

# SITE INVESTIGATION **REPORT**

12 April 2018

PROPOSED ALTERATIONS & ADDITIONS  
**76 URQUHART STREET, HAWTHORN.**

JOB NUMBER: **2181808**



**REPORT** prepared for

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## 1. INTRODUCTION

We are pleased to report on investigations carried out at the above site with the object of determining the ground conditions so that recommendations could be made on suitable foundation types and design parameters for the proposed alterations and additions.

This report outlines footing recommendations to satisfy AS2870-2011 in accordance with the National Construction Code Series Volumes One and Two - Building Code of Australia, 2017.

## 2. FIELDWORK

2 Boreholes and 1 Testpit were placed. The Engineering Logs are attached and form part of this report. The location of the boreholes and testpit placed is described on the Borehole Location Plan.

## 3. SITE GEOLOGY

The site is located in an area of Quaternary Alluvial Deposits bordering Silurian Mudstones.

## 4. SOIL CONDITIONS

The soil profile and condition in each borehole is described on the Engineering Logs attached.

## 5. SITE CLASSIFICATION

The site is classified as **CLASS P** in accordance with AS2870-2011. A characteristic surface movement ( $y_s$ ) in the range of 20mm to 40mm has been estimated for this site.

The site has been classified **P** due to existing filling on this site and abnormal moisture conditions caused by existing trees on this site and adjoining sites and proposed removal of existing structure and footings.

The underlying natural soil has been classified as **MODIFIED CLASS M**.

Note: The above classification is based on the site conditions not changing significantly prior to construction. In accordance with AS2870-2011, Clause 2.5.2, the classification may need to be amended if the site is cut by more than 500mm or if additional controlled or uncontrolled fill is placed.

## 6. EXISTING FOOTINGS

The existing footing details as exposed at Test Location 3, are contained in the Engineering log attached.

Based on the observed stiffness of the natural clays beneath the footing exposed at Test Location 3, an allowable bearing capacity of **200kPa** will exist beneath the concrete footing.

The results of testing are attached.

## 7. FOOTING RECOMMENDATIONS

### 7.1 Timber Floor System

The use of Modified Class M strip footings and stumps is recommended. The *minimum* founding depths for these footings is 800mm for strips and 800mm for stumps. Footings should be taken through any surface fill and founded at least 100mm into the underlying natural clays. An allowable bearing pressure of at least 200kPa will exist beneath these footings at the depths recommended below.

Borehole	Recommended Founding Depth For Strips (mm)	Recommended Founding Depth For Stumps (mm)	Founding Material
1	800 <sup>*1</sup>	800 <sup>*1</sup>	clay
2	800 <sup>*1</sup>	800 <sup>*1</sup>	clay

<sup>\*1</sup> Existing trees and large shrubs may be located too close to proposed footings. If so, then vegetation should either be removed or root barriers designed and constructed. Alternatively, footings may be deepened to 2000mm.

*Correct drainage and site maintenance is particularly important at this site. Refer to the "General Construction and Site Maintenance Requirements" section of this report and to sections 5 and 6 of AS2870-2011.*

*Surface drainage must be considered in the design of this footing system in accordance with Clause 5.6.3 of AS2870-2011. Surface drainage must be controlled from the start of construction and must be completed by the finish of construction. Subsurface drains to remove groundwater shall not be used within 1.5 metres of the building unless designed in accordance with engineering principles.*

*These details are to be used as a guide only and this footing system must be designed by an engineer familiar with this form of construction.*

### 7.2 Concrete Slab Floor System

The use of a Suspended Slab System is recommended.

A slab freeboard (height to top of slab from surrounding ground level) of 150mm is recommended. The suspended slab panels should be supported on a series of deepened slab beams, strip footings, pad footings, bulk piers or bored piers.

All slab beams, footings and piers should be taken through any filling and founded at least 100mm into the natural clays. An allowable bearing capacity of at least 200kPa will exist beneath these slab beams, footings and piers at the depths recommended below.

Borehole	Recommended Founding Depth For Slab Beams, Footings and Piers (mm)	Founding Material
1	700	clay
2	700	clay

Note: where the depth of fill is less than 400mm, then a Modified Class M slab on ground may be used. A bearing capacity of 50kPa will exist in the natural silts.

