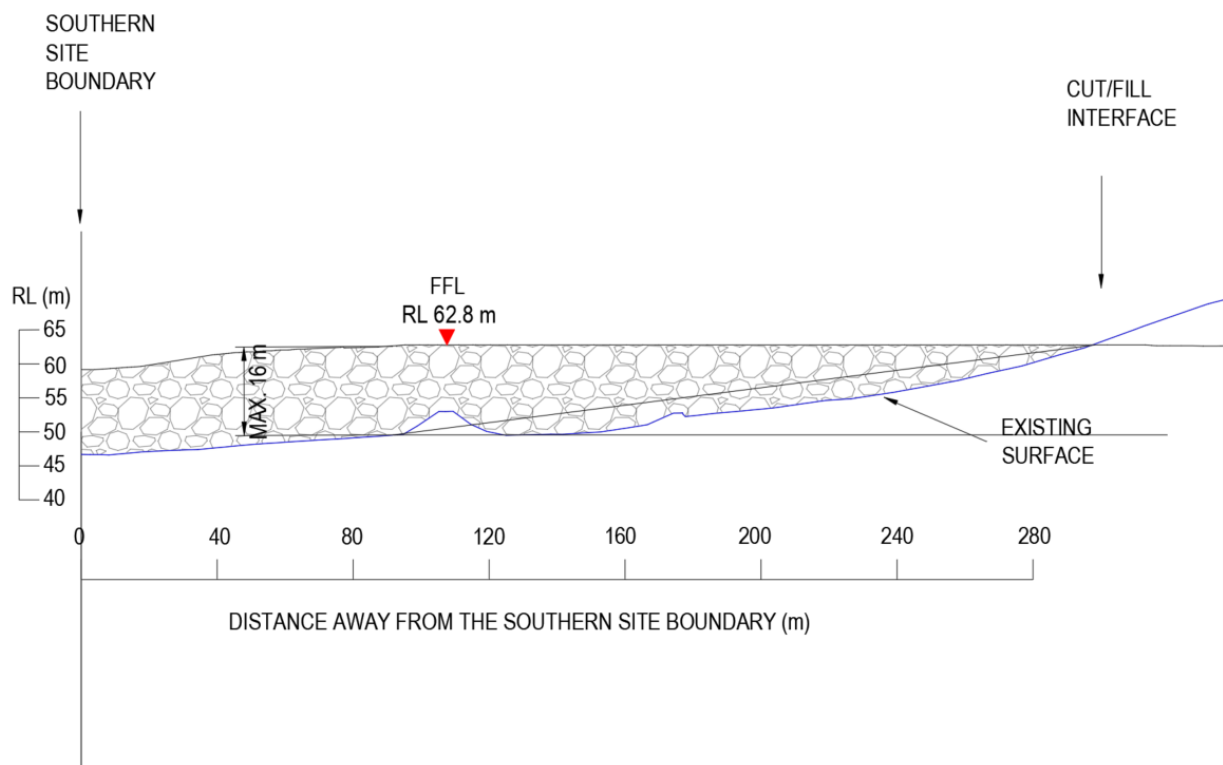
- Masterplan by Greenbox Architecture(ref: SSDA-A-0100 dated 7 November 2025)
- Bulk earthworks cut-fill plan by AT&L (ref: SYD4-SITE-DRG-ATL-CIV-02031 dated 10 November 2025).

Based on the provided drawings, we understand the following bulk earthworks details:

- Max cut depth: 21.0 m
- Max fill depth: 16.0 m
- The bulk earthworks level ranges between RL 51 m and 67 m.

We understand the gradient of the existing landform is relatively low, e.g. approx. 6H to 20H:1V. Some retention structures (i.e. up to 12 m high) are to be developed along the southern boundary to the adjacent site.

Inset 1 presents the sketch of cross section outlining the variation in ENGINEERED FILL thickness in relation to the Site. The section location is presented in Figure 1.



**Inset 1: Typical north-south section across the deep fill area of the Site showing the maximum thickness of ENGINEERED FILL to be placed during the proposed earthworks**

The design intent is for the bulk earthworks on site to be completed in accordance with the PSM Specification PSM5872-007S (the Specification). The Specification sets out clearly the roles and responsibilities of the earthworks contractor and its Geotechnical Inspection and Testing Authority (GITA). The Specification will only be varied with the consent of PSM to ensure that this interim design advice is able to be confirmed at the completion of the earthworks.

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

We have based our assessment of moduli on numerous plate load tests (PLTs) completed on VENM/ENM fills by PSM. Fill placed in accordance with such a specification is referred to herein as ENGINEERED FILL. It is our opinion that the majority of the cut material would be suitable for reuse on the site as ENGINEERED FILL without the requirement for crushing. The criteria for and selection of acceptable material is set out in Clause 3.3 of The Specification.

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

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

### 3. Interim Geotechnical Design Advice

#### 3.1 General

The design of the data storage centre should consider the following factors:

- Fill settlement
- Load induced settlement (slab loads, surcharges, etc.)
- Characteristic surface movement due to moisture changes.

