

17 February 2019

Project No.: G2002

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## **RE: Preliminary Geotechnical Assessment Report for 11 Sherwood Crescent, Narraweena**

### **Introduction**

*BMB Engineers* was commissioned by Ms Lili Liu to carry out a preliminary assessment of site conditions at 11 Sherwood Crescent, Narraweena. This report documents the results of a geotechnical assessment conducted on 15<sup>th</sup> February 2019 to fulfil the requirements of Northern Beaches Council as a part of Development Application No. DA2020/049 dated 28 January 2020. This report briefs the existing ground condition, appropriate excavation method, assess the likelihood of adverse impacts for the proposed development and risk mitigation measures where necessary.

### **Proposed development**

*BMB Engineers* reviewed the survey plan and architectural sketches (refer attachments, Figures 1 to 3). It is understood that the proposed development consists of a construction of new car space in front of existing house next to the road side. This development has a maximum excavation down to 1.8m depth towards the rear side adjacent to the existing house and will be levelled 0.5m above the property boundary level.

### **Site Geology**

The site is trapezoidal shape tapered towards the front and occupies approximately 562.8 m<sup>2</sup>. Overall the site has a steep slope of about 10 to 12 degrees dipping towards the northwest direction (road side). Reference to the 1:100,000 scales NSW Department of Mines Geological Map of the Sydney Basin indicates that the site is underlain by Hawkesbury Sandstone of Wianamatta group dating back to the Triassic period. It comprises medium to coarse-grained quartz sandstone, minor shale and laminate lenses.

### **Site Observations**

During the site visit, following observations were made by *BMB Engineers*:

- The lot has a single storey residential dwelling in the middle of the site.
- The lot has a road on the northwest side, and is surrounded by residential dwellings in other sides.
- The residential dwelling is accessed through the concrete steps and ramp.

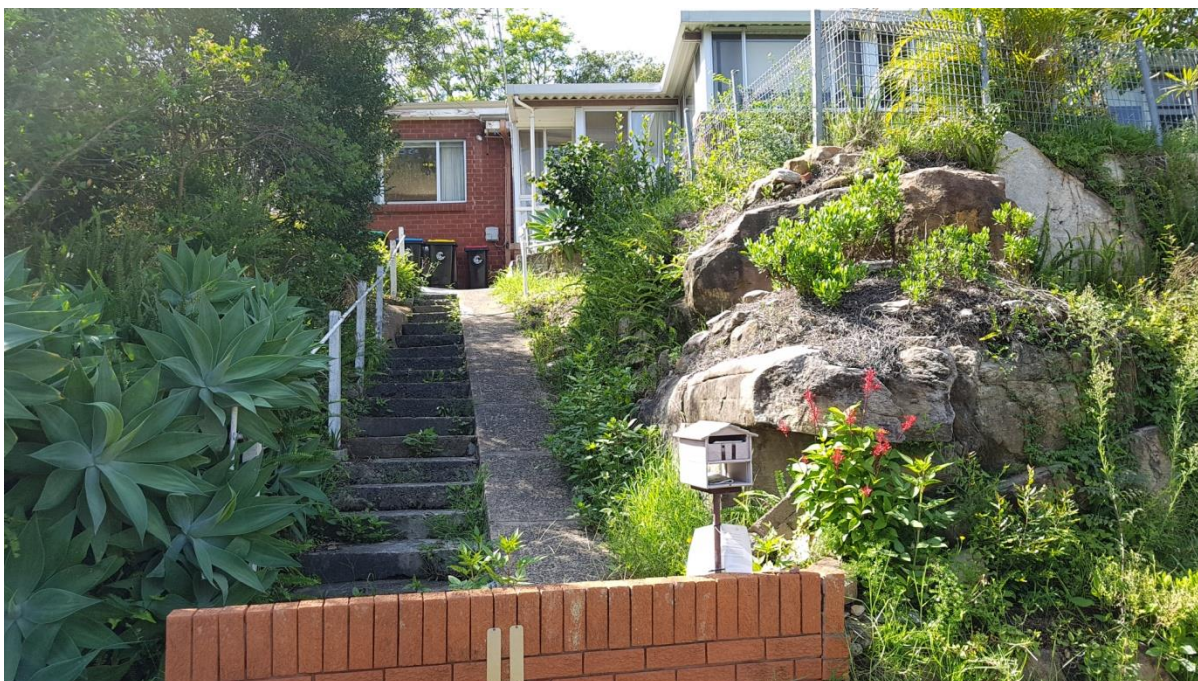
- Sandstone outcrops are observed at the rare side next to retaining wall adjacent to wall of the house at southern corner and in the majority of the front side along the road.
- The site is partially covered with few trees, shrubs and grasses.

