



# LOCAL GEOTECHNICS

19 November 2024

**Report on**  
**Geotechnical Site Classification**  
**11 Moores Road, Pinjarra WA**

Project:  
**LGK0372024SC**  
**Rev\_0**

Client:  
**Method Planning**

Geotech

Civil

Pavement

Drainage



19 November 2024

To  
**Method Planning**

Dear Sir/Madam,

**RE:** Geotechnical Site Classification for 11 Moores Road, Pinjarra WA.

This letter presents our report on a geotechnical site classification carried out at *11 Moores Road, Pinjarra WA*. The report must be thoroughly read and implemented in full, no partial implementation of this report is allowed.

If you have any questions in regards to the geotechnical site investigation or we can be of further assistance, please do not hesitate to contact Local Geotechnics.

Sincerely yours

A handwritten signature in blue ink, appearing to read "Harun Meer", written over a light blue horizontal line.

**Dr. Harun Meer**

*Ph.D.(Geotech), M. Eng. (Geotech), B. Eng. (Civil)*  
*MIEAust, CPEng, EngExec, NER, APEC Engineer, IntPE(Aust)*

Director

**Local Geotechnics**

PROJECT INFORMATION

Project	LGK0372024SCRev_0 Geotechnical Site Classification			
Site Location	11 Moores Road, Pinjarra WA			
Rev	Description	Date	Prepared by	Approved by
0	Issued to client	19 November 2024	L Su	H Meer

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## EXECUTIVE SUMMARY

Method Planning commissioned Local Geotechnics to prepare a geotechnical site classification report for 11 Moores Road, Pinjarra WA.

The proposed construction will be the Pinjarra Veterinary Hospital.

The objectives of the site class investigation were to obtain information on the subsurface conditions in order to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011.

Field works were conducted on 12 November 2024 in fine and sunny weather conditions. The investigation work consisted of field observation, documentation, sub-surface probing, soil profile logging and conducting of penetrometer testing alongside the test holes.

***The findings of the site classifications are presented in the following sections***

It is observed from the PSP test that the site soil is in loose to dense condition.

### **Site Classification**

Provided earthworks are completed as per the recommendation in Section 6.0 of this report, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as “**CLASS S**” in accordance with definitions provided in the Australian Standard AS2870 -2011. The characteristics surface movement **Ys** is considered to be 10 mm.

### **Stormwater Drainage**

We recommend discharging of surface and roof runoff onsite via soakwell. The drainage system must be designed by a qualified engineer as per requirements of the local government authority.

*It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction to ensure that all organic, roots, demolition debris, loose material have been adequately removed from the area and that the fill material is adequately compacted.*

## 1.0 INTRODUCTION

Method Planning commissioned Local Geotechnics (LG) to prepare a geotechnical site classification report for 11 Moores Road, Pinjarra WA (the project). The site location is shown in Figure 1.



**Figure 1. Aerial View of the Site Location (Source: Landgate Map)**

The objectives of the investigation are to obtain information on the sub-surface conditions to classify the site in accordance to the definitions provided in Australian Standard AS2870 – 2011 and to provide recommendations on stormwater drainage system for the site. Field works were conducted on 12 November 2024. Weather condition on the day of field investigation was fine and sunny.

The scope of the investigation did not include compaction control, bearing capacity, wind force calculations or classifications, slope stability checking, and settlement calculation. Environmental issues were not considered in this report.

## 2.0 PROPOSED DEVELOPMENT

The proposed construction will be the Pinjarra Veterinary Hospital.

## 3.0 SCOPE AND OBJECTIVES

The scope and objectives of the investigation are as follows:

- Desktop review of geological survey maps, groundwater atlas and other publicly available information for the site;
- Conducting of up to four (04) Test Holes by using a hand auger up to 2.5 m or refusal;
- Conducting of Perth Sand Penetrometer (PSP) tests alongside the test holes up to a depth of 1.05 m or refusal;
- Logging of site soil profile as per Australian Standard AS1726;
- Groundwater recording as per test hole observation;
- Submit a factual report on findings to classify the site in accordance with the Australian Standard AS2870 - 2011;
- Provide recommendation on earthworks; and
- Provide recommendation on stormwater drainage.



