CIVIL TEST PTY LTD
SOIL TESTING & GEOTECHNICAL CONSULTANTS
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REPORT No.	:	1111105
CLIENT	:	Mr Dan Mabilia 17 Derby Street NORTHCOTE VIC 3070
PROJECT	:	12 Mabilia Road KILCUNDA
PROPOSAL	:	It is proposed to construct a single storey and/or double storey articulated masonry veneer and/or clad dwelling at this site.

1. COMMISSION:

Investigation for site classification (Australian Standard 2870-2011 Residential Slabs and Footings), recommend a founding depth and or foundation treatment where appropriate.

2. SITE GEOLOGY:

Geological maps of the area suggest that the site is in an area of KLS - Cretaceous Sediment - CLAYS. The site investigation confirmed this.

3. SITE TOPOGRAPHY:

The site has a gentle slope down to the south east. The ground cover comprises of lawn grasses.

4. INVESTIGATION:

Three boreholes were drilled by mechanical auger at the approximate locations shown on the attached plan.

Soil strengths of the cohesive soils were tested (if considered appropriate) by using a shear vane apparatus and observed densities of non-cohesive soils were noted.

The logs of each bore are attached showing the soil descriptions and depths along with any cohesive strengths measured and observed densities on non-cohesive soils.

5. FINDINGS:

The boreholes revealed that the existing soil profile consisted of dark grey sandy SILT FILL overlying the naturally occurring grey sandy SILT. This is followed by grey mottled brown orange sandy CLAY.

6. SITE CLASSIFICATION:

After considering the area geology, the soil profile encountered in the bores, the proposed superstructure and the climatic zone of the area, this site has been classified as CLASS P due to the depth of fill, with respect to foundation construction (Australian Standard 2870-2011 Residential Slabs and Footings). It is anticipated that the seasonal surface movement at this site will not exceed 40mm.

It must be emphasised that the heave mentioned and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report without taking 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).

7. RECOMMENDED FOUNDATION FOR SLABS:

7.1 Slab on Fill:
Where the fill depth exceeds 400mm, it is recommended that an engineered designed slab, founded on either deep edge beams or driven or bored piers should be used at this site. The slab should be designed as a suspended slab.

The edge beams and piers should be founded not less than 100mm into the naturally occurring CLAY as described in the logs of boring which from the site investigation can be assumed to have an allowable bearing capacity of 150kPa at this depth.

As a guide to the founding depths with regard to the above, along with information obtained from the bores, the founding depth at this site will be approximately up to 900mm in relationship to the existing surface where this surface is to be the finished surface level surrounding the structure.

7.2 Skin Friction:
It can be assumed that 20kPa skin friction will exist between the piers and the naturally occurring silty CLAYS, however no skin friction will exist within the crack zone - which at this site is 1500mm from the surface - and/or in any FILL soils.

7.3 Slab on Natural Ground where the Fill is Less Than 400mm Deep:
It is recommended that a CLASS M (Refer AS2870-2011) slab on ground should be used at this site with edge beams founded not less than 200mm below the finished surface level surrounding the structure.

However, the founding depth must be at least 100mm into any of the naturally occurring soil as described in the logs of boring which from the site investigation can be assumed to have an allowable bearing capacity of 80kPa at this depth.

As a guide to the founding depths with regard to the above, along with information obtained from the bores, the founding depth at this site will be approximately up to 500mm in relationship to the existing surface where this surface is to be the finished surface level surrounding the structure.

7.4 Slab and or Stiffening Beams:
Any organic and deleterious matter should be removed from under the proposed slab area to a depth of not less than 50mm and replaced with levelling fill (See 7.5 below) under the slab and internal beams. This excavated surface can be assumed to have an allowable bearing capacity of at least 50kPa.

7.5 Levelling Fill:
Up to 400mm of site derived clayey or 800mm of site derived sandy or imported sandy levelling fill including existing fill material, if any, may be placed under the slab and internal beams providing that this filling is placed in 150mm thick layers and compacted in a moist condition using a light weight vibratory roller or vibratory plate tamper or similar to form a dense layer. Based on the likely condition of this levelling fill, an allowable bearing capacity of at least 50kPa can be assumed to exist beneath the slab and any internal beams founded in or on this filling.