The results of the visual assessment indicate that the site is covered with very thin topsoil/residual soil underlying highly weathered, medium strength sandstone (bedrock).

A minor seepage was observed through the fractured rocks near the concrete steps during the site visit. It is anticipated that seepage was occurred due to heavy rain for couple of days before the site visit. The minor seepage could be happened within the excavation, during the rainy season from within the soils overlying bedrock and / or from joints/ bedding defects within the rock mass.

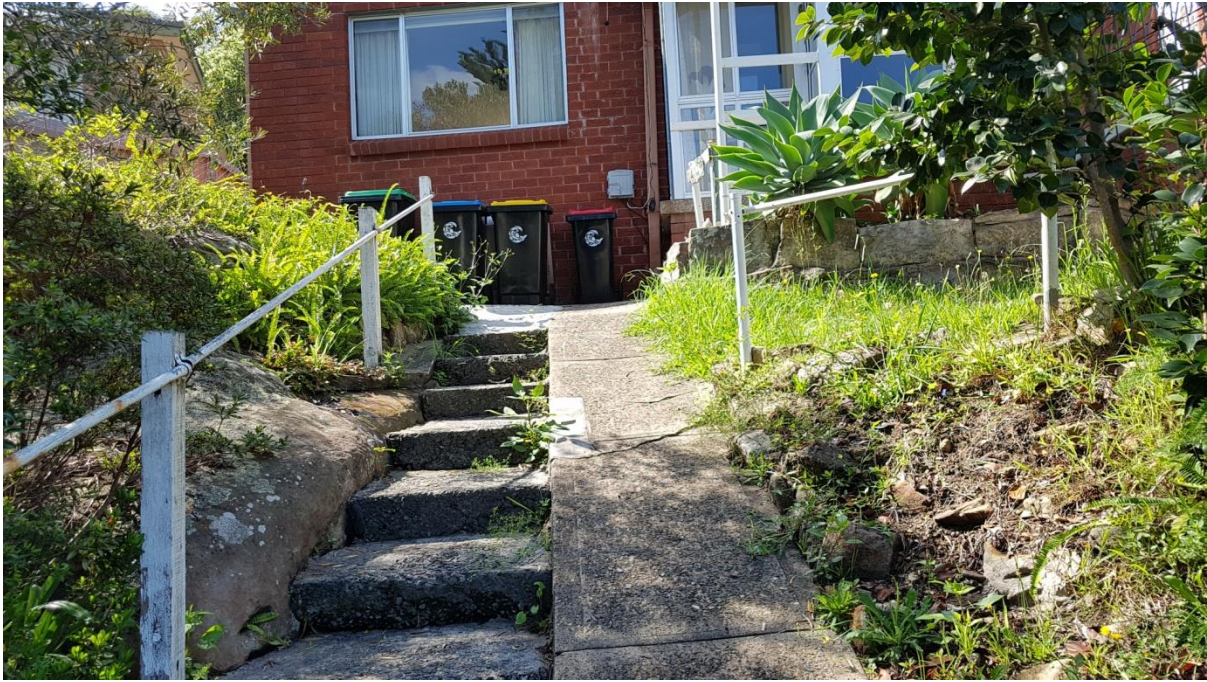
### **Preliminary Landslip Risk Assessment**

There was no sign of slope instabilities such as rock fall, rock slide in the site at the time of site visit. A few photographs of the site are presented below.



Front left side of the property - access to the dwelling (roadside)





Closer view of the concrete steps and rock outcrops near the dwelling



The front yard of the dwelling





Backyard of the dwelling - exposer of rock at the right corner



Front view of the dwelling – exposure of rock outcrops and rock wall

## Potential Landslide Hazards and Risk Assessment

Based on the council landslip risk map, the site is located at the Area B as shown in Figure 4. A preliminary assessment of site conditions prepared in accordance with the Checklist for Council's assessment of site conditions has been carried out for the proposed development. Based on the flowchart of the conditions (Figure 5) and need of geotechnical report in Geotechnical Class B and D, it is considered that detailed geotechnical report is not required.