## 4.0 SITE CONDITIONS

### 4.1 Surface Condition

The surface condition and the overall topography of the site are generally flat. There are medium to large sized trees can be observed at the time of investigation. The site boundaries are enclosed with fences. There are surrounding houses adjacent to the property.

Ground water table was encountered at depths of 1.3 m, 1.0 m, 1.0 m and 0.6 m at TH1, TH2, TH3 and TH4 during the time of investigation. Site photos taken during the field investigation are shown in Appendix C.

### 4.2 Subsurface Condition

A review of Environmental Geological Western Australia survey Map of Pinjarra 1:250,000 (Sheet SI 50-2 and Part Sheet SI 50-1) was conducted before site investigation. Environmental Geological map of Pinjarra revealed that the site is consisted of Guildford Formation (Qpa): alluvium (clay, loam, sand, gravel) variably lateritized and podsolized.

### 4.3 Water Table and Drainage

A review of 'Perth Ground Water Atlas' of the Department of Water was carried out for this site. No existing ground water information was available during the time of investigation on 'Perth Ground Water Atlas'.

## 5.0 FIELD INVESTIGATION

The field investigation consists of sub-surface probing by using a hand auger at four locations, taking photograph and Perth Sand Penetrometer (PSP) testing alongside the test holes.

### 5.1 Test Hole Logs

Four Test Holes (TH1, TH2, TH3 and TH4) were conducted at the site by using a hand auger. Test hole locations are shown in the site sketch in Appendix A.

During sub-surface probing, the spoil was stockpiled adjacent to the test location. The subsurface profiles exposed in the boreholes were logged in accordance with AS1726 and were photographed to provide a visual record of subsurface conditions encountered. Following these activities, each test location was progressively backfilled in the reverse order of excavation works.

Test holes TH1 – TH4 consist of similar soil profile as described below:

- **Topsoil, Silty SAND (SM)** – fine to medium grained, grey, with low plasticity silt, grass and roots, slightly moist, loose to dense, up to a depth of 0.1 m; followed by
- **Silty SAND (SM)** – fine to medium grained, grey, with low plasticity silt, slightly moist, loose to dense, up to a depth of 0.5 m; followed by
- **SAND (SP)** – fine to medium grained, pale grey to pale brown, slightly moist to wet, loose to dense, up to the maximum investigated depth.

TH1, TH2, TH3 and TH4 were terminated at depths of 1.7 m, 1.5 m, 1.8 m and 1.5 m respectively due to hole collapsed. Ground water table was encountered at depths of 1.3 m, 1.0 m, 1.0 m and 0.6 m at TH1, TH2, TH3 and TH4 during the time of investigation. Test hole logs are attached in Appendix B.

### 5.2 Perth Sand Penetrometer (PSP) Tests

PSP tests (PSP1 to PSP4) were conducted alongside the test holes. PSP tests indicate the soil density of the site as per Standard Australia HB 160-2006, Table 6.4.6.2. PSP data are presented in Table 1 and PSP test certificates are attached in Appendix B.

**Table 1.** Summary of PSP test data Ref. Table 6.4.6.2 HB 160-2006

PSP Location	PSP1		PSP2		PSP3		PSP4	
Depth (mm)	No. of Blows/300mm (Density Classification)							
0 – 150	Seating		Seating		Seating		Seating	
150 – 450	4	L	5	L	5	L	10	D
450 – 750	6	MD	6	MD	5	L	11	D
750 – 1050	6	MD	6	MD	5	L	11	D
Note: Density Classification is obtained based on Number of blows required for 300 mm penetration of PSP Very Loose (VL) < 2; Loose (L) 2 – 6; Medium Dense (MD) 6 – 8; Dense (D) 8 – 15; Very Dense (VD) > 15								

It is observed from the PSP test that the site soil is in loose to dense condition.