If more than 400mm of site derived clayey or 800mm of site derived sandy or imported sandy fill including existing fill material, if any, is required, then the slab must be designed as a suspended slab and supported by a grid of beams founded through any fill material in accordance with the above edge beam recommendations (or see 11.3 below).

7.6 Drainage During Construction:
Due to the nature and composition of the soil profile found in the site, construction during or after wet weather may be difficult. Therefore, it is recommended that an open cut drain be constructed around the proposed site to a depth of not less than 300mm below the site foundation material, or CLAY, whichever occurs first to intercept any ground water. There is no need to maintain this drain after construction to ground level has been reached. At this stage the drain should be backfilled, failure to do so may have detrimental effects.

8. RECOMMENDED FOUNDATION FOR STRIP FOOTINGS AND/OR PAD FOOTINGS:

8.1 Strip Footings and Pad Footings:
Although classified as CLASS P, the use of CLASS M (AS2870-2011) strip footings and pad footings founded at minimum depths of 525mm and 500mm respectively, below the finished surface level surrounding the structure is recommended. However, the founding depth must be at least 100mm into any of the naturally occurring CLAYS as described in the logs of boring, which from the site investigation can be assumed to have an allowable bearing capacity of 150kPa at this depth.

As a guide to the founding depths with regard to the above along with information obtained from the bores, the founding depths at this site will be up to 900mm for strip footings and up to 900mm for pad footings and stumps in relationship to the existing surface where this surface is to be the finished surface level.

8.2 Foundations Adjacent to Easements:
It is recommended that where any footings are to be constructed next to existing underground services (sewers, etc.), then these footings or edge beams should be founded at a depth above the invert of the service at an angle of repose of 45° for CLAYS and 30° for SANDS, unless special consideration has been given to the founding material.

9. RECOMMENDATIONS ON MINING SUBSIDENCE

Giedl (1984/97) stated that the severity of subsidence and its effects at the surface are related to factors such as the mining depth, extraction thickness and mining method used in the extraction. A major portion of the maximum anticipated mining subsidence generally occurs within one to two years of cessation of mining works. However, Giedl explained further that the period over which subsidence continues is dependent on the thickness of cover rocks and their competence but in general the time period was less than 20 years. There are also cases where subsidence was observed well over 50 years after mining works had stopped. The effect of time is very difficult to assess, and to determine whether subsidence has fully occurred and reached an equilibrium state is almost impossible.

According to Cooney (1983), coal in Kilcunda was extracted from one single seam. Cooney pointed out that based on a few available drilling logs, the seam was found to be part of a sequence of sandstone, mudstone, shale and other very thin coal seams, and frequently both the roof and the floor of the main seam were shale. The approximate seam thickness was up to about 0.7 – 1.0 m and the approximate depths of the coal workings varied significantly between 10 – 100 m below ground surface.

The seam had a slope of 1 in 7.5 (7.6°) towards the northeast. This northerly dip coupled with increasing elevation of the land surface topography northwards meant that there was an overall increase of overburden cover towards the north (towards the Bass Highway). The site in question is located close to the Bass Highway, overburden thickness in this area is assumed to increase proportionately as the land rises in elevation.

The extent of subsidence if any over this area cannot be confirmed as a detailed survey of the ground surface had not been done before and after the mining.
With the currently available information and literature, the following deductions can be made about mining subsidence at the given site:-

(1) Subsidence Hazard Zoning according to Cooney (1985) indicates that the site is in Zone 2 of intermediate to mining subsidence.
Where:
Zone 1 = Areas for which there is a likelihood that subsidence troughs and/or sinkholes may occur;
Zone 2 = Areas for which there is a likelihood that subsidence troughs but not sinkholes may occur;
Zone 3 = Areas not underlain by old workings or their transition zones.

(2) Overburden Thickness: The site is located in an area of, immediate to deep, coal workings. The area of the site is thought to have approximately 40 metres overburden coverage according to Cooney (1985/68, fig.9), which is 20 times the presumed cavity height of 2.0 m.

(3) The year in which mining ceased: Mining works ended in 1953. A time period of about 49 years has lapsed and it is expected that a major portion of the subsidence would have taken place by now. However, it cannot be certain since pre- and post-mining topographical survey data is not available to confirm this.

(4) Other existing structures: Many houses and other structures are presently located over the Kilcunda coal workings but thus far, there is no clear evidence to prove that subsidence is still continuing.