#### 3.2 Fill Settlement (Deep Fill)

The following advice regarding settlements that may be experienced by the structures founded on the deep fill area (more than 10 m deep) as initial advice. We recommend that once details of the design are advanced further specific advice be sought. This advice is additional to the advice provided in previous sections.

The civil and structural designers need to consider the settlements due to the fill depths in their design. Three settlement mechanisms are addressed in this letter.

##### 3.2.1 Immediate Settlement during Filling

This refers to the ‘immediate’ settlement experienced during the filling.

The controlling factors to this settlement are:

- The thickness of fill
- The stiffness (or Young’s Modulus).

We have estimated the during construction settlement at an 16 m deep ENGINEERED FILL area and its various components. The calculation considers 16 m of ENGINEERED FILL, see Inset 1. The estimated “immediate” settlement during filling is up to 170 mm. Depending on the rate of fill construction, the majority of this settlement is expected to occur during filling, with at most 30% of the immediate settlement occurring within 6 months after the completion of filling; i.e. that is settlement of up to 50 mm can be expected to occur between completion of filling and 6 months after the earthworks are completed.

**Table 1 – “Immediate Settlement During Filling” Predictions**

Fill Thickness (m)	Estimated “Immediate Settlement” (mm)	30% of Remaining Immediate Settlement to occur after the pad reaches BEL (mm)	Expected “Immediate” Settlement to complete after the pad reaches BEL
10	65	20	Up to 3 months
13	115	34	Up to 3 months
16	170	50	3 – 6 months

On this basis, we advise the following:

- OPTION 1 - Design of the structures within this fill pad will need to allow for the remaining immediate settlement of the fill

Or

- OPTION 2 - Construction within the pad be delayed until the immediate settlement is completed.

We expect this to be completed between 3 and 6 months.

Surface settlement monitoring (eg. survey points) shall be installed at the completed surface to monitor the settlement of the pad for at least 3 months and up to six months to confirm that the immediate settlement is complete prior to construction of the slab. The surface settlement shall be monitored at lines across the pad with points installed at 20 m spacing.

If this option (i.e. delaying the construction) is adopted, then the design of the structures would not need to account for this immediate settlement.

### 3.2.2 Post Construction Long term Settlement Predictions

This refers to the settlement that occurs from the end of the immediate settlement is often referred to as creep settlement. The characteristic of this settlement is that it slows down with time with the settlement between six months (0.5 year) and five years, being the same as the settlement between five years and 50 years.

The controlling factors to this creep settlement are:

- The thickness of fill
- The creep coefficient, which is in turn a function of thickness of the fill and the fill material. We have adopted a creep coefficient linearly increasing with fill thickness up to 0.3%/log cycles of time at 16 m thickness
- The timing of construction of the slab.

We have estimated the post construction settlement a slab constructed on a of a 10 m, and 16 m deep fill 6 months after completion of the earthworks from construction (6 months) to 50 years after construction (typical building design life), i.e. 2 log cycles of time and its various components. These are presented in Table 4.

The estimated creep settlement (over 50 years) is up to 168 mm.

**Table 2 - Creep Settlement**

Fill Thickness (m)	Estimated Creep settlement from 6 months to 50 years – 2 log cycle of time (mm)
10	38
13	63
16	96

On this basis, we advise the following:

- The design of the structures within this fill pad will need to allow for the above predicted post construction settlement (i.e. creep settlement)
- The designer (Civil and Structural) shall also consider the differential settlement resulting from the creep. Given that the existing natural landform is relatively flat, it is unlikely to be an issue. Based on the above and an original ground surface sloping at 15H:1V (see Inset 1) we would expect the differential settlements (tilts) to be in the range of 1:1000.

Should the post construction settlement be an issue for the proposed development, further geotechnical advice should be sought. Alternatives such as suspended slab system (for critical structures) or the use of crushed sandstone fill at the bottom of the fill to reduce the creep settlement at depth could be considered.

The magnitude of creep settlement will decrease with a delay between end of filling and start of construction. The above estimates allow for a 6 month delay. Should this time be less (say 3 months) the creep settlements

may be up to 25% greater. Similarly a larger delay in construction results in smaller creep settlements being experienced by the structure.

### 3.2.3 Inundation/Collapse Settlement

At high stresses, wetting up of loosely placed fill can result in inundation/collapse settlements. The literature and our experience indicate that provided the fill is compacted to at least 98% SMDD the magnitude of collapse settlements is negligible.

It thus becomes critical that the material is placed in layers no thicker than 300 mm and compacted to above 98% SMDD throughout the layer. We have varied the requirements in the Specification in this area to increase the control of layer thickness and the degree of compaction of the fill in each layer.

### 3.3 Site Classification

While the proposed development (i.e. data centre campus) is out of scope of AS2870-2011 "Residential slabs and footings", we assess that for natural clay soil placed in accordance with the 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 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 400.

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.