## 6.0 EARTHWORKS RECOMMENDATION

Any earthworks at the site should be carried out in general accordance with the Australian Standard AS 3798-2007 “Guidelines on Earthworks for Commercial and Residential Developments”. Asbestos and septic tank investigation was not in the scope of this investigation. Client must confirm that the site is free from asbestos and there is no septic tank at the site. Followings are general guidelines to be followed during earthworks:

- Clear any unsuitable material from the topsoil of the site. Unsuitable materials generally includes: organics, grass roots, uncontrolled fill of building rubbles, bricks, stone blocks, concrete, wood, asphalt, bore well, different types of waste etc.
- There is a bore at the site. Fill the bore in layers and compact to dense condition.
- Remove all the trees with roots from the site and backfill with clean sand.
- Before laying a foundation, compact the site up to 1050 mm depth to a dense condition as per AS 3798-2007. We recommend, PSP seating for 0-150 mm, 8 PSP blows for 150-450 mm, 9 PSP blows for 450-750 mm and 10 PSP blows for 750-1050 mm and 10 PSP blows for every 300 mm of penetration.
- In order to achieve the desired compaction, we recommend, box out approximately 300 mm top layer and stockpile at the site to reuse after screening. Compact bottom layer to bring it to dense condition. Later backfill the area to raise the site to the existing surface level by using clean sand (or screened site soil) and compact to a dense condition as per AS 3798.
- The backfilling layer should not exceed more than 300 mm in loose condition. Each 300 mm layer of backfilling should be compacted to dense condition as per AS 3798-2007.
- Site should be prepared in a way so that surrounding stormwater runoff or surface water runoff does not pass through the building envelop.
- Care needs to be given to any existing or adjacent structures to avoid any damage from excessive vibrations during compaction and earthworks.
- Retaining wall is required if there is an elevation difference of 250 mm or as per requirement of the local council.
- For site maintenance it is recommended to follow the CSIRO publication “Guide to Home Owners on Foundation Maintenance and Footing Performance” in Building Technology File Number 18. This document provides important information about implications of plumbing, property maintenance, site classification on foundation design, drainage and performance expectations.
- *It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction.*



## 7.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS

### 7.1 Site Classification

Provided earthworks are completed as per the recommendation in Section 6.0 of this report, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as **“CLASS S”** in accordance with definitions provided in the Australian Standard AS2870 -2011. The characteristic surface movement  $Y_s$  is considered to be 10 mm.

An assumption of soil suction change of 2.5 m is made in this case. General definition of 'Site Class' is shown in Table 2 (Source: AS 2870-2011).

**Table 2.** General Definition of Site Class (Source: AS 2870-2011)

Site Class	Soil Description	Characteristic Surface Movement (mm)
A	Most SAND and ROCK sites with little or no ground movement due to moisture content variation	little or no ground movement
S	Slightly reactive clayey or silty SAND, which will cause slight ground movement due to moisture content variation	$0 < Y_s \leq 20$
M	Moderately reactive clayey or silty soil which will cause moderate ground movement due to moisture content variation	$20 < Y_s \leq 40$
H1	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	$40 < Y_s \leq 60$
H2	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	$60 < Y_s \leq 75$
E	Extremely reactive clayey or silty soil which will cause extreme ground movement due to moisture content variation	$Y_s > 75$
P	Problematic sites, sites consisted of soft soils, soft clay or silt or loose sand; landfills, mine subsidence, collapsing soils, very reactive soils, subjected to erosion and sites which cannot be classified as A to E.	-

### 7.2 Earthquake Design Factor

Australian Standard AS1170.4-2007 Structural design actions Part 4 “Earthquake actions in Australia” is recommended for earthquake consideration. AS1170.4-2007 outlines the design criteria required for a structure in consideration of the risk of being subjected to earthquake loads. Earthquake design factors are summarised in Table 3.