Based on the above, it is prudent to take into account the possibility of some movements occurring. Since cavities were made beneath the area and these may to some extent remain open, the possibility of their eventual and further collapse with repercussions cannot be dismissed. Based on the above points however, the risk of subsidence affecting a structure built on this site appears to be low. As a safeguard it is recommended that the building design be made as flexible as possible to absorb any differential movement that may occur. The most advisable structure would be of timber or similar flexible construction, but if a masonry dwelling is selected it should be fully articulated, so that any differential movement which may occur will cause minimum distress to the structure.

10. FOOTINGS SYSTEM IN A SUBSIDING AREA

Mine subsidence can subject footing systems and the dwellings they support to ground movement including lateral strain, settlement, slope and curvature. In order to reduce the effect of the ground movement, the footing system should be designed to accommodate the differential movement that may occur between footing sections. Therefore it is recommended that an adjustable stump footing system be adopted to support the proposed dwelling. The adjustable stump footings should be designed to allow adjustment of the stump height when subsidence void migration occurs at the ground surface.

It is also recommended that the stump size be designed up to 30% larger than those for the normal condition to accommodate possible lateral strain and any occurring load eccentricity from the upper structure.

Articulation of both the upper structures and footing system should also be considered where applicable.

11. CONDITIONS OF THE RECOMMENDATION:

11.1 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.

11.2 Since the soil horizons and layers can vary in depth and thickness over the site, the depths and bearing capacities given above 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 logs of boring for this site, then the requirements of this report have been met.

11.3 Where any filling is to be placed (other than under the floor slab, refer to 7.3 above) the footing founding depths recommended in this report will need to be increased accordingly by the depth of that fill unless one of the following occurs:-

11.3.1 The base of the footing is founded in the founding soil recommended in 7.1.

11.3.2 The fill has been placed under controlled conditions and compacted to a minimum of 95% of AS1289, 5.1.1 (Standard Compaction) throughout. In this case, the footings may be placed in this fill depending on the findings of further site investigations and the revision of the recommendations made in this report.

11.4 The descriptions of the soils found in the bore holes closely follow those outlined in AS1726 -1993 (Geotechnical Site Investigations). Colour descriptions can vary with soil moisture content. It should be noted therefore, colour and shade descriptions mentioned in this report are made when the soil is in a moist condition.

11.5 This report has been compiled and recommendations made based on information supplied in the brief to Civiltest Pty Ltd and from the field investigations 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.

11.6 To ensure acceptable long term performance of the footing systems recommended in this report, care should be taken that the fundamental building, landscaping and long term maintenance procedures are adhered to as set out in the CSIRO Division of Building, Construction and Engineering: Building Technology File 18 [http://www.publish.csiro.au/pid/3612.htm], "Foundation Maintenance and Footing Performance: A homeowners guide". This information sheet forms an integral part of this report.

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

This report consists of twelve pages including one site plan.

