GEOTECHNICAL SITE CLASSIFICATION REPORT

PROPOSED UNIT DEVELOPMENT
PROJECT: 2240433-1
17 RAILWAY PARADE, SEAFORD

RESCOM Consulting Engineers

Date of Fieldwork	22 February 2024
Site Classification (in accordance with AS2870-2011)	P (due to demolition)
Underlying Geology	Quaternary Sand Deposits (0-20mm)
Wind Classification (in accordance with AS4055-2021)	N1
Bushfire Attack Level (BAL) (in accordance with AS3959-2018)	LOW (please refer to Section 3)

Report prepared for: E&U Bafto Corporation
23 February 2024

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ResCom Consulting Engineers Pty Ltd.
1 Woodbine Court, Wantirna South.
ACN 617 439 951.

1. INTRODUCTION

ResCom Consulting Engineers (RCCE) have been engaged to conduct a limited appropriate field investigation at this site, to determine the current ground and subsurface conditions for the proposed articulated brick veneer development. The objectives are the identification, measurement and assessment of the following:

- site classification;
- presence and depth of fill;
- strengths of foundation strata;
- level and quantity of groundwater;
- suitable footing systems;
- minimum founding depths.

This report outlines footing recommendations to satisfy AS2870-2011 Residential Slabs and Footings, in accordance with NCC 2022.

This report is only applicable for the subject site and type of building detailed herein. If the location or type of construction is modified, RCCE must be contacted, as revised recommendations may be required.

2. FIELDWORK

Two (2) Boreholes were drilled and disturbed samples collected, to provide information on subsurface soil profiles. Cohesive strengths were field tested and observed densities of non-cohesive soils were noted as appropriate.

The approximate locations of the boreholes are shown on the Borehole Location Plan.

The Engineering Logs are attached and form part of this report. The soil descriptions in the Engineering Logs, are in accordance with AS1726-2017 Geotechnical Site Investigations.

2.1 Site Geology

GeoVic on-line geological mapping and relevant Geological Survey of Victoria maps, indicate this site to be located within an area of **Quaternary Sand Deposits.**

In general, the anticipated subsurface conditions have been encountered during this site investigation and are considered to be consistent with the geological maps.

2.2 Climatic Zone and Soil Suction Profile

In accordance with AS2870-2011 Figures D1/D2 & Table 2.5, this site is located within climatic zone:

- Zone 2 - Depth of design suction change (H_s) is 1.8m.

2.3 Site Description

At the time of this investigation, the site had a slight slope and was occupied (the existing structures are proposed to be demolished). The vegetation consisted of large and immature tree/s and shrub/s on this and adjoining sites.

3. BUSHFIRE ATTACK LEVEL (BAL)

At the time of investigation, an assessment of this site and the surrounding terrain was carried out to determine the Bushfire Attack Level (BAL).

In accordance with Section 2 Determining the Bushfire Attack Level (BAL), Clause 2.2 Simplified Procedure (Method 1) and Table 2.4.2 of AS3959-2018 Construction of Buildings in Bushfire-Prone Areas, this site is rated:

- **BAL LOW.** The risk is considered to be **VERY LOW**.
  There is insufficient risk to warrant any specific construction requirements, but there is still some risk.
  The risk is very low and radiant heat on the building is not significant enough to warrant specific construction requirements; however ember attack may still occur.
  If you are in a designated BPA and your bushfire attack level is **BAL LOW**, you must still construct to a minimum **BAL 12.5**.

The BAL Assessment Report can be found in this report.

4. WIND SPEED ANALYSIS

At the time of investigation, an assessment of this site and the surrounding terrain was carried out to determine the Wind Classification Design Speed.

Based on calculations in accordance with AS4055-2021 Wind Loads for Housing, the Ultimate Limit State ($V_{h,u}$) Design Gust Wind Speed for this site has been determined as:

- **N1 (34m/sec).**

Refer to Section 1.2 of AS4055-2021, for applicable conditions (geometric limits).

If wind loads are determined using AS4055-2021, design parameters shall be derived from AS4055-2021 only. Where wind loads are determined using AS/NZS 1170.2, design parameters in that Standard only must be used.

5. SITE CLASSIFICATION

Site Classification is based on the expected ground surface movement and the depth to which this movement extends. This site has been classified in accordance with AS 2870-2011, Clauses 2.1.2 and 2.1.3 using the techniques and principles specified in Clauses 2.2, 2.3, 2.4 and 2.5.

Please note that Site Classification may require consideration of factors beyond the boundaries of the subject site.