### 3.4 Earthquake Site Classification

Earthquake loading and site classification is to be determined by the structural engineering designer in accordance with AS1170.4-2007. Based on the expected ground conditions following proposed bulk earthworks:

- Areas where the bedrock is within the upper 3.0 m of the bulk earthworks level, the sub-soil classification will be Class B<sub>e</sub> (rock)
- Areas where the bedrock is below 3.0 m of the bulk earthworks level, the sub-soil classification will be Class C<sub>e</sub>(shallow soil).

The Hazard Factor (Z) depends on the geographic location of the Site. The Hazard Factor for Sydney is 0.09 and is taken from Figure 3.2(A) of AS1170.4-2007.

### 3.5 Foundations

#### 3.5.1 Pad Footings

Pad footings can be proportioned based on an allowable bearing pressure (ABP) for centric vertical loads provided in Table 3. Higher ABPs in soil units may be available, but these depend on the size, depth, loads, etc., and would be subject to specific advice. The ABP needs to be confirmed by a geotechnical engineer during an inspection.

Settlements in soil units can be estimated using the elastic parameters provided in Table 6. We note that allowable bearing pressures presented in assume a settlement of approximately 1% (or less) of the least footing dimension for footings in the BEDROCK units.

**Table 3 – Engineering Parameters of Inferred Geotechnical Units**

Inferred Unit	Bulk Unit Weight (kN/m <sup>3</sup> )	Soil Effective Strength Parameters		Ultimate Bearing Pressure Under Vertical Centric Loading (kPa)	Allowable Bearing Pressure Under Vertical Centric Loading (kPa)	Ultimate Shaft Adhesion (kPa)	Elastic Parameters	
		c' (kPa)	φ' (deg)				Young's Modulus (MPa)	Poisson's Ratio
ENGINEERED FILL, NATURAL SOIL	18	0	30	420 <sup>(1)</sup>	150 <sup>(1)</sup>	N/A	10	0.3
BEDROCK A	22	N/A	N/A	3,000 <sup>(2)</sup>	700 <sup>(3)</sup>	50	100	0.25
BEDROCK B	24	N/A	N/A	6,000 <sup>(2)</sup>	1,500 <sup>(3)</sup>	350	350	0.25
BEDROCK C	24	N/A	N/A	30,000 <sup>(2)</sup>	6,000 <sup>(3)</sup>	600	1200	0.2

Note:

- (1) Pad footings in soil unit should have a minimum horizontal dimension of 1.0 m and a minimum embedment depth of 0.5 m.
- (2) Ultimate bearing pressure for bedrock assumes a settlement of approximately 5% of the least footing dimension for footings in rock.
- (3) Allowable bearing pressure assumes a settlement of approximately 1% of the least footing dimension for footings in rock.

### 3.5.2 Piled Foundations

Piled foundation should be founded within the BEDROCK units.

Piles should be designed in accordance with the requirements in AS 2159 (2009), *Piling – Design and Installation*. The parameters provided in Table 3 may be adopted in the design of piles founded in the BEDROCK unit.

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

- The ABP needs to be confirmed by a geotechnical engineer during a pile inspection
- Under permanent load, the contribution of side adhesion for soils including soil units should be ignored
- Pile settlement needs to be checked using the recommended elastic parameters in Table 3.

The bearing capacities provided are contingent on piles or footings being vertically and centrally loaded. Further advice should be sought if the footings are not vertically centrally loaded. Should higher bearing capacities be required in Table 3 further advice should be sought from PSM.

With regards to the pile design, we recommend that:

- A geotechnical strength reduction factor,  $\Phi_g = 0.60$  (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 designers in accord with the requirements of AS 2159
- 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)).

Foundation conditions at the proposed pile locations should be inspected by a suitably qualified geotechnical engineer prior to pouring concrete to confirm this advice.

### 3.5.3 Slab on Ground

In general, we advise the slab on ground design can be based Young's moduli in Table 3. We note that the environmental effects (e.g. drying or wetting up of the finished surface) affecting the land prior to the development should be considered by the various designers of any development.

The Designers should also consider the fill settlements in deep fill area (See Section 3.2).

We note that the final bulk earthworks subgrade will require proof rolling and plate load testing to confirm the properties provided and may require some boxing out and refilling, etc. Plate load testing during the filling will be required where blended topsoil has been used.

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

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

### 3.6 Pavements

A total of three (3) CBR tests were undertaken. The test results indicate a soaked CBR value of between 1.5% and 2.5%.

Based on our experience with typical clay VENM in western Sydney, the soaked CBR value could be as low as 1%. We advise that a CBR of 2% can be adopted for subgrade and FILL formed in bulk earthworks constructed in accordance with the Specification.

Higher values may be provided on completion of testing on the finished bulk earthworks or if, on request, the Specification is varied to obtain such higher values on ENGINEERED FILL.

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

### 3.7 Permanent and Temporary Batters

The batter slope angles in Table 4 are recommended for the design of batters up to a nominal 3 m height, 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. This could include the requirement for soil nails or rock bolts. The length and spacing of soil nails and rock bolts are a matter of design.

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

Proper and suitable safe work method statements and OHS documents need to be developed for works to be undertaken in the vicinity of the crest and toe of batters.