S D BUFFINTON
CIVILTEST PTY LTD

REF: EJ/SF/km

21 September 2011

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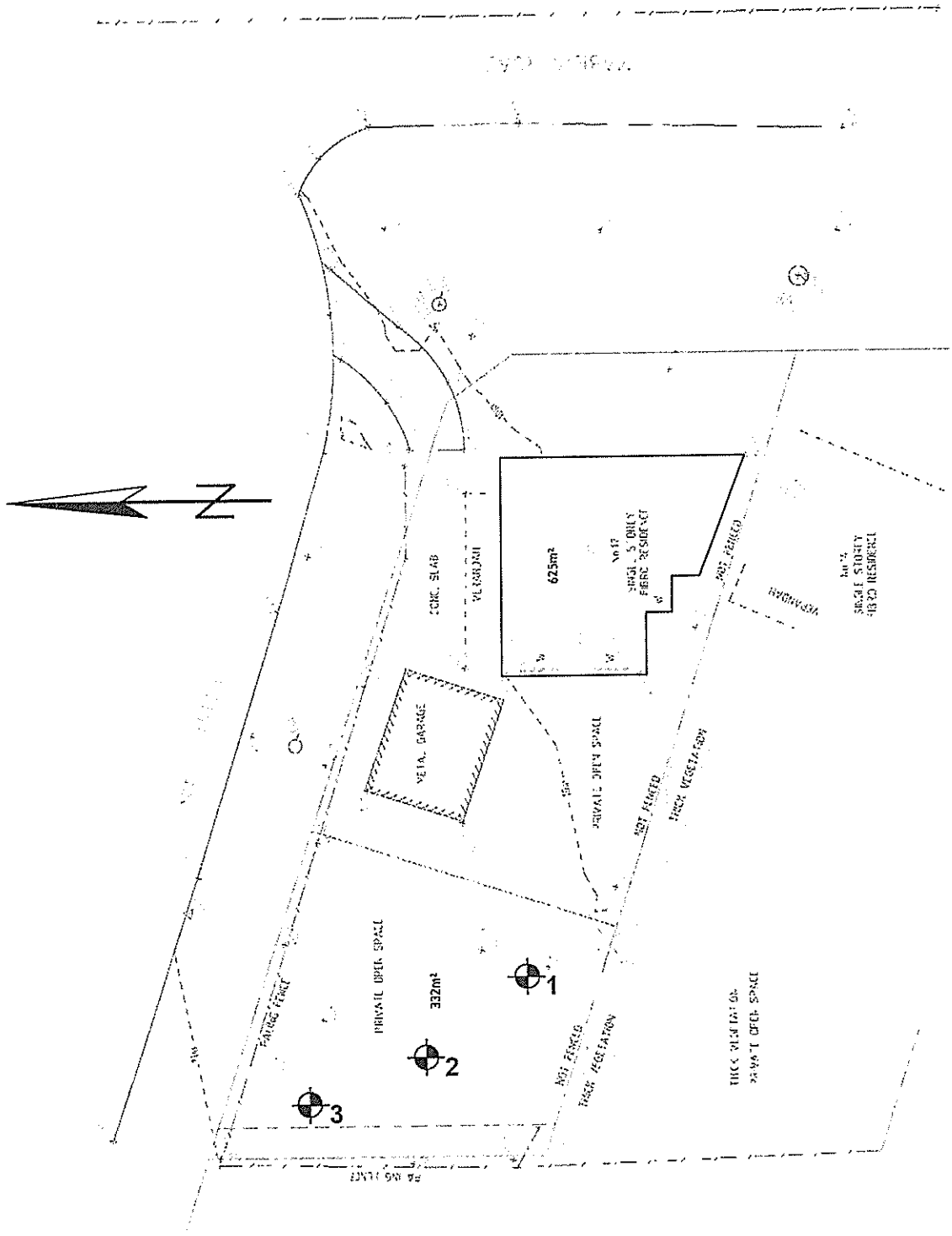
LOCATION OF TEST SITES

12 MABILIA ROAD KILCUNDA



Denotes Test Holes

NOT TO SCALE

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

Test Hole No 1 Depth (m)	Classification	Shear Vane Strength kPa	Engineering Log
0.500	x . . . x . . . x . . . x . . . x . . .		Dark grey Sandy SILT FILL Medium dense Moist to wet Gravels throughout FILL
0.600	x . . . x . . . x . . . x . . .		Grey Sandy SILT Medium dense Wet
1.500	∴ —— – ∴ – —— ∴ —— — ∴ —— – ∴ – —— ∴ ∴ —— – ∴ – —— ∴ —— — ∴ —— –		Grey mottled brown orange Sandy CLAY Firm Moist Pales with depth
			END OF BORE (05/09/11)

Test Hole No 2 Depth (m)	Classification	Shear Vane Strength kPa	Engineering Log
0.700	x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪		Dark grey Sandy SILT FILL Medium dense Moist to wet Gravels throughout FILL
0.800	x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪		Grey Sandy SILT Medium dense Wet
1.500	∴ —— – ∴ – —— ∴ —— – ∴ —— – ∴ – —— ∴ —— – ∴ – —— ∴ —— –		Grey mottled brown orange Sandy CLAY Firm Moist Pales with depth
			END OF BORE (05/09/11)

Engineering Log

Test Hole No 3 Depth (m)	Classification	Shear Vane Strength kPa	
0.600	x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪		Dark grey Sandy SILT FILL Medium dense Moist to wet Gravels throughout FILL
0.800	x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪ x ▪ ▪ ▪		Grey Sandy SILT Medium dense Wet
1.500	∴ —— – ∴ – —— ∴ —— – ∴ —— – ∴ – —— ∴ ∴ —— – ∴ – —— ∴ —— – ∴ —— –		Grey mottled brown orange Sandy CLAY Firm Moist Pales with depth
			END OF BORE (05/09/11)