However, the site has been assessed with reference to the Australian Geomechanics Society Landslide Taskforce 'Practice Note Guidelines for Landslide Risk Management' (AGS-2007). The risk level for this site is considered as very low after the assessment of the potential landslide hazards possibly associated with the proposed development could be associated with rock slide, rock fall and boulder roll. Moreover, there was no indication of instability in the vicinity of the proposed development site that could be attributed to above-mentioned hazards.

## Risk Mitigation Measures

### Excavation Method

The excavation for the proposed development is anticipated to be almost wholly within sandstone bedrock. The rock is likely to be continuous across the building and likely to adjoining property. Excavation requirements will be governed by the presence of the rock and the sensitivity of nearby structures to vibrations caused by the rock excavation. If the contractor adopts methods and/or equipment in accordance with the recommendations given in Table 1 for a ground vibration limit of 5 mm/sec, vibration monitoring may not be required. The limits of 5 mm/sec and 10 mm/sec are expected to be achievable if rock breaker equipment or other excavation methods are restricted as indicated in Table 1.

During the excavation, the equipment must be operated by qualified and experienced personnel, according to the manufacturer's instructions and in a manner consistent with minimising vibration effects.

**Table 1: Recommendations for Rock Breaking Equipment**

Distance from adjoining structure (m)	Maximum Peak Particle Velocity 5 mm/sec		Maximum Peak Particle Velocity 10 mm/sec*	
	Equipment	Operating Limit (% of Maximum Capacity)	Equipment	Operating Limit (% of Maximum Capacity)
0.5 to 1.5	Hand operated jackhammer or Small hand held Kanga	50	300 kg rock hammer	30

1.5 to 2.5	Hand operated jackhammer or Small hand held Kanga	100	300 kg rock hammer	50
2.5 to 5.0	Hand operated jackhammer or Small hand held Kanga	100	300 kg rock hammer	100

\*Vibration monitoring is recommended for 10 mm/sec vibration limit.

### Excavation Stability and Batters

Temporary batter slopes could be appropriate for excavations not encountering groundwater seepages and provided the excavations are set back sufficiently from the site boundaries. The recommended maximum slopes for excavated batters are presented in Table 2.

**Table 2: Recommended Maximum Batter Slopes**

Material (Unit)	Maximum Batter Slope (V:H)	
	Permanent	Temporary
Extremely weathered very low strength Sandstone	1V:2H to 1V:1H*	1V:0.75H
Weathered low to medium strength Sandstone	1V:0.75H*	1V:0.25H
* subject to inspection and confirmation by a geotechnical engineer		

It must be noted that the recommended batter slopes are only applicable for excavations where the not retained soils/weathered bedrock do not extend below the “zone of influence” of adjacent structures i.e. a line drawn 45° down from the foundation level of adjacent neighbouring buildings and structures or features (including paths, fences, stairs etc.).

Retaining wall must be provided designed by suitably qualified engineer where the space of temporary batter is not available.

### Boulders/rocks and front rock wall

The vulnerable boulders and detached rocks next to the excavation site should be carefully removed and relocated in a safe place to prevent from possible boulder roll if any. The strength of the front



rock wall next to the excavation adjacent to the road should be assessed and strengthened where necessary.

### Limitations

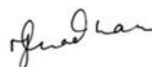
The report is based upon the information provided by the client and visual inspection of the site. Where subsurface conditions are encountered other than expected, we recommend that you immediately contact this office for further advice.

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

On the behalf of BMB Engineers



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Principal

### Attachments

1. Survey Plan
2. Plan and Section of the proposed new car space
3. Council Landslip Risk Map of the site
4. Flowchart of the Conditions and Need of Geotechnical Report