In accordance with AS 2870-2011, this site is classified **CLASS P.**

This site has been classified **P** due to:

- soil disturbance caused by the removal of existing tree/s;
- soil disturbance caused by the removal of existing structure/s and footings;

This classification was determined by taking into consideration the area geology, soil profile encountered, the climatic zone of the area and any potential abnormal moisture conditions.

In accordance with AS2870-2011 Table 2.3, it is estimated that the characteristic surface movement (y_s) will be in the range of **0 to 20mm (Class S)**.

6. FOOTING RECOMMENDATIONS

Based on the Site Classification, and in accordance with AS2870-2011, standard design footing systems may not be considered on this site. The footings must be designed by an experienced structural engineer. The designer should refer to the recommendations below to finalise the footing design.

The following recommendations assume that aspects of site drainage, paving, and landscaping are taken into consideration and implemented in accordance with Footing and Foundations Society Practice Notes (2013) "Guide to Foundation Maintenance for Reactive Soils" and CSIRO Building Technology File (BTF) 18 "Foundation Maintenance and Footing Performance: A Homeowner's Guide".

6.1 Slab

6.1.1 Slab Preparation

Any topsoil, grass roots, organic matter, surface rubbish, or other deleterious material shall be removed from the area on which the slab is to rest (a minimum scrape of 100mm is recommended). The building area may then be levelled by spreading fill under the slab panel areas and internal beams.

Slab panels, non load-bearing internal beams or ribs and load-support thickenings may be founded on natural soil, controlled fill or rolled fill.

Load-bearing edge beams and any load-bearing internal beams are to be founded on natural soil or controlled fill only. This fill shall continue past the edge of the building by at least 1m and shall be retained or battered beyond this point by a slope not steeper than 1:2. Any load-bearing beams shall not be founded on rolled fill.

6.1.2 Stiffened Raft Slab

Edge beams should be taken through any poorly compacted surface fill and founded at least 100mm into the natural loose to medium dense sand, where an allowable bearing capacity of 100kPa will be achieved.

Please refer to bolded notes at the end of this report.

This footing system must be designed by a structural engineer familiar with this form of construction and with reference to the relevant requirements of AS2870-2011.

6.1.3 Waffle Raft Slab

The depth of fill, including any existing fill, placed under the slab shall not exceed 300mm. Any fill must be compacted in accordance with the requirements of AS2870-2011, Clause 6.4.2. If this is not the case, engineer designed piers/piles will be required. The edge beams must be founded onto the natural loose to medium dense sand, where an allowable bearing capacity of 100kPa will be achieved.

Please refer to bolded notes at the end of this report.

This footing system must be designed by a structural engineer familiar with this form of construction and with reference to the relevant requirements of AS2870-2011.

7. BORED PIERS

Bored piers may be required due to:

- Depth of fill;

Bored piers should be founded at a minimum depth of 0.6m into the underlying natural **loose to medium dense** sand founding material.

Soil	Allowable End Bearing (kPa)
filling/sand	0
loose to medium dense sand	100

The bases of all pier excavations must be clean and free of all loose material, and the concrete poured as soon as practicable upon completion of boring/excavation.

8. SCREW-IN PILES

8.1 Pile System

The structure could also be supported on screw-in piles. The screw-in piles should be designed in accordance with Appendix G6 of AS2870-2011.

8.2 Design Actions

Screw-in piles should be designed for all imposed vertical and lateral loads from the supported residential construction plus load due to swelling or shrinking of the foundation, and including loads imposed during installation. For sites with deep fill, the effect of negative skin friction should be considered.

8.3 Minimum Depth

The installed depth of the screw-in piles should not be less than $1.25H_s$. Final pile lengths should be determined by the design engineer. Alternatively, a test screw-in could be placed in order to determine final depths and capacities.

8.4 Design Strength

Screw-in piles should satisfy the following requirements:

- The design strength should be in accordance with AS2159.
- The design strength of the pile in compression and bending should consider the effective supported length of the shaft. The freestanding portion of the pile above ground is unsupported. The pile may effectively be unsupported in a soft or loose soil layer, or dry clay soil with shrinkage cracks.
- If a screw-in pile is to resist bending actions, the shaft should be embedded into the pile cap or footing sufficient to generate the required resistance.

8.5 Pre-Boring

Some difficulties may be experienced with pile driving due to the presence of underground obstructions and therefore allowance should be made for relocating some piles or for pre-boring pile locations. It is critical for future performance of the piles that the pre-boring does not create an oversized hole that allows surface water to ingress into the foundation. The maximum pre-bore diameter that should be used is 90% of the minimum pile diameter.