*Correct drainage and site maintenance is particularly important at this site. Refer to the "General Construction and Site Maintenance Requirements" section of this report and to sections 5 and 6 of AS2870-2011.*

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*These details are to be used as a guide only and this footing system must be designed by an engineer familiar with this form of construction.*



### 7.3 Waffle Raft Slab Floor System

The use of a Suspended Waffle Raft Slab is recommended.

All slab beams, footings and piers should be taken through any filling and founded at least 100mm into the natural clays. An allowable bearing capacity of at least 200kPa will exist beneath these slab beams, footings and piers at the depths recommended below.

Borehole	Recommended Founding Depth For Slab Beams, Footings and Piers (mm)	Founding Material
1	700	clay
2	700	clay

A Suspended Waffle Raft Slab supported on piers is recommended.

The suspended waffle raft slab is to be proportioned to minimum Modified Class M specifications. Piers should be taken through any filling and founded at least 300mm into the natural clays. Refer to the Bored Pier section of this report for allowable bearing capacities.

Where the depth of fill, including existing fill, will be less than 300mm and be compacted in accordance with the requirements of AS2870-2011, Clause 6.4.2(a), then the use of a Modified Class M waffle raft slab without piers is recommended.

Once the site has been scraped and all vegetation, organic topsoil, roots and loose surface fill have been removed, an allowable bearing capacity of 50kPa will exist at the surface.

Where the depth of fill is less than 300mm and is not compacted in accordance with the requirements of AS2870-2011, Clause 6.4.2(a), all edge beams and internal beams shall be founded directly onto the natural soil where a bearing capacity of at least 50kPa will exist.

*Correct drainage and site maintenance is particularly important at this site. Refer to the "General Construction and Site Maintenance Requirements" section of this report and to sections 5 and 6 of AS2870-2011.*

*Surface drainage must be considered in the design of this footing system in accordance with Clause 5.6.3 of AS2870-2011. Surface drainage must be controlled from the start of construction and must be completed by the finish of construction. Subsurface drains to remove groundwater shall not be used within 1.5 metres of the building unless designed in accordance with engineering principles.*

*These details are to be used as a guide only and this footing system must be designed by an engineer familiar with this form of construction.*

### 7.4 Bored Piers

Bored piers could be adopted. Piers should be taken minimum 300mm into the underlying clay to achieve the end-bearing and side friction noted below. The following design parameters are recommended:

Soil Type	Allowable End-Bearing Capacity (kPa)	Allowable Side Friction Capacity (kPa)
filling	0	0
silt/sand	0	0
clay	200	30

The bases of all excavations for piers should be well cleaned out prior to the pouring of concrete. Also, the above side friction parameters do not allow for gross smearing of the sides of holes by clay/mud. If this occurs during construction, then either the sides of the holes should be 'roughened' or a reduction in side friction capacity made.

*The construction of bored piers may prove difficult due to possible collapse of the sides of excavations or ground water ingress.*

## 8. GENERAL INFORMATION

Since the depth and thickness of the soil layers may vary across the site, the depths given above are only guides. Provided footings are at least the minimum size and are constructed on the recommended founding material given above, then the footings will have fulfilled the requirements of this report.

There is no technical reason to found all footing trenches at the same level or to make them constant in size.

Any earthworks carried out over the site will change the founding depths given above. If the site is levelled by cut, then the founding depths may be reduced to the minimum values specified. If levelling fill is placed on the site, then the founding depths will increase accordingly.

## 9. GENERAL CONSTRUCTION AND SITE MAINTENANCE REQUIREMENTS

### 9.1 General

The satisfactory performance of the footings detailed in this report assumes that the notes detailed below are followed.

Reference should also be made to CSIRO's *Guide to Home Owners on Foundation Maintenance and Footing Performance*, BTF 18-2003, and to *Appendix B* of *AS2870-2011*, for a more detailed presentation of similar requirements.

### 9.2 Drainage

The ground surface and paving around the building should be graded or drained to prevent the ponding of water adjacent to footings. This may necessitate providing at least 100mm fall over the first two metres away from the building. Any paving should also be suitably sloped.

### 9.3 Vegetation

Trees and large shrubs should not be planted or allowed to exist closer to the building than 0.75 times their expected mature height. Closer planting may be possible by the correct use of tree root barriers or equivalent.