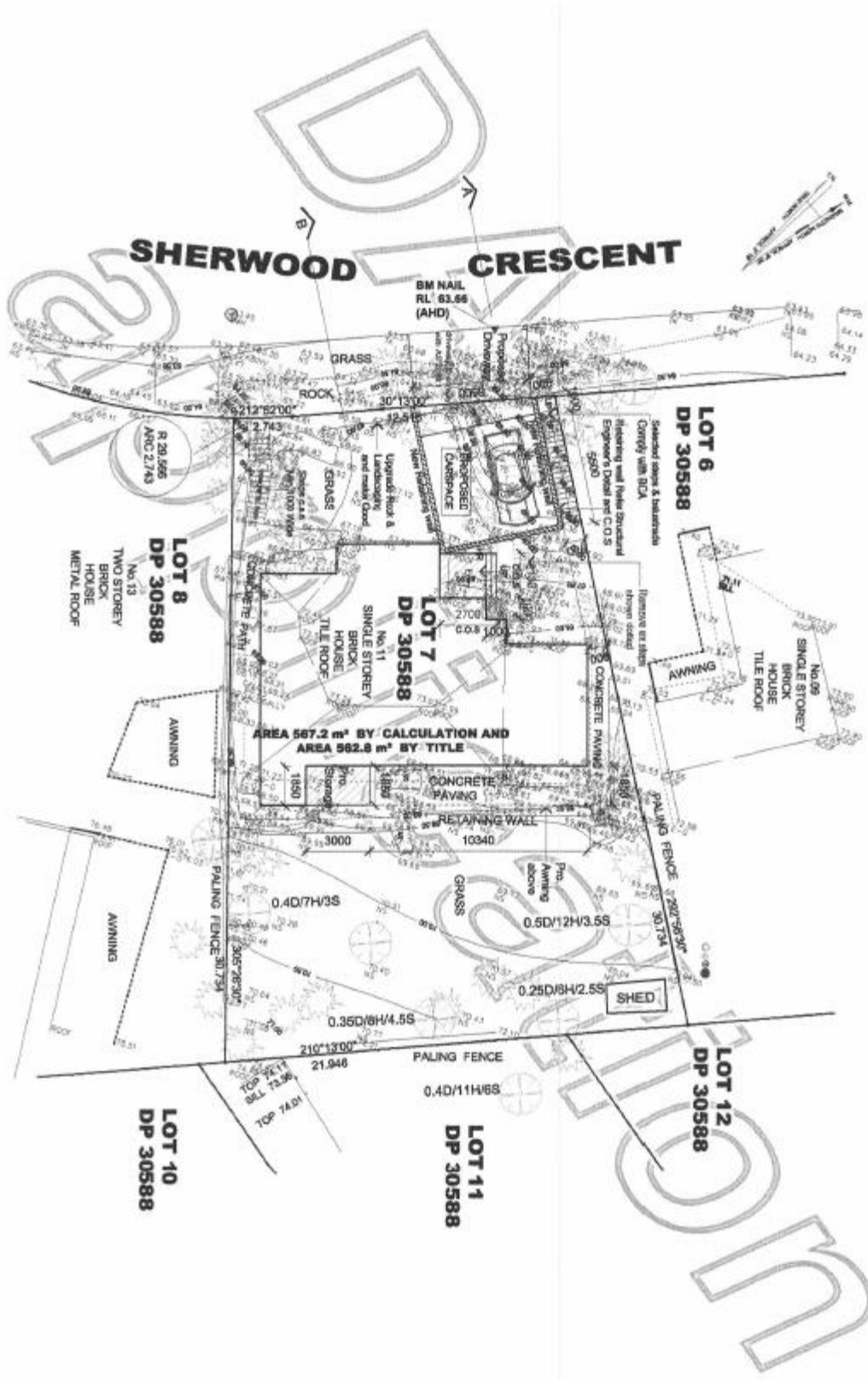


Figure 1. Survey Plan



