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Attention: Joseph Quarello
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**PRELIMINARY GEOTECHNICAL ADVICE
PROPOSED ALTERATIONS AND ADDITIONS
3 COOTAMUNDRA DRIVE, ALLAMBIE HEIGHTS, NSW**

1 INTRODUCTION

We confirm that our Associate (Matthew Pearce) completed an inspection of the above site on 21 May 2021. The purpose of the inspection was to assess the topographic, surface drainage and geological conditions of the site and its immediate environs, and to then:

- Review the results of the inspection with regard to the Northern Beaches Council Warringah DCP 2011 E10 Landslip Risk zone requirements, and
- Complete the suggested checklist of site conditions in order to advise on the need for a geotechnical assessment in accordance with the requirements of Council's DCP E10 Landslip Risk zone requirements.

We have been provided with the following information:

- Architectural sketches (Sketch Plan 1 dated February 2021, Sketch Plans 2.1 and 4.1 dated 25 February 2021 and Sketch Plan 3.2 dated 4 March 2021) prepared by JQDM.
- Survey plan (Ref. 1900866 Ver. A dated 8 July 2019) prepared by Beveridge Williams.
- Geotechnical investigation report (Project No. 2021-015 dated 12 February 2021) prepared by Crozier Geotechnical Consultants (Crozier).

2 RESULTS OF REVIEW OF PROVIDED INFORMATION AND COUNCIL'S DCP E10 LANDSLIDE ZONE MAPPING

Based on the results of our review of the provided information and Council's DCP E10 Landslip Risk zone requirements we note the following:

- The proposed alterations and additions to the existing house will include a new partial garage basement level below the western side of the existing house, together with reconfiguration of the existing house and an additional level. A new driveway will line the western site boundary and provide access to the new garage under the area of the existing southern deck, to the east of the existing pool.
- The proposed landscaping will include reconfiguration of the existing deck areas to the north.



- Floor levels have not been confirmed but we understand from Joseph Quarello (JQDM) that they will require excavations to less than 2m depth and filling to less than 1m height.
- Reference to Warringah Council's Landslide Risk Zoning Map's indicates that the site is located in Landslip Risk Classes A (Plateau areas, ridge crests etc with slope angles $< 5^\circ$) and B (Flanking slopes with slopes between 5° to 25°).

3 RESULTS OF SITE INSPECTION AND REVIEW OF PREVIOUS GEOTECHNICAL REPORT

The pertinent results of our site inspection are provided below:

- The site is located over the south-western side of a broad relatively flay ridge and the site surface levels have overall slopes of about 3° to the south-west with slope angles increasing to a maximum of 10° (locally 15°) within the bushland beyond the southern site boundary.
- The site has a northern frontage onto the asphaltic concrete paved Cootamundra Drive and is about 25m to 35m width (east to west) and about 28m to 29m length (north to south). A rendered fence formed the majority of the street frontage there was a maximum separation at the interface with the neighbouring brick fence to the east. The garden bed lining the street frontage was supported by a rendered retaining wall (about 0.5m height).
- The central portion of the site was occupied by a single-storey brick house with the surrounding yard area comprising a mix of timber decks, grass covered and synthetic grassed areas and concrete and brick paved walkways and driveway. An above ground pool was located over the south-western portion of the site and appeared to be suspended on concrete columns.
- The eastern end of the rear grass covered area was supported by a timber retaining wall (maximum height about 0.4m). A timber retaining wall (maximum 1m height adjacent to the pool and deck area) was off-set a maximum of about 1m from the southern property boundary and supported the majority of the yard area within the site. The top of the retaining wall was tilting over at 20° from vertical.
- The western end of the southern timber retaining wall terminated at a sandstone bedrock. The upper portion of the outcrop comprised what appeared to be a detached overhanging and a portion of the floater had been underpinned by sandstone masonry. An adjacent sandstone bedrock surface extended north-east into the site and westwards into the neighbouring property and bushland. Sandstone bedrock surfaces and 'floaters' were evident in the neighbouring grass and tree covered bushland to the south.
- To the west and east of the site neighbouring single and two storey brick houses with brick paved and grass covered surrounds were set-back about 1.5m from their respective common boundaries. Surface levels appeared to be similar across the common boundaries. A neighbouring small shed was set-back about 2m from the southern end of the western site boundary. A neighbouring above ground concrete swimming pool was set-back between about 1m and 2m from the southern end of the eastern site boundary.
- Based on a cursory inspection from within the site, unless otherwise described above, the buildings and structures within the site appeared to be in good condition.
- Sandstone bedrock forming the outcrops was assessed to be moderately weathered and generally of medium strength. The Crozier geotechnical investigation encountered or inferred weathered bedrock at depths between about 0.3m and 1.6m below existing surface levels and was overlain by intermittent thicknesses of sandy fill and/or residual clayey sands.
- Stacked sandstone retaining walls (maximum height about 1m) supported steps in the yard levels; the retaining walls appeared to be in reasonable condition, based on a cursory visual assessment.