### 9.4 Plumbing and Drainage

Roof gutters, downpipes, stormwater and sewerage drainage should be regularly maintained to prevent leaks or overflows. Any leakages should be repaired or replaced as soon as possible. Service trenches located alongside any building should be offset at a lateral distance at least equal to their depth.

### 9.5 Existing Services and Footings

The presence of services on this and adjacent sites should be determined and their effect on the proposed footings considered. The depth of any adjacent building footings should be considered in the proposed footing design and construction.

### 9.6 Masonry Articulation

All brickwork should be well articulated by the provision of full-height joints at a maximum continuous spacing of 6m. Brickwork control joints should be provided at or near changes in foundation soil/rock type.

### 9.7 Shrinkage Cracking For Concrete Slabs

Surface cracking for concrete slabs is to be expected as the concrete cures. This problem is of no structural significance and will not affect the performance of the slab. However, this shrinkage cracking may transmit through brittle floor tiles causing them to crack. Therefore, the placement of floor tiles should be delayed as long as possible and a flexible adhesive and a weak grout should be used.

### 9.8 Inspections

All excavations should be carefully inspected to ensure that a suitable founding material has been reached and to check for the presence and variations in depth of filling. This office should be contacted if any doubt exists.

### 9.9 Filling

Care has been taken to identify any filling on this site. A check should however be made with all relevant authorities e.g. Local Council, to locate possible former dams, creeks, etc. If any doubt exists at the time of construction regarding identification of filling, then this office should be contacted for further advice.

## 10. CONSTRUCTION DIFFICULTIES AND SPECIAL SITE FEATURES

The presence of groundwater within the surface soils may lead to construction difficulties especially during wet Winter and Spring months.

The sides of excavations through the surface filling and natural sands may collapse.

It is recommended that a feature survey be carried out by a licensed surveyor prior to footing design in order to: locate all trees, easement pipes and adjoining structures etc... The relevant engineer should then take into account all those features at the time of design.

**Existing trees and large shrubs may be located too close to proposed footings (refer above). If so, then vegetation should either be removed or root barriers designed and constructed. Alternatively, footings may be deepened to 2000mm.**

The presence of variable filling on this site should be anticipated, e.g. footings from previous structures, service trenches, backfill from tree removal, etc. Allowance should be made for deeper founding depths and/or suspended slab panels if required.