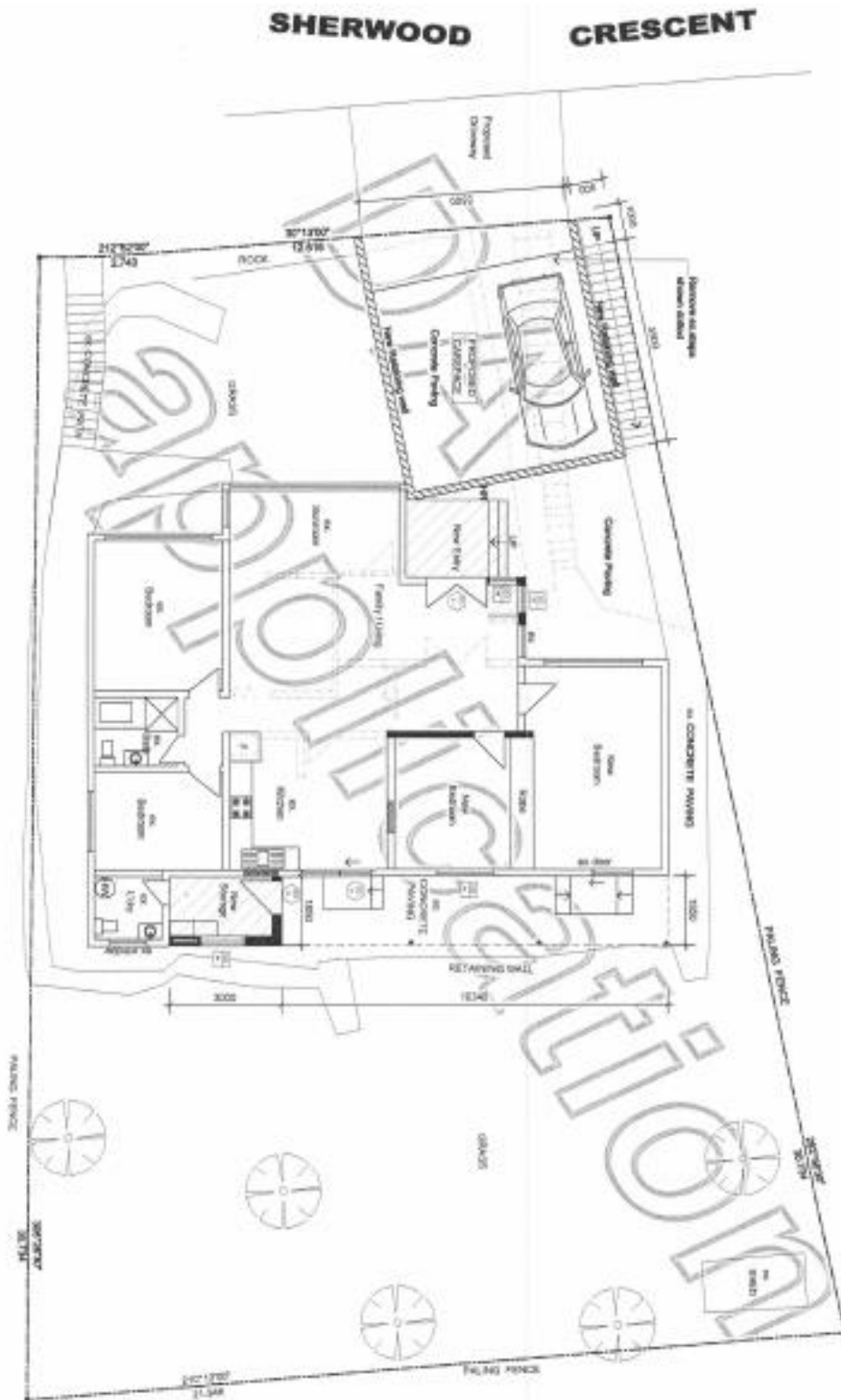


Figure 2. Plan of the proposed new car space