**Table 3.** Earthquake Design Factors

Factor/Class	Value/Name	Ref. AS1170.4- 2007
Hazard Factor (z)	0.09	Section 3 Figure 3.2(C)
Site subsoil class	Class $C_e$ – Shallow Soil	Section 4

### 7.3 Stormwater Drainage

We recommend discharging of surface and roof runoff onsite via soakwell. The drainage system must be designed by a qualified engineer as per requirements of the local government authority.

## 8.0 LIMITATION OF USE

The ground is a product of continuing natural and man-made processes and therefore exhibits characteristics and properties which may vary from place to place and can change with time. Geotechnical site investigation involves gathering and assimilating limited facts about these characteristics and properties in order to better understand or predict the behaviour of the ground at a particular site under certain conditions.

This site investigation has been carried out by inspection, using a limited amount of pit excavations, sampling, testing or other means of investigation. Achieving a full coverage of the site to ensure all variations is not practical and is seldom done due to cost constraints as well as the impracticality.

It should be noted that the subsurface conditions encountered by the limited number of pit excavation as part of this geotechnical site investigation represents the ground conditions at the locations where the samples were taken and where tests have been undertaken and as such are an extremely small proportion of the site to be developed.

The facts reported in this document are directly relevant only to the ground at the place where, and time when, the investigation was carried out and are believed to be reported accurately. Given the limited number of test pits and limited field and laboratory testing carried out with respect to the overall site area, variations between investigation locations is likely and ground conditions different to those presented in this report may be present within the subject site area. The risk associated with this variability and the impact it will have on the proposed development should be carefully considered.

The level of geotechnical investigation that has been completed to date is considered appropriate for the project objectives. If the above mentioned client, its subcontractors, agents or employees use this factual information for any other purpose for which it was not intended, then the client, its subcontractors, agents or employees does so at its own risk and Local Geotechnics will not and cannot accept liability in respect of the advice, whether under law of contract, tort or otherwise.

Any interpretation or recommendation given in this report is based on judgement and experience and not on greater knowledge of the facts reported. Local Geotechnics does not represent that the information or interpretation contained in this report addresses completely the existing features, subsurface conditions or ground behaviour at the subject site.

## 9.0 REFERENCES

- Australian Standard AS1170.4-2007, *"Earthquake Actions in Australia"*.
- Australian Standard AS 1726-1993 *"Geotechnical Site Investigations"*.
- Australian Standard AS 2870-2011, *"Residential Slabs and Footings"*.
- Australian Standard AS 3798-2007, *"Guidelines on Earthworks for Commercial and Residential Developments"*.
- CSIRO publication *"Guide to Home Owners on Foundation Maintenance and Footing Performance"* in Building Technology File Number 18.
- Environmental Geological Western Australia survey Map of Pinjarra 1:250,000 (Sheet SI 50-2 and Part Sheet SI 50-1)
- Standards Australia, Hand Book HB 160-2006 *"Soil Testing"*.