  
For and on behalf of  
 **Macgregor**  
GEOTECHNICAL

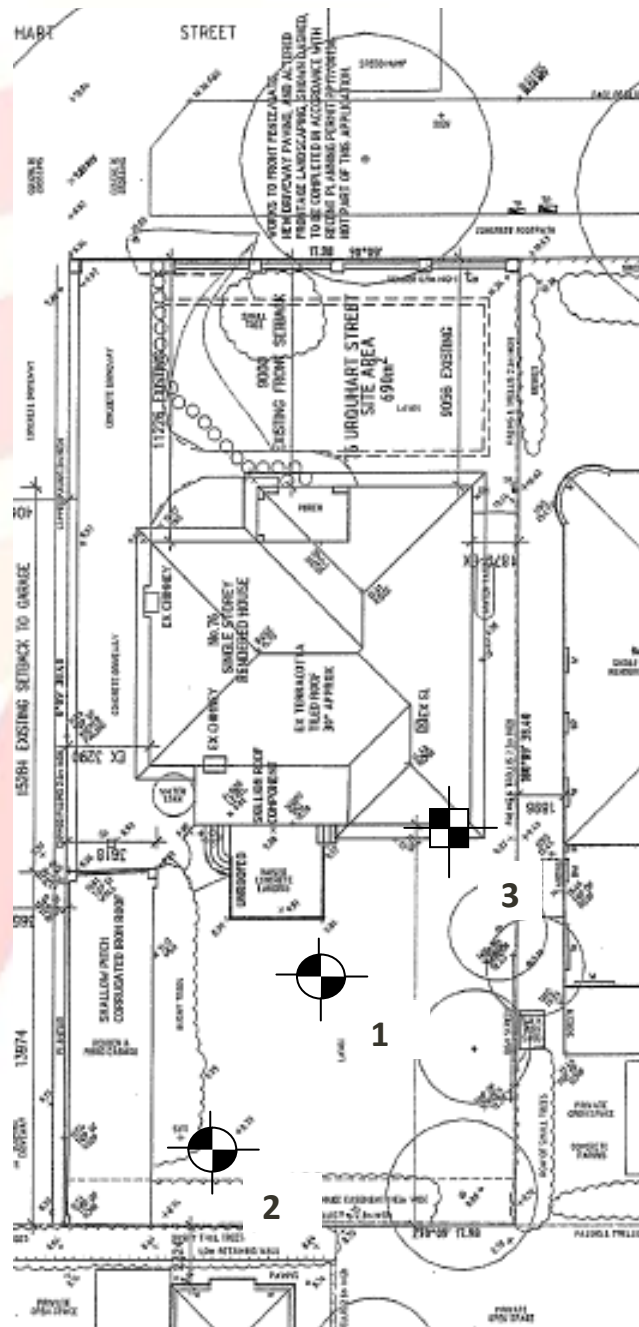






## PROPOSED ALTERATIONS & ADDITIONS

### 76 URQUHART STREET, HAWTHORN.

prepared for **West Valentine**

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## 12. ENGINEERING LOG

### PROPOSED ALTERATIONS & ADDITIONS 76 URQUHART STREET, HAWTHORN.

prepared for **West Valentine**

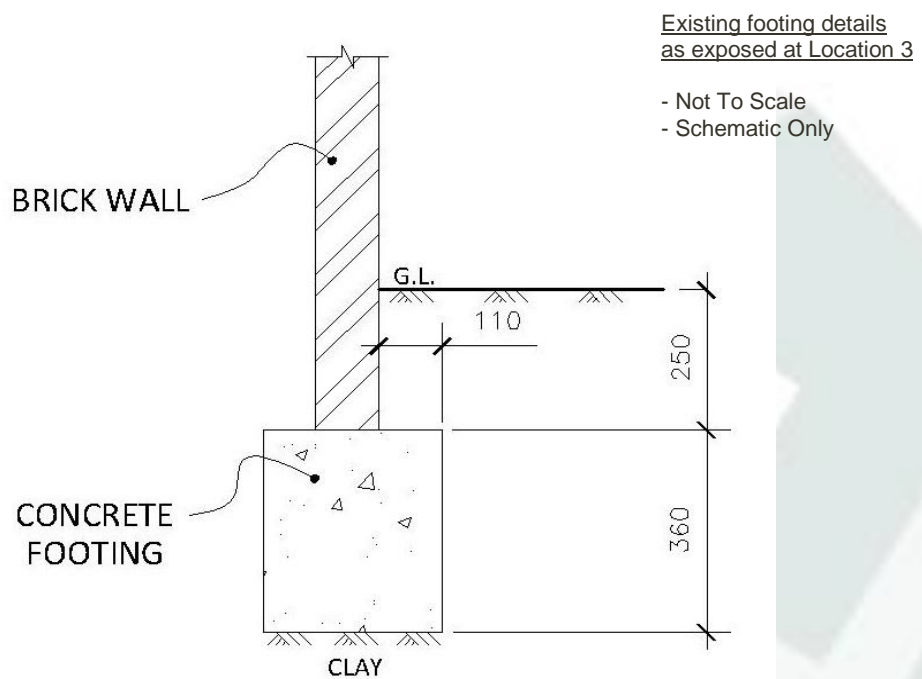
Borehole No. 1.		Refer to site plan		
Depth (mm)	Description	Soil Type	Moisture Condition	Comments
0	Loose sand and gravel fill	FILL	dry	Borehole dry on completion
600	Stiff to very stiff brown, orange and grey silty clay	CLAY	moist	Drilled by hand auger
1200	Terminated			

Borehole No. 2.		Refer to site plan		
Depth (mm)	Description	Soil Type	Moisture Condition	Comments
0	Loose sand and silt fill	FILL	dry	Borehole dry on completion
400	Loose grey and brown clayey silt	SILT	dry	Drilled by hand auger
600	Stiff to very stiff brown, orange and grey silty clay - containing tree roots	CLAY	moist	
1200	Terminated			



**Borehole No. 3.** Refer to site plan

Depth (mm)	Description	Soil Type	Moisture Condition	Comments
0	Loose sand and gravel fill	FILL	dry	Borehole dry on completion
600	Stiff to very stiff brown, orange and grey silty clay	CLAY	moist	<b>Drilled by hand auger</b>
1000	Terminated			

**Testpit No. 3.** Refer to site plan

Drill Make: Type: Hand Supervisor: cb Date: 11/04/18 Logged: cb Checked: