

**REPORT NO:** 3230600-1

**CLIENT:** Common ADR  
36 Cobden Street  
NORTH MELBOURNE VIC 3051

**PROJECT LOCATION:** Visitor & Cultural Building  
Monash Drive  
SWAN HILL

**COMMISSION:** Carry out appropriate in-situ soil tests and observations at three locations as shown on the attached plan, to a depth of up to 3.0 metres.

Recommend allowable bearing pressures for slab, strip footings, pad footings, end bearing pressures and skin friction values for bored piers.

## 1. INTRODUCTION:

### 1.1 Aim:

This report discusses the field investigation carried out on 18 December 2023 and 2 February 2024, for the proposed development of a new single storey visitor & cultural building.

## 2. INVESTIGATION:

### 2.1 Site Geology:

Geological maps of the area suggest that the site is in an area of Quaternary Alluvium. The natural soils encountered during the site investigation confirmed this.

### 2.2 Site Topography:

The ground surface over the site is relatively level. Groundcover consists of natural grasses, and introduced trees. A photograph of the site taken during the site investigation is provided in **Figure 1**.

### 2.3 Fieldwork:

The fieldwork consisted of drilling three boreholes to 3.0 metres depth with a mechanical auger. The approximate locations of the boreholes are shown on the attached plan. Subsurface materials penetrated were visually classified to AS1726: Geotechnical Site Investigation. The engineering logs of each borehole are attached showing the soil descriptions and depths, along with any cohesive strengths measured and observed densities of non-cohesive soils.

Dynamic Cone Penetration (DCP) tests were conducted adjacent to the borehole 1.



**Figure 1:** Site photograph showing the existing site conditions.

### **3. FINDINGS:**

#### **3.1 Field Data:**

The boreholes revealed that existing soil profile consisted of sandy CLAY FILL and sandy GRAVEL FILL overlying naturally occurring silty/sandy CLAY. The depth of the existing FILL varies between 200mm and 300mm.

Groundwater was not encountered in the boreholes during the field investigation.

Substrata conditions encountered are such that infiltration and occurrence of perched water at the interface between different material layers should not be disregarded.

### **4. SITE CLASSIFICATION:**

Based on the site investigation and the geology of the area, this site would be classified as CLASS P with respect to Australian Standard 2870-2011 (Residential Slabs and Footings) due to the presence of currently growing and/or to be removed trees. However, this classification is technically not correct for the proposed type of structure, therefore is given as a guide only.

It is anticipated that the normal seasonal surface movement at this site, without considering any abnormal moisture conditions, will not exceed 60mm. It must be emphasised that the seasonal surface movement mentioned, and recommendations referred to in this report do not take into account the effects of any abnormal moisture conditions that may develop after construction as defined in Clause 1.3.3 (A) (B) (C) (D) (E).

Trees in the vicinity of the proposed development will cause future abnormal moisture conditions, and consequently the footings will have a higher probability of damage than that given in Clause 1.3.1 of AS2870 – 2011. The designer of the footing system should take this into account.

The recommendations given in this report have been based largely on the soil conditions encountered at the time of the field investigation. Under inclement weather or prolonged wet weather conditions, the soil conditions noted and reported in this report could vary. It is advisable to undertake construction during and following good weather conditions - i.e., dry weather conditions - not during or following inclement weather or prolonged wet weather conditions.

## 5. RECOMMENDATIONS:

### 5.1 Building Foundations:

#### 5.1.1 Pad Footings, Strip Footings, and Edge Beams:

As this site has been classified as CLASS P, the footing system should be designed by a qualified Engineer as defined in AS2870-2011 following engineering principles.

The following allowable bearing pressures can be adopted for the design of shallow foundations, including edge beam for a stiffened raft slab:

Depth from Existing Ground Level (mm)*	Bore-hole No.	Consistency / Relative Density and Type of Anticipated Material	Allowable Bearing Capacity (kPa)	
			Pad Footings	Strip Footings or Edge Beams
500	1-3	Silty/sandy CLAY-Stiff to very stiff	140	100
1000	1-3	Silty/sandy CLAY-Stiff to very stiff	180	140
1500	1-3	Silty/sandy CLAY-Stiff to very stiff	240	190
2000	1-3	Silty/sandy CLAY-Stiff to very stiff	280	230

The founding material types and depths vary over the site. Deeper FILL may be encountered in some areas. The bearing guide above should be read in conjunction with the engineering logs attached.