The installation of piles should not create voids or permeable paths that could allow water ingress to reactive clay foundations.

9. SITE SPECIFIC POTENTIAL CONSTRUCTION DIFFICULTIES

9.1 Groundwater and Soft Soils

The potential presence of groundwater within soil horizons may lead to construction difficulties.

Due to the nature of soils on this site, the surface may become soft and boggy during wet weather.

Surface filling or natural sands may cause collapse of side of excavations.

Drilling bored piers in sand may cause collapse of the piers, therefore screw-in piles are recommended.

10. GENERAL AND SITE MAINTENANCE RECOMMENDATIONS

10.1 Surface Drainage

Surface drainage of the site shall be controlled from the start of site preparation and construction. The drainage system shall be completed by the finish of construction of the building, in accordance with AS2870-2011 Clause 5.6.3.

Surface drainage shall be designed and constructed to avoid water ponding against or near the building. The ground immediately adjacent to the building should be graded to a uniform fall of 50mm minimum away from the building over the first metre, and shaped to prevent ponding of water. Where filling is placed adjacent to the building, the filling shall be compacted and graded to ensure drainage of water away from the building.

The subfloor space for buildings with suspended floors should be graded or drained to prevent ponding where this may affect the performance of the footing system.

The roof water should be diverted away from the footing as soon as the roof is constructed by using temporary pipes, if necessary. The surface water should also be provided by constructing surface gutters or grading the surface to divert the water away from the footing.

All surface drainage recommendations should be maintained for the economic life of the building.

10.2 Subsurface Drainage

The base of trenches shall be sloped away from the building. Trenches shall be backfilled with clay in the top 300mm within 1.5m of the building. The clay used for backfilling shall be compacted.

Where pipes pass under the footing system, the trench shall be backfilled full depth with clay to act as a barrier to the ingress of water beneath the footing system. Alternatively, a plastic membrane across the cross-section of the trench, taped to the pipe and keyed into the sides and base of the trench may be used.

Subsurface drains to remove groundwater shall not be placed within 1.5m of the building unless designed in accordance with engineering principles.

10.3 Existing Services

Any new footings to be constructed adjacent to existing underground services (eg. sewers, stormwater drains, etc..) should be deepened or supported on bored piers/piles below the invert level of the angle of repose in the natural, undisturbed soils.

10.4 Masonry Articulation

Foundation movement may be a cause of visible cracks in buildings and/or brickwork. It is essential to provide flexibility of the structure by considering full height openings (doors and windows) or masonry articulation joints at suitable spacings.

The articulation of masonry as deemed necessary by the design engineer, shall comply with the requirements of Technical Note 61 published by the Cement and Concrete Associations of Australia (TN 61. (1.6)).

10.5 Concrete Shrinkage Cracking

Surface cracking of concrete slabs is common (and expected) as the concrete cures. This cracking can continue for up to 18 months, and has no effect on the long-term structural integrity or performance of the slab.

The time of attachment of floor coverings and the selection of the adhesive for them should take into account the moisture in the concrete floor and its possible effect on adhesion. Concrete floors can take a considerable time to dry (three to nine months).

Floor coverings and their adhesives can be damaged by moisture in the concrete and by the shrinkage that occurs as the concrete dries. The time of fixing of floor coverings and the selection of the adhesive should take these factors into account.

10.6 Long Term Foundation Maintenance

Homeowners should be made aware of their responsibilities regarding the ongoing maintenance of the building and site. Guidance to the Homeowner is available in a document published by the CSIRO: Building Technology File 18 (formerly known as Information Sheet 10-91), entitled: Foundation Maintenance and Footing Performance: A Homeowner's Guide. This document may be obtained from CSIRO Publishing (www.publish.csiro.au). It is suggested that a copy be given to the new Homeowner by the builder. Site maintenance after occupation, becomes part of the owner's accepted responsibilities.

The appropriate site drainage, paving, landscaping and foundation maintenance should be implemented as soon as possible after completion of construction of the building.

11. CONDITIONS AND LIMITATIONS

This report has been exclusively prepared for the benefit of our client, and it may not be relied upon for any other purpose without the prior written consent of RCCE.

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

The client has a responsibility to investigate the previous land use of the site, that may be relevant to the condition of the soil profile or proposed building works (e.g. previous buildings, locations of filled excavations, grubbed out large trees, etc.). If at a later time it is found that the information previously provided to RCCE was incorrect, incomplete and/or if at any time the soil conditions are found to differ from those reported, RCCE should be contacted immediately for further site assessment.