- Based on the condition of the house and pool, we consider that they have been founded on sandstone bedrock.
- There were no obvious signs of slope instability such as tension cracks in the surface levels within the site or the road surface above. The timber retaining wall to the south was leaning over and there appeared to be some relative movement between the fence lines within and neighbouring the site to the east at the street frontage.

4 CONCLUSIONS

Based on our observations, the site is a Landslip Risk Class A and B. Sites lying within Landslip Risk Classes A and B require a preliminary geotechnical assessment to be completed. Based on our preliminary assessment, we note the following:

- The site may be regarded as 'stable' overall.
- Assuming the design and construction of the proposed alterations and additions is carried out in accordance with the advice provided below, we consider that the levels of risk to property under existing conditions and following the development are at 'acceptable' levels. Furthermore, assuming typical spatial, temporal, vulnerability and evacuation factors for this type of site and development, levels of risk to life under existing conditions and following the development are at 'acceptable' levels. The terminology adopted is in accordance with Reference 1.

A copy of the Council's DCP E10 Landslip Risk checklist is attached, and based on the Council guidance, we do not consider that a geotechnical report is required. However, we recommend the following:

- The proposed new footings should be founded on bedrock, subject to geotechnical inspection.
- The existing house is expected to be founded on bedrock. All existing footings supporting additional loads should be exposed by excavating test pits to confirm this assumption. The test pits should be inspected by the structural and geotechnical engineers to confirm founding conditions and detail any underpinning that may be required.
- The sandstone is considered suitable for an allowable bearing pressure of 600kPa, subject to geotechnical inspection.
- The excavations will extend through a limited thickness of sandy soils and sandstone bedrock. Temporary batter slopes of 1V in 2H through the sandy soils will be achievable and this assume existing footings lining the excavations have been founded and/or underpinned to bedrock.
- Bedrock excavations should be inspected by the geotechnical engineer to check for any potential unstable features such as weak seams, wedges etc which, if not able to be supported by the permanent structure will require stabilisation using rock bolts, shotcrete etc.
- Excavation of bedrock using rock breakers can generate potentially damaging vibrations. When rock breakers are being used to excavate bedrock, continuous vibration monitoring of the neighbouring buildings and structures will be required, to confirm that peak particle velocities (PPV) fall within acceptable limits. Subject to the results of the dilapidation reports (see below), we would recommend that the PPV along the site boundaries do not exceed 5mm/sec during bedrock excavation using rock breakers. Should higher vibrations be measured they should be assessed against the attached Vibration Emission Design Goals as higher vibrations may be acceptable depending on the vibration frequency. We note that this vibration limit will reduce the risk of vibration damage to the neighbouring building and structures. However, these vibrations may still result in discomfort to occupants of the neighbouring buildings. If excessive vibrations are confirmed,

it will be necessary to use lower energy equipment such as smaller rock breakers and/or use rock saw cuts with the base of the slot maintained below the level at which the rock breaker is being used.

- Prior to demolition and excavation commencing, detailed dilapidation reports should be compiled on the neighbouring buildings and structures to the west and east. The property owners should be asked to confirm that the reports present a fair record of existing conditions as the reports may assist the client in defending themselves from unfair damage claims.
- The structural drawings should be reviewed by an experienced geotechnical engineer to confirm that they have been prepared in accordance with the advice provided in this letter report.
- The initial stages of the excavation should be directed by the geotechnical engineer. In addition, the structural engineer should inspect the nearby retaining wall immediately to the south of the southern site boundary prior to works commencing and detail any temporary propping together with long term strengthening and/or reconstruction that may be required to improve its stability.