The allowable bearing pressures provided in this report are the maximum values. The total and differential settlements under the abovementioned allowable bearing pressures would be less than 25mm and 15mm respectively. This does not consider seasonal surface movement or any abnormal moisture conditions. It is recommended that all load-bearing shallow foundations should be founded in the same type of founding material to minimise differential movements.

Trees in the vicinity of the proposed development will cause future abnormal moisture conditions, and consequently, the footings will have a higher probability of damage than that given in Clause 1.3.1 of AS2870 – 2011. The designer of the footing system should take this into account.

In accordance with Appendix D of AS2870 – 2011 the soil profile and site conditions should be inspected at the footing excavation stage by Civiltest Pty Ltd or by a Building Surveyor, to confirm the soil profile, allowable bearing capacities, and site classification.

### 5.1.2 Deep Foundations:

If deep foundations are required for the proposed development, bored piers would be a suitable option.

The following parameters can be adopted for the design of bored pier or pile foundations:

Depth from Existing Ground / Floor Level (mm)*	Bore-hole No.	Consistency / Relative Density and Type of Anticipated Material	Allowable End Bearing Capacity (kPa)	Allowable Skin Friction (kPa)
2000	1-3	Silty/sandy CLAY-Stiff to very stiff	200	Ignore
2500	1-3	Silty/sandy CLAY-Stiff to very stiff	250	Ignore
3000	1-3	Silty/sandy CLAY-Stiff to very stiff	300	30

The founding material types and depths vary over the site. Deeper FILL may be encountered in some areas. The bearing guide above should be read in conjunction with the engineering logs attached.

In accordance with Appendix D of AS2870 – 2011 the soil profile and site conditions should be inspected at the footing excavation stage by Civiltest Pty Ltd or by a Building Surveyor, to confirm the soil profile and site classification.

### 5.1.3 Floor Slab:

The floor slab and any internal stiffening beams may be placed on or in the existing natural soils as described in the engineering logs. This is providing that any soft areas have been well compacted with a small vibratory roller or vibratory plate compactor, with the soil in a moist condition. This material will provide a subgrade for the slab and based on the field observations can be assumed to have a modulus of subgrade reaction of 30kPa/mm.

Where levelling fill is used the floor slab and any internal stiffening beams required may be placed on or in levelling fill provided that not more than 300mm of site derived clayey or 600mm of site-derived sandy or imported granular fill, including existing fill material excluding perishable and organic matter if any is used. Stripped or imported fill meeting the minimum suitability requirements of section 4 of AS3798 must be placed at a maximum of 200mm loose uncompacted layers. Each layer shall be compacted to a minimum 98% dry density ratio at a moisture content between 85% and 115% of the optimum moisture content. Following the above preparation, an allowable bearing pressure of 80kPa can be assumed at 200mm below the compacted surface. If significant amounts of fill are placed under the floor slab, then the above parameters and the site classification will need to be reviewed.

In accordance with Appendix D of AS2870 – 2011 the soil profile and site conditions should be inspected at the footing excavation stage by Civiltest Pty Ltd or by a Building Surveyor, to confirm the soil profile and site classification.

## 6. CONDITIONS OF THE REPORT:

The recommendations made in this report may need to be reviewed should any site works disturb any soil 300mm below the founding depth of the structure.

Since the soil horizons and layers can vary in depth and thickness over the site, the depths and bearing pressure given above (i.e., in the report) are given as a guide only. If the footings are founded at the minimum depth as stated and are in the soil as described in the engineering logs for this site, then the requirements of this report have been met.

Where any filling is to be placed, the footing design parameters recommended in this report will need to be increased accordingly in relationship to the depth of that fill.

The descriptions of the soils found in the boreholes closely follow those outlined in AS1726-2017 (Geotechnical Site Investigations). Colour descriptions can vary with soil moisture content and exposure. It should be noted therefore, colour and shade descriptions mentioned in this report are made when the soil is in a moist condition.

