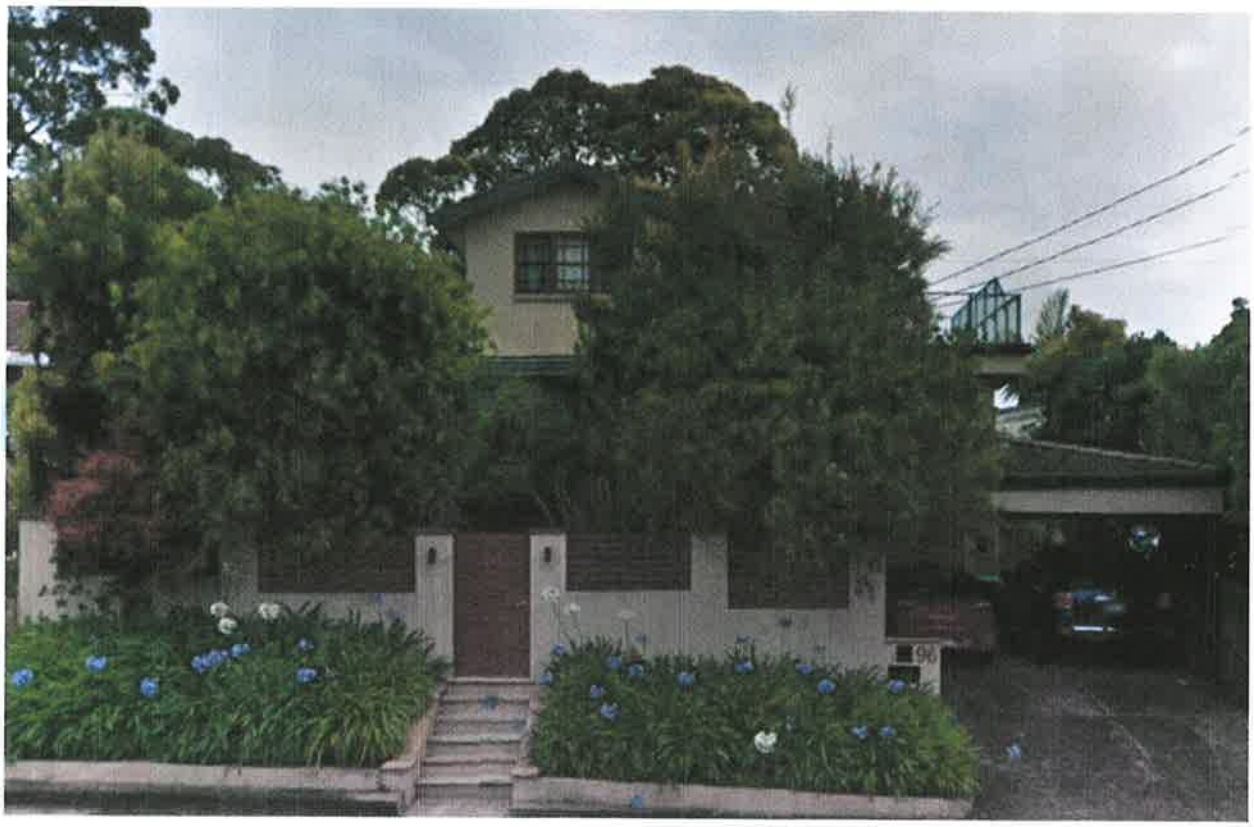
Geotechnical Assessment Report for the Proposed Development at 96 Beacon Hill Rd, Beacon Hill NSW 2100



Client: Michael Nott

Project No.: G1743G

December 2019

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1 Introduction

BMB Engineers has prepared this report to discuss the results of a geotechnical assessment conducted on 7th of December 2019 for the site located at 96 Beacon Hill Rd, Beacon Hill as per the client's request. This report briefs the existing ground condition, assess the slope stability and risk mitigation measures where necessary.

BMB Engineers understand that the proposed development is the construction of a new pergola and deck area replacing the exiting pergola.

2 Site Description

The lot is legally described as LOT 8 IN D.P. 25604. During the site visit, following observations were made by *BMB Engineers*

- The site is rectangular in shape and occupies as an area of about 677.7 m^2.
- The site has existing double-storey residential dwelling in the central part, lawns and concrete driveway in the front part and lawns in the rear part.
- The site is located towards north-eastern side of the Beacon Hill Road and surrounded by the residential dwellings in other three sides.
- The site has an overall slope of less than 5 degrees sloping towards the road. The front side of building is noticeably slope and middle and backyard is almost flat.
- An existing pergola is located at the northern corner of adjacent to the house.