5 GENERAL COMMENTS

The recommendations presented in this report include specific issues to be addressed during the construction phase of the project. In the event that any of the construction phase recommendations presented in this report are not implemented, the general recommendations may become inapplicable and JK Geotechnics accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

Occasionally, the subsurface conditions between and below the boreholes and DCP tests completed by Crozier may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides advice on geotechnical aspects for the proposed civil and structural design. As part of the documentation stage of this project, Contract Documents and Specifications may be prepared based on our report. However, there may be design features we are not aware of or have not commented on for a variety of reasons. The designers should satisfy themselves that all the necessary advice has been obtained. If required, we could be commissioned to review the geotechnical aspects of contract documents to confirm the intent of our recommendations has been correctly implemented.

A waste classification is required for any soil and/or bedrock excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM), General Solid, Restricted Solid or Hazardous Waste. Analysis can take up to seven to ten working days to complete, therefore, an adequate allowance should be included in the construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) could be expected. We strongly recommend that this requirement is addressed prior to the commencement of excavation on site.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. If there is any change in the



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Should you require any further information regarding the above, please do not hesitate to contact the undersigned.

Yours faithfully
For and on behalf of
JK GEOTECHNICS

Paul Roberts
Principal Associate | Engineering Geologist

Reference 1: Australian Geomechanics Society (2007c) *'Practice Note Guidelines for Landslide Risk Management'*, Australian Geomechanics, Vol 42, No 1, March 2007, pp63-114.

Attachments

Council's DCP E10 Landslip Risk checklist
Vibration Emission Design Goals
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SUGGESTED CHECKLIST FOR COUNCIL'S ASSESSMENT OF SITE CONDITIONS

1.0	LANDSLIP RISK CLASS (circle Landslip Risk Class in which site is located)
x	A A Geotechnical report not normally required.
x	B B Preliminary assessment of site conditions required to determine whether a geotechnical report is required.
	C C Geotechnical report required.
	D Preliminary assessment of site conditions required to determine whether a geotechnical report required.
	E Geotechnical report required.

2.0	SITE LOCATION
	Street no.& Name, Position in street (above or below), Site dimensions (block shape & size); 3 Cootamundra Drive, Allambie Heights; below the street; maximum about 29m x 35m

3.0	PROPOSED DEVELOPMENT:
	General description, including maximum excavation depths, maximum fill depths, and proximity to existing structures; See Section 2 of JK Geotechnics letter (Ref. 34081Rlet) dated 28 June 2021.

4.0	EXISTING SITE DESCRIPTION:
	e.g. Topography, slope angles (in degrees), exposures of rock and soil, existing site development, evidence of possible slope instability. See Section 3 of JK Geotechnics letter (Ref. 34081Rlet) dated 28 June 2021.

5.0	RECOMMENDATIONS
	Based on the above items, and the attached flowchart that indicates the principal factor(s) considered in the assessment, it is recommended that: Geotechnical assessment is not required.
6.0	DATE OF ASSESSMENT; 28 June 2021
7.0	ASSESSMENT BY; Paul Roberts (JK Geotechnics)

VIBRATION EMISSION DESIGN GOALS

German Standard DIN 4150 – Part 3: 1999 provides guideline levels of vibration velocity for evaluating the effects of vibration in structures. The limits presented in this standard are generally recognised to be conservative.

The DIN 4150 values (maximum levels measured in any direction at the foundation, OR, maximum levels measured in (x) or (y) horizontal directions, in the plane of the uppermost floor), are summarised in Table 1 below.

It should be noted that peak vibration velocities higher than the minimum figures in Table 1 for low frequencies may be quite ‘safe’, depending on the frequency content of the vibration and the actual condition of the structure.

It should also be noted that these levels are ‘safe limits’, up to which no damage due to vibration effects has been observed for the particular class of building. ‘Damage’ is defined by DIN 4150 to include even minor non-structural effects such as superficial cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls. Should damage be observed at vibration levels lower than the ‘safe limits’, then it may be attributed to other causes. DIN 4150 also states that when vibration levels higher than the ‘safe limits’ are present, it does not necessarily follow that damage will occur. Values given are only a broad guide.

Table 1: DIN 4150 – Structural Damage – Safe Limits for Building Vibration

Group	Type of Structure	Peak Vibration Velocity in mm/s			
		At Foundation Level at a Frequency of:			Plane of Floor of Uppermost Storey
		Less than 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use.	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 and 2 and have intrinsic value (eg. buildings that are under a preservation order).	3	3 to 8	8 to 10	8

Note: For frequencies above 100Hz, the higher values in the 50Hz to 100Hz column should be used.