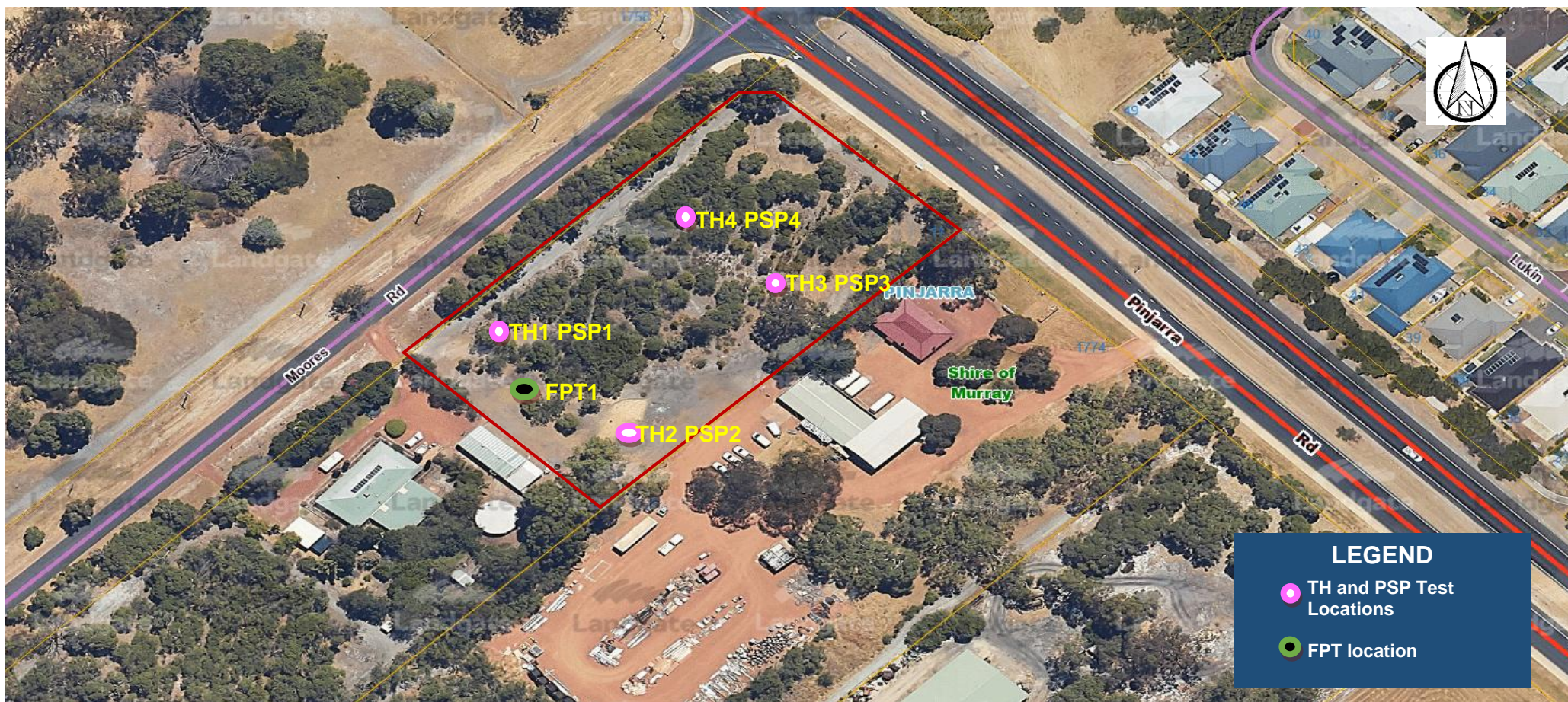
# APPENDIX A

## SITE SKETCH


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**Site Sketch : Test Hole (TH), Perth Sand Penetrometer (PSP) and Field Permeability Test (FPT) Locations**

Reference:	LGK0372024SC & SSE	 <b>LOCAL GEOTECHNICS</b> Unit 12, 8 Production Road Canning Vale WA 6155 PO Box 5050, Canning Vale South WA 6155 Phone: 08 9457 3517 E-mail: <a href="mailto:admin@localgeotechnics.com.au">admin@localgeotechnics.com.au</a> Web: <a href="http://www.localgeotechnics.com.au">www.localgeotechnics.com.au</a>
Client:	Method Planning	
Project:	Site Soil Evaluation 11 Moores Road, Pinjarra WA	