This report is based on the conditions of the site at the time of testing. In subsurface investigations, the soil profiles encountered may differ significantly between test points and sample intervals and at locations other than where observations, explorations or investigations have been carried out. Whilst the utmost application of professional observation, knowledge and experience is taken to foresee possible variations in the soil profile across the site, it is not possible that these are comprehensive, particularly in the determination of the depth of fill across the site. This applies especially in the presence of undetected filled excavations or natural depressions (filled swimming pools, drainage ditches, dams, creek channels, grubbed-out trees etc.). Therefore, if it is found during construction that for any reason the soil profile differs considerably to that described in this report, RCCE must be contacted immediately for further site investigation and/or amendment of the report. Thus any conclusions drawn in this report have some level of uncertainty because of the inherent variations that can exist at any site. RCCE accepts no responsibility and shall not be liable for any consequence of changed or unanticipated surface or subsurface conditions.

The recommendations in this report are valid for a maximum period of twelve (12) months, provided that the site conditions do not change significantly prior to construction. In accordance with AS2870-2011 Clause 2.5.2, the recommendations may become invalid if additional controlled or uncontrolled filling is placed, or if the site is cut by more than 500mm. Other changes to the site which may render this report invalid include, but are not limited to; changes to the design and/or construction methods proposed, planting of trees on the subject site or neighbouring properties, abnormal weather conditions, or failure of plumbing or drainage on or adjacent to the subject site.

If fees for this and any associated documentation are not paid in full, RCCE reserves the right to disclaim any documentation relevant to this project in its entirety. This report will remain the property of RCCE and may be withdrawn unless payment is received.

Soil and drilling depths are given to a tolerance of +/- 100mm.

Should the subsurface conditions encountered during construction vary from those described in this report, RCCE must be advised of these variations to provide comment or inspect the site as necessary. The use of standard footings as presented in AS2870-2011 is only applicable to building with loadings and a construction style similar to that of a residential dwelling as described in section 3.1 of AS2870-2011.

This report is not a detailed geotechnical investigation. It complies with the requirements of AS2870-2011 and is limited to the items required under Clause 2.2.2(a).

The presence of variable filling should be expected, due to backfill from tree removal, removal of footings from previous structures, service trenches, etc.. Deeper founding depths and/or suspended slab panels may be required.

This report has been issued as final, despite the existing structures which are to be demolished. It is recommended that an additional site investigation be undertaken post-demolition, to assess the extent of soil disturbance due to demolition works (unless supported on piles). This should occur once the existing structures have been demolished and the site has been cleared.

Andre Merheb
B.Eng (Honours), MIEAust
admin@rcce.com.au
9468 5232

For and on behalf of


Beware
22/02/24


22/02/24

12. BAL ASSESSMENT REPORT

The Bushfire Attack Level (BAL) for this site has been calculated based on the house siting details provided. Should the house siting be modified, an updated BAL assessment may be required.

Step 1. Determine Relevant Fire Danger Index (FDI).

Victorian Alpine Areas	50
Victorian General (excluding alpine areas)	100

Step 2. Vegetation Classification.

	North	South	East	West
Vegetation Type	Forest	Forest	Forest	Forest
	Woodland	Woodland	Woodland	Woodland
	Shrubland	Shrubland	Shrubland	Shrubland
	Scrub	Scrub	Scrub	Scrub
	Mallee/Mulga	Mallee/Mulga	Mallee/Mulga	Mallee/Mulga
	Rainforest	Rainforest	Rainforest	Rainforest
	Grassland	Grassland	Grassland	Grassland
	Excludable	Excludable	Excludable	Excludable

Step 3. Distance to Classified Vegetation.

	North	South	East	West
Distance from the property boundary to vegetation	**>100m**	**>100m**	**>100m**	**>100m**

Step 4. Effective Slope of Land Under Classified Vegetation.