**Table 4 – Batter Slope Angles**

Unit	Temporary	Permanent
ENGINEERED FILL	1.5H : 1V	2.0H : 1V
NATURAL SOIL	1.5H : 1V	2.0H : 1V
BEDROCK A	1H : 1V*	1.5H : 1V*
BEDROCK B and C	0.5H : 1V (subject to local support)	1H : 1V (subject to design)

Note:

\* See above requirements regarding inspections and local support.

### 3.8 Retention Systems

Permanent cuts in the NATURAL SOIL and BEDROCK unit's steeper than the recommended permanent batter slopes in Table 4 will need to be supported by some form of retaining structure.

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

- Effective soil strength parameters in Table 3
- Water pressure (depending on the type of the structure)
- With regards to the BEDROCK units, the designer shall allow a minimum lateral pressure of 10 kPa for the BEDROCK units when cut vertical. This is to allow for blocks and rock wedges formed due to adverse defects that may exist within the unit. These loads may be able to be reduced by specifying inspections during the works and provision of additional support (rock bolts, shotcrete etc.) should the inspection indicate that support is required. In any case excavation in BEDROCK units will need to be inspected during the works to confirm/dismiss the presence of defects/structure in the unit that may result in higher loads than anticipated in this design. The designer of the wall should consider including inspection requirements in their design at no more than 2 m intervals in the excavation.

Note that design of retention systems may be based on either  $K_a$  or  $K_p$  earth pressures. Design using active earth pressures provides the minimum lateral earth pressure that must be supported to avoid failure and requires 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.

**Yours Sincerely**



**BRENDAN TA**  
**GEOTECHNICAL ENGINEER**



**AGUSTRIA SALIM**  
**PRINCIPAL**

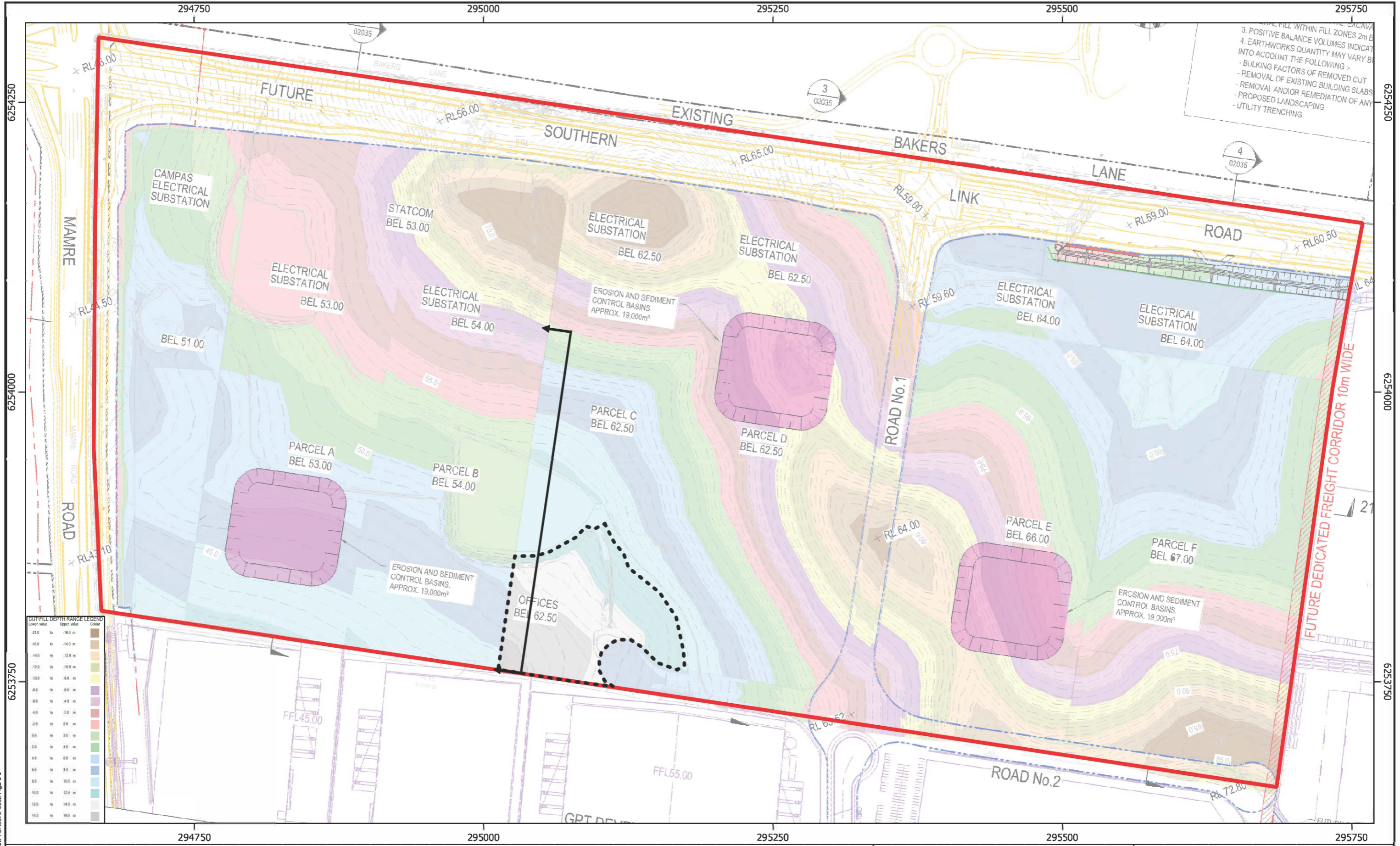


**JUNO LIANG**  
**ASSOCIATE GEOTECHNICAL ENGINEER**

Encl.