This report has been compiled and recommendations made based on information supplied in the brief to Civiltest Pty Ltd and from the field investigation and observations made including the extent of, if any, site filling. Every care has been taken within the terms of the brief to ensure that the field investigation is representative of the site. Therefore, if it is found that for any reason information received by Civiltest Pty Ltd is incorrect or conditions on site vary considerably during construction to those described in this report then the comments and recommendations made in this report may need to be amended.

The recommendations given in this report have been based largely on the soil conditions encountered at the time of the field investigation. Under inclement weather or prolonged wet weather conditions, the soil conditions noted and reported in this report could vary. It is advisable to undertake construction during and following good weather conditions - i.e., dry weather conditions - not during or following inclement weather or prolonged wet weather conditions.

Any levels referred to in Civiltest reports should be regarded as general and are not to be interpreted as surveyed confirmed levels. All levels should be checked and confirmed by a licensed surveying organisation or qualified personnel.

Finally, no responsibility will be taken for this report if it is altered in any way or is not reproduced in full.

This report consists of six pages including a site plan. Appendices A (Engineering Logs) and B (Laboratory Review) are attached.



**PREETI KUMMARI**  
**GEOTECHNICAL ENGINEER**  
**CIVILTEST PTY LTD**

**REF:** am/lc/PK/po/rb

20 February 2024

## LOCATION OF TEST SITES: VISITOR & CULTURAL BUILDING SWAN HILL



 Denotes Boreholes

**NOT TO SCALE**

THIS PLAN IS NOT INTENDED TO PROVIDE AN  
ACCURATE DEPICTION OF THE NUMBER, SIZE  
OR LOCATION OF TREES AND/OR SHRUBS

# **APPENDIX A**

## **ENGINEERING LOGS**

**PROJECT LOCATION: Swan Hill Visitor & Cultural Building, Pioneer Settlement, Monash Drive SWAN HILL**

[illegible]





# **APPENDIX B**

## **LABORATORY REVIEW**

Unit 2 48 Tenth Street MILDURA VIC 3500 Telephone: 5023 2870  
Head Office: 10 Latham Street (P O Box 537) Mornington 3931 Tel: (03) 5975 6644 Fax: (03) 5975 9589  
Also at: Thomastown (03) 9874 5844, Albury (02) 6024 4343 and Perth (08) 9395 8684

## CIVILTEST PTY LTD

Soil Testing and Geotechnical Consultants.

TEST METHODS ; AS 1289 2.1.1. & 3.6.1.

## SITE INVESTIGATION LAB REVIEW.

### MILDURA LABORATORY.

SAMPLED BY / DATE:		TS	2/02/2024		Page 1 of 1	
TESTED BY:		RG				
CHECKED BY:		JT				
BALANCE:		24				
OVEN:		19				
REPORT NUMBER:		3230600				
CLIENT:		Common ADR				
PROJECT:		Swan Hill Visitor & Cultural Building				
BOREHOLE NUMBER:	1	1	1	3	3	
SAMPLE NO:						
DEPTHS: mm	300	1600	2400	200	1500	
SAMPLE DESCRIPTION:	CLAY sandy Trace Gravel	CLAY silty Trace sand	CLAY trace sand Grey	CLAY sandy Brown	CLAY silty Trace sand	
GPS POSITION *	Brown Moist Stiff Very Stiff	Grey Brown Moist Stiff to Very Stiff	Moist Stiff to Very Stiff	Moist Stiff to Very Stiff	Brown Grey Moist Stiff to Very Stiff	
EASTING						
NORTHING						
Penetrometer: kPa						
UNIFIED SOIL CLASS: **						
Moisture Content:	18.5%	18.2%	25.3%	20.4%	23.2%	
CLAY AND SILT: -0.075mm	62.4%	83.9%	81.0%	62.8%	89.5%	
FINE SAND: 0.075-0.425mm	36.7%	3.0%	17.7%	24.6%	8.0%	
COARSE SAND: 0.425-2.36mm	0.9%	10.1%	1.3%	11.7%	2.0%	
GRAVEL: +2.36mm	0.0%	3.1%	0.0%	0.9%	0.5%	

\*\* Estimated on visual assessment only

\* GPS is approximate only