3 Geology

Reference to the 1:100,000 scales NSW Department of Mines Geological Map of the Sydney indicates that the site is laid in the area of medium to course-grained quartz sandstone, very minor shale and laminite lenses of Wianamatta Group.

4 Geotechnical Investigation

4.1 In-situ Testing

Two Dynamic Cone Penetration (DCP) tests were carried out in the field. The testing was carried out in accordance with 'Australian Standard (AS) 1289: Methods of Testing Soil for Engineering Purposes'. The DCP tests locations are marked in Figure 1 and its results are given in Appendix A. Based on the

DCP test results, it is anticipated that the hard material may be encountered in about 0.6 m depth below the existing ground level.

4.2 Borehole Drilling

One borehole was drilled by using hand auger up to a depth of 0.5 m from the existing ground level. The soils encountered during the investigation were visually classified according to 'Australian Standard (AS) 1726: Geotechnical Site Investigations'. On completion of logging and sampling, the boreholes were backfilled with the obtained soil. The locations of boreholes are shown in Figure 1 and the logs of boreholes are given in Appendix A.

4.3 Sub-surface Conditions

The results of the investigation indicate that the sub-surface profiles at the test locations comprise sand underlain by bedrock. Based on the information obtained from the boreholes, a geotechnical model has been developed and is presented in Table 1.

Table 1: Summary of Sub-surface Conditions and Inferred Geotechnical Model

Geotechnical Unit	**Depth (m bgl)**	**Description of material**
Top soil	0.0 - 0.2	Brown, silty Sand
Sand	0.2 to 0.5	Yellow-brown, fine sand

4.4 Groundwater Assessment

Seepage was not observed during the fieldwork. However, minor seepage may occur within the excavation during the rainy season.

4.5 Slope Stability Assessment

The front side of the site is slightly sloped towards the road as shown in Figure 2. The middle and backyard is almost flat as shown in Figure 3 and Figure 4 respectively. The existing timber pergola adjacent to the house in the northern boundary is shown in Figure 5.

There were no signs of deep-seated slope instability, down slope creep and past ground movements such as tension cracks and slide scrap in this part of the site and the possibility in future is also unlikely. The site is appeared to be relatively well drained.

5 Conclusions and Recommendations

5.1 Landslide Risk Assessment

Based on the location of the site and ground condition, the landslide risk assessment of this site is considered not required. In addition, the proposed new development has not significant additional loads as the new pergola and deck will be built after demolishing the existing pergola.

5.2 Site Classification

Classification of this site has taken into account the following:

- Identification of the sub-soil profile, classification of soil type and plasticity.
- On the basis of the findings of this investigation, including visual-tactile identification of the soil profile combined with thelocal knowledge and experience, the characteristic surface movement on this site.

In accordance with 'AS 2870-2011: Residential Slabs and Footings', a class "P" site classification is appropriate for this site due to existing structures. However, if assessed in accordance with engineering principles, the site may be reclassified as the slightly reactive site (S) which may experience slight ground movement from moisture changes and the site is estimated to have a characteristic surface movement (y_s) up to 20 mm.

If a more detailed geotechnical investigation report is required for this site with regards to soil reactivity and other geotechnical aspect, *BMB Engineers* should be contacted for detailed investigation report. In addition, any details relating to this site history should be supplied to this office by the client.

5.3 Allowable Bearing Pressures for Footings

The preliminary allowable bearing pressures provided in Table 2 may be adopted for pad and strip footings on the edge and internal beams of raft slabs. These bearing pressures apply where typically the embedment is a minimum of 300mm into the specified material.

Table 2: Preliminary Allowable Bearing Pressures for Shallow Footings

Material (Unit)	Preliminary allowable bearing pressure (kPa)
Very/Dense Sand	400
Low to very low strength Sandstone	950

5.4 Excavation Support

Temporary batters may be considered for retention during excavation only where adequate room for full batter construction is available. Recommended maximum slopes for permanent and temporary batters up to 5 m high are presented in Table 4.

Table 4 - Recommended Maximum Batter Slopes

Unit	Maximum Batter Slope (H : V)	
	Permanent	Temporary
Dense to Very Dense Sand	2 : 1	1 : 1
Highly Weathered Sandstone	0.75:1	0.5:1

All batters should be protected from erosion and drainage. The batters shall be inspected by a qualified geotechnical engineer at regular intervals during the excavation to confirm the conditions and assess the potential for adversely oriented defects which may require stabilisation.