Figure 1

Site Locality Plan



**Legend**

- Site Boundary
- Section Line
- Area comprising deep FILL (>10m)

**Notes:**  
 1. Bulk earthworks cut-fill plan by AT&L (ref. SYD4-SITE-DRG-ATL-CIV-02031, dated 10 November 2025).  
 2. Indicative Section Line for Inset 1.

Scale 1:3,000

0 20 40 60 80 100 m

EPSG:7856  
GDA2020 / MGA zone 56

PSM	Created By:	PSM	Revision:	A
	Date:	20 Oct 2025	Paper Size:	A3

Aurecon  
 706-752 Mamre Road, Kemps Creek  
 Interim Geotechnical Design Advice

**SITE LOCALITY PLAN**

PSM5872-006L      Figure 1

M:\PSM5872\Eng\GIS\PSM5872-006L\Figure 1

# Appendix I

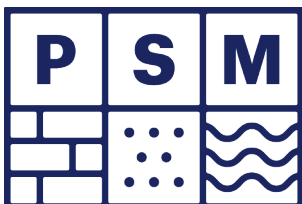
## Bulk Earthworks Specification (ref: PSM5872-007S)



# Mamre Road Data Centre Campus (706-752 Mamre Road Kemps Creek NSW) PSM Bulk Earthwork Specification

PSM5872-007S REV1      21 November 2025

**Aurecon Australasia Pty Ltd**



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# 1. Scope

This specification details the requirements for the bulk earthworks to be undertaken at 706-752 Mamre Road, Kemps Creek NSW (the Site).

The site is proposed for development under a State Significant Development Application (SSDA) as a data centre campus comprising:

- Approximately 26 shells across four-storeys data centre buildings (4x four shells and 2x five shells), including six technical office buildings, plus a campus office
- Incoming and internal electrical substations and associated infrastructure
- Site preparation, including earthworks, stormwater, sewer, roads, and associated infrastructure.

The area where this specification is applicable is shown in Figure 1. This includes areas where material is filled or cut to bulk earthworks level (BEL) within the site.

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

This specification does not address any environmental, contamination or erosion issues or additional regulatory/approval requirements (e.g. Council Consent Conditions) associated with the earthworks.

# 2. Site Preparation Works

The following tasks shall be undertaken as part of the Site Preparation Works:

1. To prepare the site for the earthworks:
  - a. Removal of stockpiles and mounds.
  - b. Clearing of the area including removal and disposal of all trees, stumps, roots, bush, other organic material, all vegetation both living and dead, all minor man-made structures (e.g. fences) and all rubbish.
  - c. Grubbing operations shall be carried out to a minimum depth of 0.5 m below the surface, where grubbing is required.
  - d. Stripping of topsoil.
  - e. Demolition of structures as directed by the Principal. Extent of demolition works are not addressed by this Specification.
  - f. Decommissioning the services from the pre-existing infrastructure. This is to include backfilling any voids such that they do not collapse or undergo excessive settlement under the weight of the filling and building loads. Backfilling is to be undertaken with one of the following materials:
    - i. Cement stabilised sand (min. 3% cement) placed in accordance with the supplier requirements or
    - ii. Mass concrete or grout as approved by PSM.
    - iii. Engineered fill placed in accordance with Clauses 3.5 and 3.6 of the Specification.

Where any excavation is required to complete the above tasks, the surface exposed at completion of the excavation shall be treated in accordance with the Subgrade Preparation requirements in Clause 3.1.

## 3. Filling Works

### 3.1 Subgrade Preparation

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

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

1. Bedrock.
2. Natural insitu material of at least stiff consistency.
3. Engineered compacted fill placed in accordance with this or other approved specifications for which the Geotechnical Inspection and Testing Authority (GITA) has a Level 1 certificate certifying compliance with that approved specification AND of at least stiff consistency.
4. Existing fill / pavement and 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 Hilf Density Ratio (Standard Compaction) of between 98% and 102%. Any such layer shall be a Lot under Clause 6.3.

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 3.5 and 3.6 of this specification.

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

### 3.2 Base Geometry

The slope of any buried batter shall be less (flatter) 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.