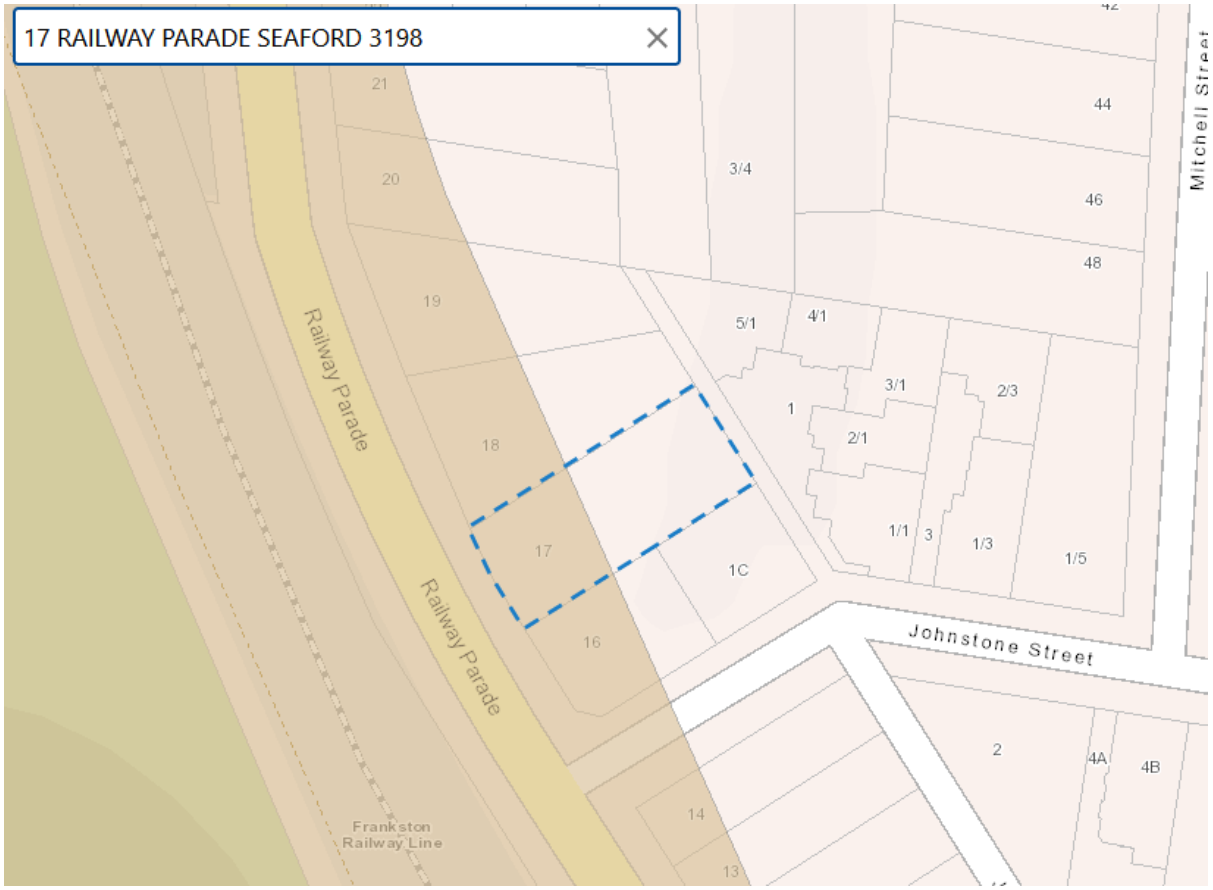
	North	South	East	West
Flat/Upslope	Yes	Yes	Yes	Yes
Downslope	>0-5°	>0-5°	>0-5°	>0-5°
	>5-10°	>5-10°	>5-10°	>5-10°
	>10-15°	>10-15°	>10-15°	>10-15°
	>15-20°	>15-20°	>15-20°	>15-20°

Step 5. Determination of Bushfire Attack Level (BAL).

Using the inputs from Step 2, 3 & 4 the corresponding BAL can be determined.

BAL: **LOW**

Comments/Notes: **If you are in a designated BPA and your bushfire attack level is BAL LOW, you must still construct to a minimum BAL 12.5.**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Mitchell Street
Frankston
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14
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3/4
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1
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3
2/3
1/3
1/5
1C
44
46
48
2
4A
4B


Diameter: 200.0m
Radius: 100.0m

13. BOREHOLE LOCATION PLAN

14. ENGINEERING LOGS

Borehole 1

Depth (mm)	Texture / Density	Soil Description	Moisture	Allowable Bearing at up to 100mm embedment (kPa)	Notes
0					
200	Poorly Compacted	**Fill**; silt and sand containing gravel	moist	0	Drilling Method: Mechanical Auger.
3000	Loose to Medium Dense	Silty **SAND**; brown, grey	moist	100	No groundwater encountered.
		Terminated			

Borehole 2

Depth (mm)	Texture / Density	Soil Description	Moisture	Allowable Bearing at up to 100mm embedment (kPa)	Notes
0					
300	Poorly Compacted	**Fill**; silt and sand containing gravel	moist	0	Drilling Method: Hand Auger.
1200	Loose to Medium Dense	Silty **SAND**; brown, grey	moist	100	No groundwater encountered.
		Terminated			