# APPENDIX B

TEST HOLE LOGS AND PSP TEST CERTIFICATES



**RESULT OF TEST HOLES/PITS**

Reference : LGK0372024SC &amp; SSE

Client : Method Planning

Project : Site Soil Evaluation

Location : 11 Moores Road, Pinjarra WA

GPS Zone 50 : Northing: 6 390 230

Easting: 393 085

Test Pit/BH No.: TH1

Date Excavated: 12-Nov-2024

Date completed: 12-Nov-2024

Equipment Type: HA, PSP and FPT

Water Table: 1.3 mbgl

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Perth Sand Penetrometer Test (Blows/300mm)
0.0						SM	<b>Topsoil, Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, grass and roots, slightly moist, loose		0
0.1						SM	<b>Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, slightly moist, loose		5
0.4									10
0.5						SP	<b>SAND</b> - fine to medium grained, pale grey, slightly moist, medium dense		15
0.8							colour changes to pale brown		20
1.0									25
1.3							water table encountered		
1.5									
1.7							Terminated at a depth of 1.7 m due to hole collapsed		
2.0									
2.5									

**Notes:**

Sampling Type:

**B** - Bulk/Disturbed Sample,**UD** - Undisturbed Sample

Method:

**HA** - Hand Auger**E** - Excavator**BH** - Backhoe Bucket

Moisture:

**D** - Dry**M** - Moist**W** - Wet

Symbols:

**W<sub>L</sub>** - Plastic Limit**W<sub>p</sub>** - Plastic Limit

Logged : YC/LS

Checked: H Meer



**RESULT OF TEST HOLES/PITS**

Reference	: LGK0372024SC & SSE	Test Pit/BH No.:	TH2
Client	: Method Planning	Date Excavated:	12-Nov-2024
Project	: Site Soil Evaluation	Date completed:	12-Nov-2024
Location	: 11 Moores Road, Pinjarra WA	Equipment Type:	HA, PSP and FPT
GPS Zone 50	: Northing: 6 390 210	Water Table:	1 mbgl
	Easting: 393 086		

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Perth Sand Penetrometer Test (Blows/300mm)
0.0						SM	<b>Topsoil, Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, grass and roots, slightly moist, loose		0
0.1						SM	<b>Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, slightly moist, loose		5
0.4									
0.5						SP	<b>SAND</b> - fine to medium grained, pale grey, slightly moist, medium dense		10
0.7							colour changes to pale brown		15
1.0							water table encountered		20
1.5							Terminated at a depth of 1.5 m due to hole collapsed		25
2.0									
2.5									

**Notes:**

Sampling Type:

**B** - Bulk/Disturbed Sample,**UD** - Undisturbed Sample

Method:

**HA** - Hand Auger**E** - Excavator**BH** - Backhoe Bucket

Moisture:

**D** - Dry**M** - Moist**W** - Wet

Symbols:

**W<sub>L</sub>** - Plastic Limit**W<sub>p</sub>** - Plastic Limit

Logged : YC/LS

Checked: H Meer

## ENGINEERING LOG



## RESULT OF TEST HOLES/PITS

ABN:61 737 984 867  
12/8 Production Road, Canning Vale WA 6155  
PO Box 5050 Canning Vale South WA 6155  
admin@localgeotechnics.com.au

Reference	: LGK0372024SC & SSE	Test Pit/BH No.:	TH3
Client	: Method Planning	Date Excavated:	12-Nov-2024
Project	: Site Soil Evaluation	Date completed:	12-Nov-2024
Location	: 11 Moores Road, Pinjarra WA	Equipment Type:	HA, PSP and FPT
GPS Zone 50	: Northing: 6 390 242	Water Table:	1 mbgl
	Easting: 393 138		

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Perth Sand Penetrometer Test (Blows/300mm)
0.0						SM	Topsoil, Silty SAND - fine to medium grained, grey, with low plasticity silt, grass and roots, slightly moist, loose		0
0.1						SM	Silty SAND - fine to medium grained, grey, with low plasticity silt, slightly moist, loose		5
0.5									10
						SP	SAND - fine to medium grained, pale brown, slightly moist, loose		15
1.0									20
							water table encountered		25
1.5									
1.8							Terminated at a depth of 1.8 m due to hole collapsed		
2.0									
2.5									