5.5 Disposal of Excavated Materials

It is assumed that all excavated materials, not retained on site by engineer designed retaining structures; need to be disposed of off-site in accordance with the current Office of Environment and Heritage (OEH) regulations. It should be noted under the Protection of the Environment Operation Act (2009).

6 Limitations

Any sketches in this report should be considered as only an approximate pictorial evidence of our work.

The report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. The assumption cannot be

substantiated until earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, further advice should be sought.

Should you need any further information, please do not hesitate to contact the undersigned.

On the behalf of BMB Engineers

Prepared by
Prabin Kayastha
MSc, BE (Civil)
Geotechnical Engineer

Review and authorised by
M Pradhan
MIEAust CPEng NER
Principal

7 References

1. Clark N.R. and Jones D.C., 1991, Penrith 1:100 000 Geological Sheet 9030, 1st edition. Geological Survey of New South Wales, Sydney.
2. Australian Standard (AS) 1726-1993: Geotechnical site investigations
3. Australian Standard (AS) 1289-2000: Method of testing soils for engineering purposes
4. Australian Geomechanics Society Landslide Taskforce, Landslide Practice Note Working Group (2007). Practice Note Guidelines for Landslide Risk Management. Australian Geomechanics 42(1):63-114.
5. Look B. G., 2007. Handbook of geotechnical investigation and design tables. Taylor & Francis Group, London, UK.
6. New South Wales (NSW). Protection of the Environment Operations Act 1997 No 156, pp. 275

Notes Relating to Geotechnical Report

Introduction
These notes have been provided to strengthen BMB's report in regard to classification methods, field procedures and the comments section. The issues discussed are not relevant to all reports and further recommendations should be sought if there are any queries regarding any recommendations or report.

Copyright

Geotechnical Report
This geotechnical report is prepared by qualified personnel on the information supplied or obtained and based on current engineering standards of interpretation and analysis.
The information may be gained from limited sub-surface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.
This report has been developed on the basis of unique project specific requirements as understood by BMB Engineers and applies only to the site investigated. If there are any changes to the project, this report should not be used and BMB Engineers will be pleased to review the report and sufficiency of the investigation work.
Every care is taken with the report content; however, BMB Engineers cannot always anticipate or assume responsibility for the following conditions:

- Unexpected variations in ground conditions.
- Changes in policy or interpretations of policy by statutory authorities.
- The actions of contractors responding to commercial pressures.

If these occur, BMB Engineers will be pleased to assist with further investigations or advice to resolve the matter.

Sub-surface Information
Logs of a borehole, recovered core, test pit, excavated face or cone penetration test are an engineering and/or geological interpretation of the subsurface conditions. The reliability of such information depends on the method drilling or excavation, frequency of sampling and the ground conditions. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practical or possible to justify on economic grounds. It should be noted that the volume of material observed or tested is only a fraction of the total subsurface profile.
Interpretation of the information and its application to design and construction should, therefore, take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight-line' variations between the test locations.
Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

The installation of piezometers and long-term monitoring of groundwater levels may be required to adequately identify groundwater conditions.

Information for Contractual Purposes
It is recommended that tenderers are provided with as much as geological and geotechnical information that is available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. BMB Engineers would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Anomalies
Should conditions encountered on site differ markedly from those anticipated from the information contained in the report, BMB Engineers should be notified immediately. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Site Inspection
BMB Engineers will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed area as expected, to full-time engineering presence on the site.