### 3.3 Material

#### 3.3.1 Imported Fill

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

1. "Virgin excavated natural material" (VENM) as defined by the Protection of the Environment Operations Act 1997 No 156, Schedule 1, on Page 209:  
*"Virgin excavated natural material (eg clay, gravel, sand, soil and rock) that is not mixed with any other waste and that:*
  - i. 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
  - ii. Consists of excavated natural materials that meet such criteria as may be approved by the EPA".
2. "Excavated natural material" (ENM) as defined under Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014:  
*"Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:*
  - i. *been excavated from the ground, and*
  - ii. *contains at least 98% (by weight) natural material, and*
  - iii. *does not meet the definition of Virgin Excavated Natural Material in the Act.*
  - iv. *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."*

**3.3.2 Site Won Material**

Site Won material shall comprise material won from excavations on site including natural and existing fill. They need to satisfy Clause 3.3.3.

**3.3.3 All Fill**

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

Engineered Fill shall not comprise unsuitable material that includes:

- Organic soils, such as many topsoils, severely root-affected subsoils and peat;
- Silts, or materials that have the deleterious engineering properties of silt;
- Other materials with properties that are unsuitable for the forming of structural fill; unless it is approved by PSM,

The GITA shall assess that the proportion of deleterious material in each Lot is not greater than 1% by weight. Deleterious material is defined by Table 3051.6 of the RMS QA Specification 3051 (Edition 7 June 2020) as:

*“Rubber, Plastic, 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.

**3.4 Fill Zonation and Placement**

**HOLD POINT**

Process Held	Placing of Fill
Submission detail	The Contractor / GITA submit to PSM a Weekly Certificate as defined in Clause 7.2.1 of this specification for the earthworks completed to the previous Saturday no later than 5 pm of the subsequent Wednesday.
Release of Hold Point	PSM to confirm receipt of Weekly Certificate and recommend release of Hold Point if initial assessment of the Weekly Certificate indicates it complies with requirements of this specification. The contract superintendent should then release the Hold Point if it considers appropriate.

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.

**3.5 Compaction**

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

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



## 3.6 Moisture Control

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

Placement moisture content of the Engineered Fill shall be measured.

## 4. Cutting

### 4.1 Subgrade Condition

The subgrade is to comprise one of the following materials:

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

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

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

## 5. Survey

### 5.1 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  $\pm 0.1$  m. The area subject to approval shall be assessed and shown on a plan drawing to an accuracy of at least  $\pm 5$  m in plan.
2. The Lot boundaries shall be assessed and shown on a plan drawing to an accuracy of at least  $\pm 5$  m in plan.
3. The location of the field density tests shall be assessed and shown on the Lot boundary plan drawing to an accuracy of at least  $\pm 5$  m in plan.
4. The elevation of the field density tests shall be surveyed to an accuracy of  $\pm 0.05$  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.

### 5.2 Cutting Areas

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

## 6. Inspection and Testing

### 6.1 Role of the GITA

A NATA accredited 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.

## 6.2 Level 1 Control

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

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

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

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

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

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

For this particular contract, Level 1 responsibility includes:

1. Lot testing as per Clause 6.3 of this specification.
2. A frequency of compaction testing not less than that specified in Clause 6.4 of this specification.
3. The GITA documenting and reporting its activity in the terms required by Clause 7 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 7 of this specification.

## 6.3 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 (both moisture conditioning and compaction) and that represents no more than one day's work.

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.

## 6.4 Testing Frequency (Compaction Testing)

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

1. 1 test per 500 m<sup>3</sup> of material placed
2. 3 tests per lot.

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

## 6.5 Proof Rolling and Plate Load Testing

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

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

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

## 6.6 Inspection, Testing and Survey

The GITA shall at least undertake the following tasks:

### Cut areas

1. Identify the subgrade as one of the subgrade types listed in Clause 4.1 of this specification and assess that the subgrade condition of cut areas is in accordance with the subgrade condition requirements of Clause 4.1 of this specification.
2. Should Engineered Fill be required to fill overcut areas, assess that filling has been placed in accordance with this specification.

### Fill areas

3. Identify the subgrade as one of the subgrade types listed in Clause 3.1 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 3.1 of this specification. Should the subgrade material comprise "Other materials as approved by PSM, e.g. existing fill intended to be left in place.", PSM should be requested to inspect and provide approval prior to filling.

The GITA needs to include / refer to PSM approval in its weekly report for subgrade comprising existing fill and other materials as approved by PSM

4. Assess that the base geometry of any area prior to placement of fill material is in accordance with the base geometry requirements of Clause 3.2 of this specification.
5. Assess that the material placed is in accordance with the fill material requirements of Clause 3.3 of this specification.
6. Assess that the Engineered Fill has been placed in accordance with the requirements for fill zonation and placement of Clause 3.4 of this specification.
7. Assess that each Lot as presented for approval by the contractor is in accordance with the requirements for Lot definition of Clause 6.3 of this specification.
8. Ensure that the survey requirements in Clause 5 of this specification have been completed.
9. Estimate the approximate volume of Engineered Fill placed in each Lot presented for approval.
10. Conduct Lot testing in accordance with the construction control testing requirements of Clauses 6.3 and 6.4 of this specification.
11. Assess that the compaction of each Lot is in accordance with the requirements of Clause 3.5 of this specification. The GITA shall select a depth of insitu density tests that allows the density of the full layer to be assessed.
12. Assess that the moisture variation of each Lot is in accordance with the requirements for moisture control in Clause 3.6 of this specification.
13. Conduct material property testing in accordance with the material testing requirements in this specification.

## 7. Reporting and Certification

### 7.1 Reporting

The GITA shall produce at least the following reports:

1. *Subgrade Approval Reports* (a sample is attached). Such a report shall:
  - Document assessments undertaken for tasks 1 and task 3 of Clause 6.6 including reporting the subgrade type
  - Document the subgrade survey that has been undertaken
  - Approve or reject the subgrade condition and base geometry for filling, based on tasks 3 and 4 of Clause 6.6
  - Approve or reject the subgrade condition for cut areas based on task 1
2. *Lot Approval Reports* (a sample is attached). Such a report shall:
  - Document assessments, testing and survey undertaken for tasks 3 to 13 of Clause 6.6
  - Report the results of testing undertaken for task 10 of Clause 6.6
  - Approve or reject lots based on tasks 11 and 12 of Clause 6.6.
3. *Material Testing Reports*. Such a report shall:
  - Report the results of material property testing undertaken for task 13 of Clause 6.6.
4. *Daily Reports* (a sample is attached). Such a report shall be completed daily and shall:
  - Document time spent on site by the GITA personnel
  - List subgrade assessments and approvals undertaken each day with reference to relevant Subgrade Approval Report(s)
  - List Lots presented, accepted and approved or rejected each day, with reference to relevant Lot Approval Report(s)
  - List survey undertaken each day as for task 8 of Clause 6.6 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.).

### 7.2 Certification

#### 7.2.1 Weekly Certificates

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

The Weekly Certificate shall transmit the following:

- Copy or reference to the complete specification document(s)
- Subgrade Approval Reports
- Lot Approval Reports
- Material property testing reports
- Daily Reports
- Survey of subgrade geometry prior to filling or in cut areas
- Plan survey drawing showing lot boundaries and location of density tests

- Survey documenting filling undertaken to date and showing location of testing
- Provide an Excel spreadsheet presenting the results of the week's acceptance testing completed by the GITA.

And certify that:

*"All the earthworks undertaken and the subgrade condition in the cut areas [in the stated period] are documented in the above reports and have been undertaken in accordance with the Specification (Ref. PSM5872-007S REV1, dated 21 November 2025)."*

### **7.2.2 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. PSM5872-007S REV1, dated 21 November 2025)."*

**Yours Sincerely**



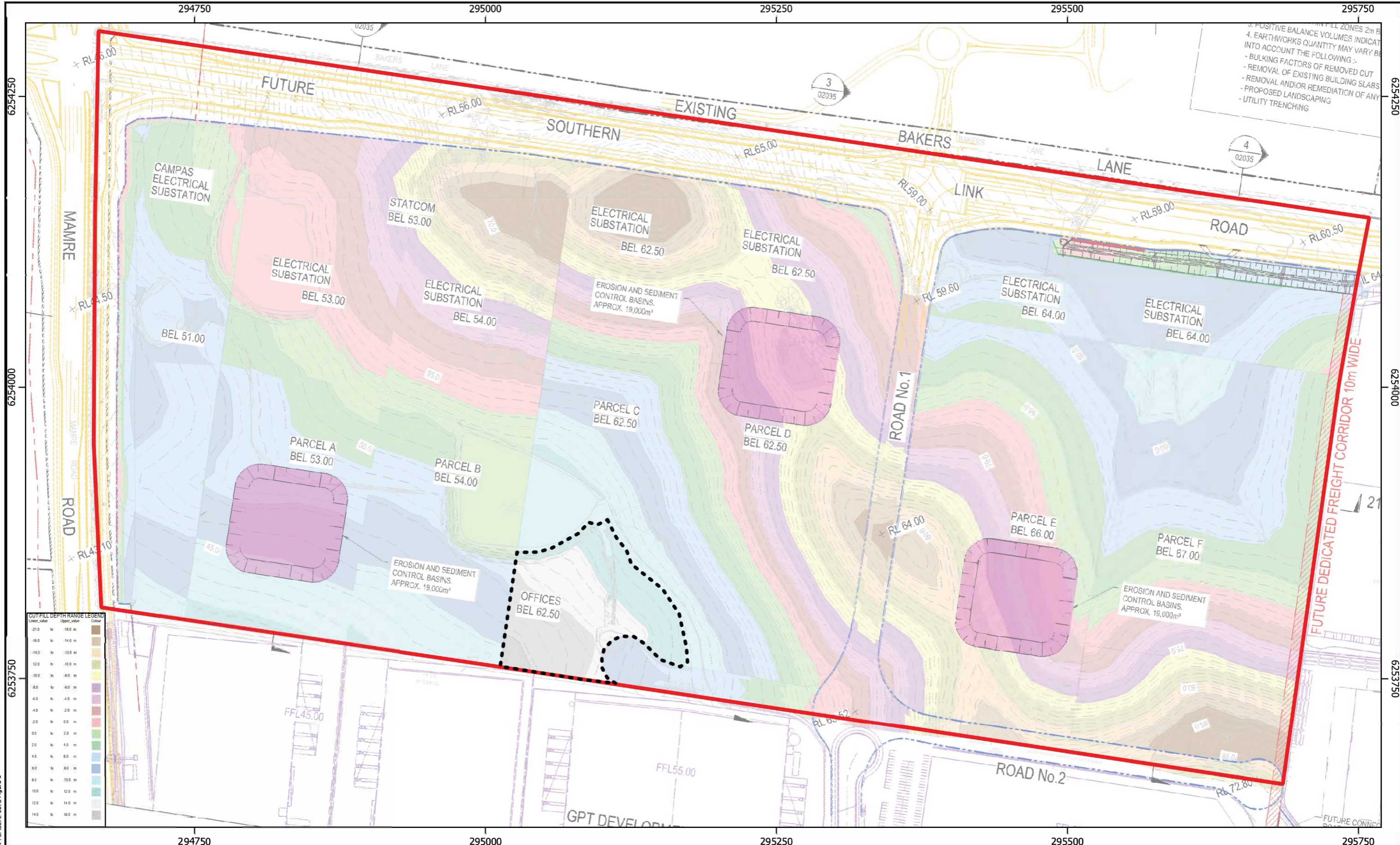
**BRENDAN TA**  
**GEOTECHNICAL ENGINEER**