## Notes:

Sampling Type:

B - Bulk/Disturbed Sample,  
UD - Undisturbed Sample

Method:

HA - Hand Auger  
E - Excavator  
BH - Backhoe Bucket

Moisture:

D - Dry  
M - Moist  
W - Wet

Symbols:

W<sub>L</sub> - Plastic Limit  
W<sub>P</sub> - Plastic Limit

Logged : YC/LS  
Checked: H Meer

**RESULT OF TEST HOLES/PITS**

ABN:61 737 984 867  
 12/8 Production Road, Canning Vale WA 6155  
 PO Box 5050 Canning Vale South WA 6155  
 admin@localgeotechnics.com.au

Reference	: LGK0372024SC & SSE	Test Pit/BH No.:	TH4
Client	: Method Planning	Date Excavated:	12-Nov-2024
Project	: Site Soil Evaluation	Date completed:	12-Nov-2024
Location	: 11 Moores Road, Pinjarra WA	Equipment Type:	HA, PSP and FPT
GPS Zone 50	: Northing: 6 390 298	Water Table:	0.6 mbgl

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Perth Sand Penetrometer Test (Blows/300mm)
0.0						SM	<b>Topsoil, Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, grass and roots, slightly moist, dense		0
0.1						SM	<b>Silty SAND</b> - fine to medium grained, grey, with low plasticity silt, slightly moist, dense		5
0.2						SP	<b>SAND</b> - fine to medium grained, pale grey, slightly moist, dense		10
0.5							colour changes to pale brown		15
0.6							water table encountered		20
1.0									25
1.5							Terminated at a depth of 1.5 m due to hole collapsed		
2.0									
2.5									

**Notes:**

Sampling Type:

**B** - Bulk/Disturbed Sample,  
**UD** - Undisturbed Sample

Method:

**HA** - Hand Auger  
**E** - Excavator  
**BH** - Backhoe Bucket

Moisture:

**D** - Dry  
**M** - Moist  
**W** - Wet

Symbols:

**W<sub>L</sub>** - Plastic Limit  
**W<sub>p</sub>** - Plastic Limit

Logged : YC/LS  
 Checked: H Meer

## PERTH SAND PENETROMETER (PSP) TEST CERTIFICATES

(AS 1289.6.3.3)

### Density Correlation - Table 6.4.6.2 HB 160-2006

Reference LGK0372024SC & SSE  
Client Method Planning  
Project Site Soil Evaluation  
Site 11 Moores Road, Pinjarra WA

Test ID PSP1-4  
Date Tested 12-Nov-24  
Tested by YC/LS  
Checked by H Meer

PSP No.	PSP1		PSP2		PSP3		PSP4	
Depth (mm)	Penetration Resistance - Blows/300mm   Density Classification							
0 - 150	Seating		Seating		Seating		Seating	
150 - 450	4	L	5	L	5	L	10	D
450 - 750	6	MD	6	MD	5	L	11	D
750 - 1050	6	MD	6	MD	5	L	11	D

#### Remarks:

#### Density Correlation - Table 6.4.6.2 HB 160-2006

Very Loose (VL)	Loose (L)	Medium Dense(MD)	Dense(D)	Very Dense (VD)
≤ 2	2 - 6	6 - 8	8 - 15	≥ 15



# APPENDIX C

## SITE PHOTOS

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Photo 1. Site, View from Moores Road



Photo 2. General Site Condition





Photo 3. Test Location 02 (TH2), Sub-surface Probing by Using a Hand Auger



Photo 4. Soil from Test Location 02 (TH2)





Photo 5. Test Location 04 (TH4), Sub-surface Probing by Using a Hand Auger



Photo 6. Test Location 04 (PSP4), Testing by Using a Perth Sand Penetrometer