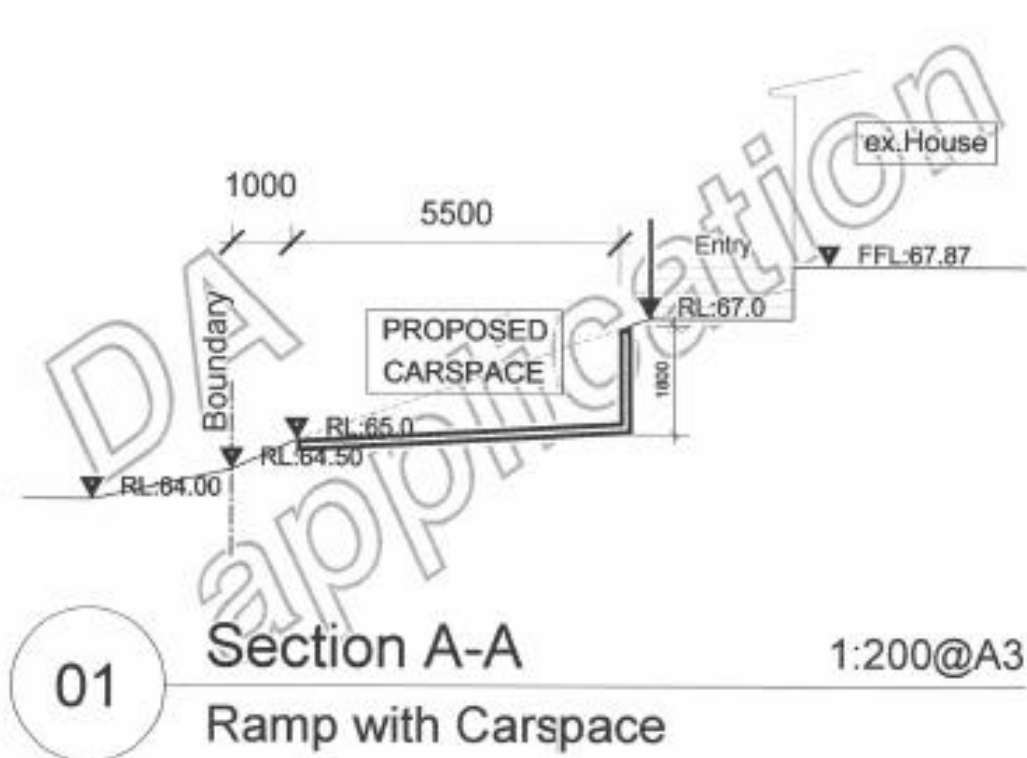
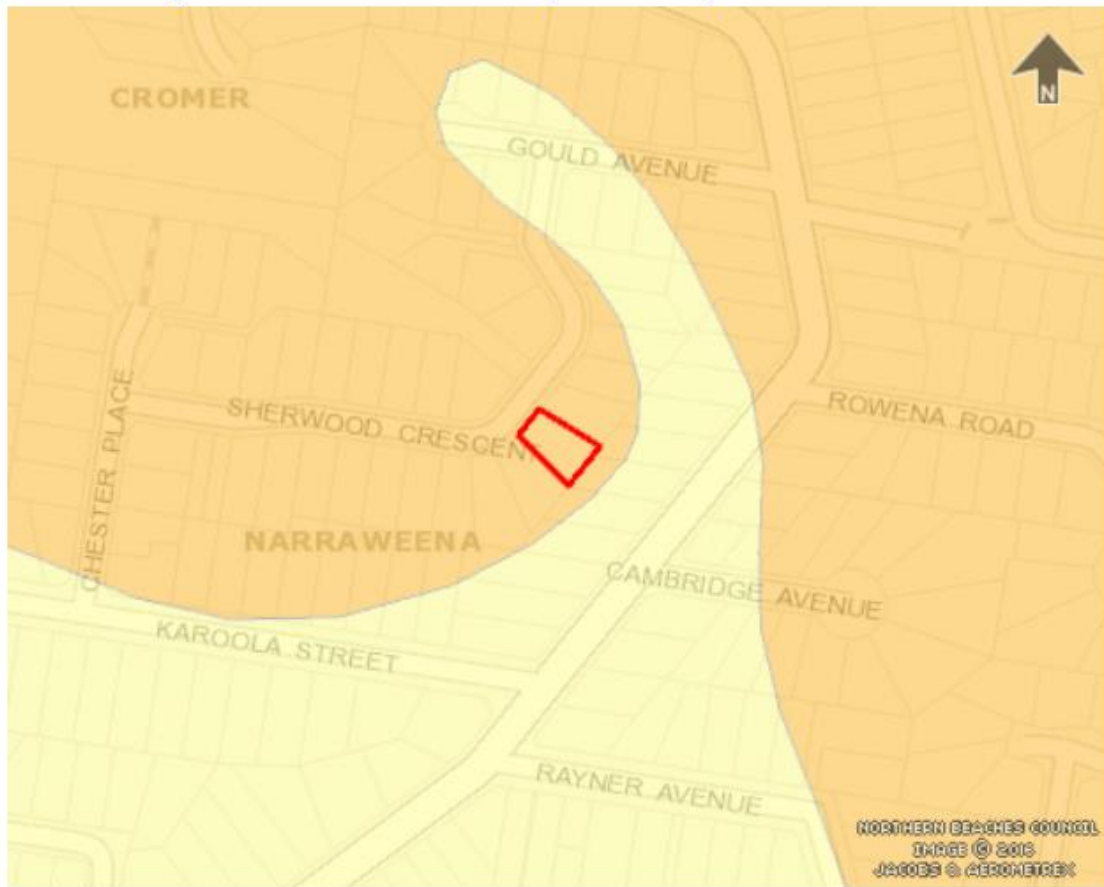