**AGUSTRIA SALIM**  
**PRINCIPAL**



**JUNO LIANG**  
**ASSOCIATE GEOTECHNICAL ENGINEER**



**Legend**

- Site Boundary
- Area comprising deep FILL (>10m)

**Notes:**

- Bulk earthworks cut-fill plan by AT&L (ref. SYD4-SITE-DRG-ATL-CIV-0203, dated 10 November 2025).

Scale 1:3,000

0 20 40 60 80 100 m

EPSG:7856  
GDA2020 / MGA zone 56

<b>PSM</b>	Created By:	PSM	Revision:	A
	Date:	20 Oct 2025	Paper Size:	A3

Aurecon  
706-752 Mamre Road, Kemps Creek  
Interim Geotechnical Design Advice

SITE LOCALITY PLAN

PSM5872-007S	Figure 1
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M:\PSM5872\Eng\GIS\PSM5872-007S Figure 1

# Appendix A

## Subgrade Approval Report



# GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number



## SUBGRADE APPROVAL REPORT

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

Subgrade areas assessed:

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

COMMENTS:

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

# Appendix B

## Lot Approval Report





**GEOTECHNICAL INSPECTION AND TESTING AUTHORITY**  
NATA accreditation number

**LOT APPROVAL REPORT**

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

<b>LOT ID:</b> _____	<b>Sheet</b> _____	<b>of</b> _____
Retest (Yes/No) _____	Original test report number: _____	
Specification reference _____	_____	
Location: _____	_____	
Lot boundary survey reference/location: _____	_____	
Materials description: _____	<i>(MATERIAL TYPE, colour, minor components, maximum particle size)</i>	
Material identification: _____	<i>(Identify the material as defined in Clause 3.3.1, Clause 3.3.2 or Clause 3.3.3 of the Specification )</i>	
Deleterious material assessment: _____	<i>(Report proportion of deleterious material)</i>	
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 <sup>3</sup> )				
Field moisture content (%)				
PWCD (t/m <sup>3</sup> )				
Compactive effort				
Moisture variation (%)				
HILF density ratio (%)				
TEST (Pass/Fail)				

<b>LOT APPROVAL</b>	(Pass/Fail)	Signed: _____	Date: _____
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# Appendix C

## Daily Report





# GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number

## DAILY REPORT

Client:	Report number:
Job number:	Report date:
Project:	Level of testing: Level 1
Location:	Technician:
Contractor	

Time on site:  
Time off site:

### 1. Subgrade Approval

Areas ID	Subgrade Approval Report No:	Comments

### 2. Lot Approval

Lot ID	Lot Approval Report No:	Comments

### 3. Survey

Type of survey	Survey undertaken by:	Reference

### 4. Instructions received on site

--

### 5. Instructions given on site

--

### COMMENTS:

--

Signed:

Date:

# Appendix D

## Certification Letter (Sample Only)



Our Ref:

Date:

Addressed to: Earthwork Contractor

Attention: Earthwork Contractor Representative

Dear

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

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

During the above period:

- The GITA has prepared the following Subgrade Approval Reports:

1. Subgrade Approval Report No 1
2. ....

- The GITA has prepared the following Lot Approval Reports:

1. Lot Approval Report No 1
2. ....

- The GITA has prepared the following Daily Reports:

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

- The following subgrade survey was undertaken:

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

- The following weekly survey was undertaken:

1. Weekly survey of week ending .....reference.....
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. PSM5872-007S, dated 17 October 2025) 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