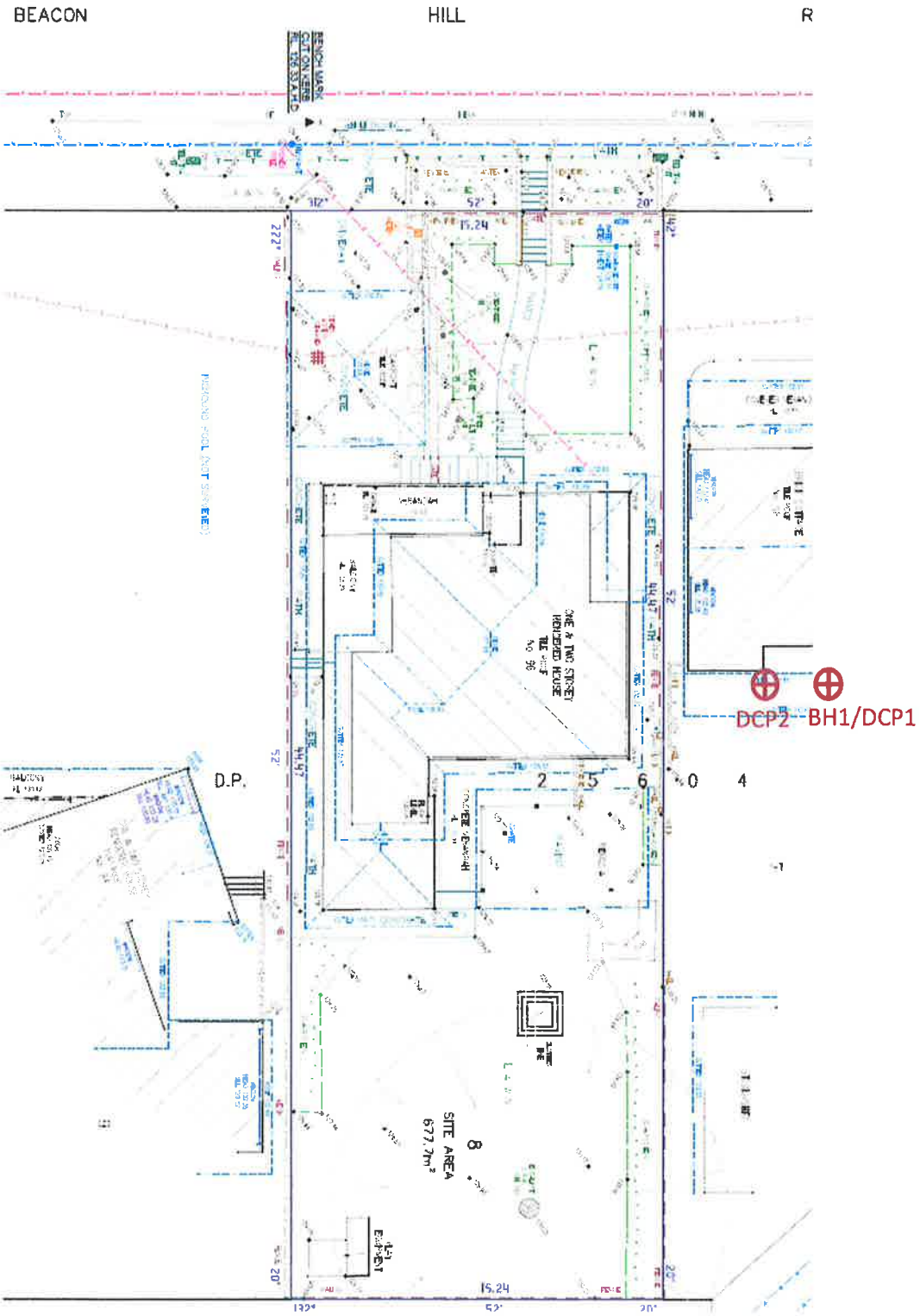
BEACON
HILL
R
DCP2
BH1/DCP1
D.P.
SITE AREA
677.7m²
15.24

Figure 1 Borehole and DCP tests location

Figure 2 Site photo showing the slope towards the road at front of the existing house

Figure 3 Access to the backyard adjacent to the existing house

Figure 4 Backyard – Photo taken from the rear boundary

Figure 4 Existing pergola to be replaced by the new pergola

APPENDIX A: Borehole Logs and DCP Test Results

								Job No:	
								Hole No:	BH01
								Date:	7/12/2019
								Logged:	
Client:						Surface RL:		-	
Location:			96 Beacon Hill Road, Beacon Hill			Test Method:		Hand Auger	
Depth (m)	SPT	Graphic Log	Unified Classification	Description		Moisture Condition	Consistency/ Rel. Density	Pocket Penetrometer	Additional Comments
0.20				Brown, silty sand		D			Top soil
0.30				Yellow-brown, fine sand		SM	D to VD		Natural soil

Borehole was terminated at 0.70m

Consistency		Moisture		Density	
Soft	S	Dry	D	Very Loose	VL
Firm	F	Slightly Moist	SM	Loose	L
Stiff	St	Moist	M	Medium Dense	MD
Very Stiff	Vst	Very Moist	VM	Dense	D
Hard	H	Wet	W	Very Dense	VD

DYNAMIC CONE PENETRATION (DCP) TEST RESULT

TEST METHOD: AS1289.6.3.2: Method 6.3.2—Soil strength and consolidation tests—Determination of the penetration resistance of a soil—9 kg dynamic cone penetrometer test

Date of Fieldwork: 7/12/2019

TEST NUMBER/ DEPTH (M)	DCP 01	DCP 02
0.00 – 0.10	3	3
0.10 – 0.20	8	4
0.20 – 0.30	12	7
0.30 – 0.40	15	9
0.40 – 0.50	20	18
0.50 – 0.60	Refusal, inferred bedrock	Refusal, inferred bedrock