Figure 3. Section of the proposed new car space



➔ Warringah LEP2011 - Land Slip Risk Map-Area B



**WARRINGAH LANDSLIP RISK MAP**

- Area A - Slope less than 5 degrees
- Area B - Flanking Slopes from 5 to 25 degrees
- Area C - Slopes more than 25 degrees
- Area D - Collaroy Plateau Area Flanking Slopes 5 to 15 degrees
- Area E - Collaroy Plateau Area Slopes more than 15 degrees

Figure 4. Council Landslip Risk Map of the site

## CONDITIONS AND NEED FOR GEOTECHNICAL REPORT IN GEOTECHNICAL CLASS B AND D

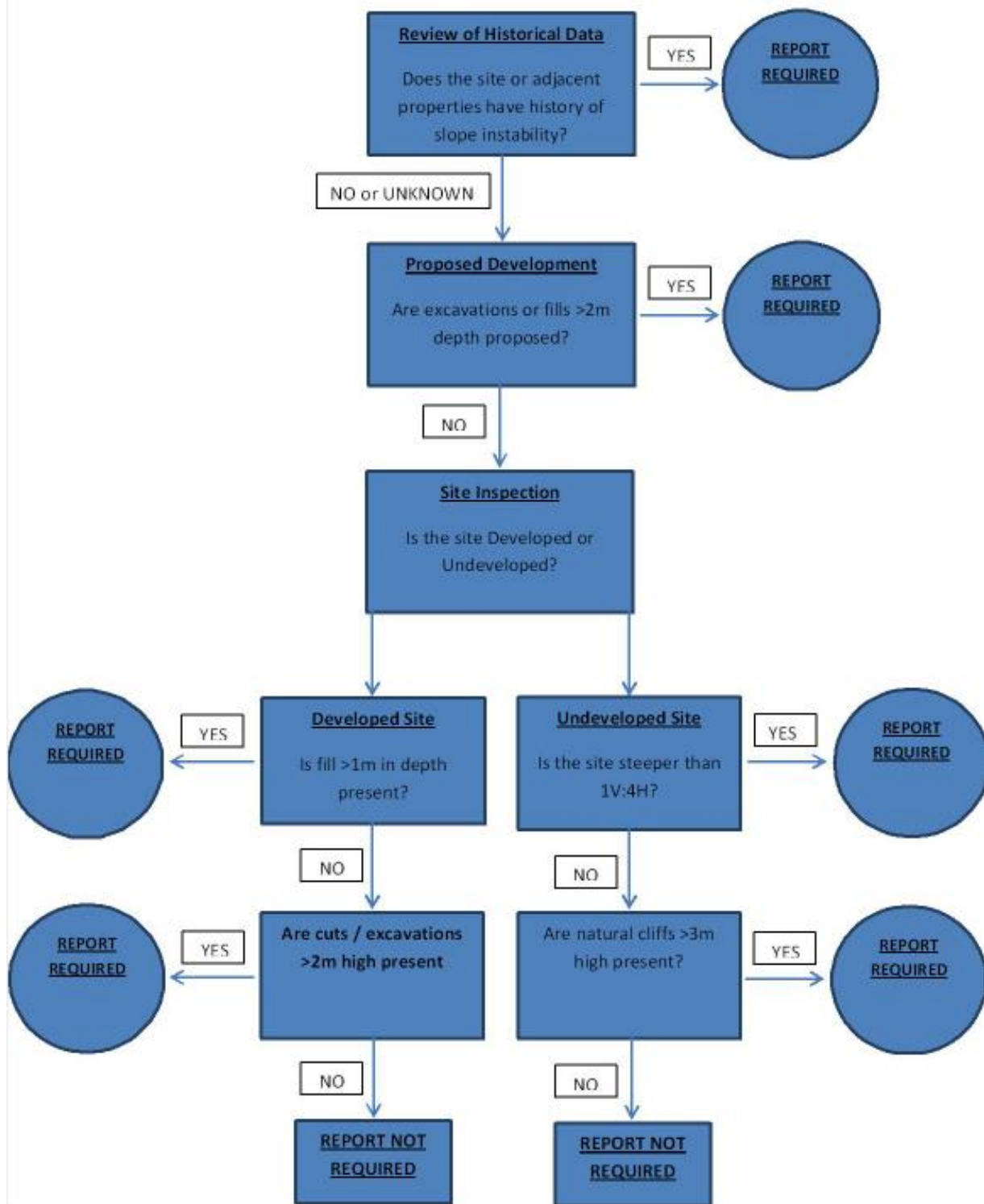


Figure 5. Flowchart of the Conditions and Need of Geotechnical Report