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Development Assessment.
Northern Beaches Council.

Peer Review of Geotechnical Reports supplied for Development Application No. 3 Berith Avenue, Wheeler Heights.

We understand that a Development Application (DA 2019/1173) was lodged with Council for demolition of existing structures and construction of a new residential development at the property No. 3 Berith Street, Wheeler Heights.

It is further understood that the DA was supported by a geotechnical report by White Geotechnical Group (WGG) and that as part of the Councils review process this report was assessed by an independent geotechnical consultancy being JK Geotechnics (JK). This review found the DA report to be inadequate and recommended further geotechnical investigation and reporting, for which the sites owner subsequently engaged JK to undertake this work. Therefore, Council now requires the works and reporting reviewed by another independent geotechnical consultancy.

1. Documentation

As a result, we have reviewed the following documents:

1. Architectural Design drawings submitted for the Development Application: Barry Rush and Associates, Job No.: 1715, Drawing No.: A01 to A11, Version: DA, Dated: (Plotted: 7/11/2018).
2. Survey Drawing: Donovan Associates, Job Reference: 1297/147760, Survey Date: 16/05/2017
3. Geotechnical Investigation Report: White Geotechnical Group, Reference No.: J2436, Dated: 17th October 2019.
4. Geotechnical Peer Review Report: JK Geotechnics, Reference: 32859YFlet, Dated: 13 December 2019
5. Geotechnical Investigation Report: by JK Geotechnics, Reference: 32859SFrpt, Dated: 20 January 2020

2. Development

The proposed development appears to involve a two-storey residential structure formed over a basement carparking level. The basement has a Finished Floor Level (FFL) at R.L.72.0 with Ground Surface levels at the corners of the basement interpreted from the survey drawing at R.L. 75.0, 77.3, 78.1 and 75.25 at the north-west, north-east, south-east and south-west corners respectively. As such based on a Base Excavation Level of R.L. 71.8 a depth of excavation of approximately 3.20m, 5.50m, 6.30m and 3.95m is required at those corners.

The separation distances of the excavation from boundaries is estimated from the design plans and survey at approximately 3.10m from the north side, 7.70m from the rear east, 2.80m from the south side with the exception of a small area for the fire stairs at 1.50m and a separation of 16.2m from the front western boundary.

3. Policy

The site is governed by the Warringah 2011 LEP and DCP with section E10 Landslip Policy being the relevant policy against which this assessment is undertaken.

This policy states that "The applicant must demonstrate that – The proposed development is justified in terms of geotechnical stability; and The development will be undertaken in accordance with good engineering practice". Also, that "A risk assessment of landslip in relation to both property and life, prepared in accordance with the guidelines published by the Australian Geomechanics Society must be submitted".

This site is located within landslip risk Area 'D' defined as Collaroy Plateau Flanking Slopes 5° to 15°, in Landslip Risk Map Sheet LSR_009 of the E10 Landslip Risk policy. A review of the policies preliminary checklist and the proposed works identified that the proposed development involves works which exceed the preliminary assessment guidelines therefore, a geotechnical report is required in support of the DA.

It is noted that the Councils policy does not define acceptance criteria for the risk levels therefore it is interpreted that the AGS 2007 guidelines and NSW Government criteria apply.

4. Investigation

The investigation by WGG was extremely limited and involved one hand auger borehole along with a series of Dynamic Penetrometer tests, which were used to interpret the bedrock surface at between 0.60m and 1.50m depth below surface.

The subsequent JK investigation involved two boreholes with coring into the bedrock extending to between 8.63m depth (R.L. 68.87 – BH 101) and 6.64m depth (R.L. 68.56 – BH 102).

These two boreholes appear to have identified the upper surface of the sandstone bedrock at between 1.0m and 1.80m depth with the bedrock below this level logged as medium to high strength and then medium strength to the base of each borehole. However, the investigation also encountered significant zones of 'no core' during the drilling process. This material is explained as "usually the result of poor quality extremely weathered shale or sandstone with soil properties or bands of clayey sands which have been washed away by the drill flush water". The boreholes also identified some sub-horizontal bedding defects and joint defects dipping at 50 to 90°.

5. Risk Analysis

A risk analysis was undertaken by WGG and it assessed the Risk to Property and Risk to Life related to Hazard One - Ground Vibrations and Hazard Two – Excavation Collapse. The assessments were rudimental with landslip only assessed for impact to the work site. The assessment determined that each hazard would result in "Unacceptable" risk levels unless the recommendations of the report were followed.

The JK "Peer Review Report" also undertook a risk analysis with the Risk to Property and Risk to Life assessed for several hazards including "Instability of Existing Retaining Walls", Instability of Existing Natural Hill Side" and "Instability of Basement Excavation". The assessments were based on "all geotechnical recommendations followed during construction" and identified risk levels at $\leq 9.165 \times 10^{-9}$ for Life and ≤ "Low" for Property.

A risk analysis was not undertaken/supplied within the JK Investigation Report with reference made to the analysis within the JK Peer Review report only.

6. Recommendations

Detailed construction recommendations were made within the WGG report in relation to Vibrations, Excavation Support Requirements, Retaining Walls and Foundations.

Detailed construction recommendations were also supplied within the JK Investigation report in relation to Dilapidation Surveys, Excavation Methods, Potential Vibration Risk, Retention Systems, Hydrogeological Considerations, Footings, Basement Slab, Earthquake Design Factors and Further Geotechnical Input.

7. Peer Assessment:

Whilst none of the reviewed reports detail the actual zoning or policies related to the site and the proposed development, they appear written on the premise of confirming that the development can be completed in terms of geotechnical stability and ensuring the works will be undertaken in accordance with good engineering practice.

The details of the proposed development including excavation depths and proximities to boundaries, along with neighbouring property conditions are more thoroughly explained within the reports by JK than in that by WGG. Our review of the supplied architectural drawings, survey plan and available data considers that the details provided in the JK report are similar to our interpretation, and are therefore considered to reasonably match actual conditions.

A risk analysis of landslip in relation to both property and life was prepared in two of the reports and both appear in general accordance with the guidelines published by the Australian Geomechanics Society "Practice Note Guidelines for Landslide Risk Management 2007, Australian Geomechanics Society, Volume 42, No.: 1 March 2007 and subsequent amendments. However, both are also considered to have deficiencies.

Risk analysis was provided in the report by WGG and as part of the Peer Review Report by JK. The initial analysis by WGG was undertaken based on the limited site conditions identified by WGG whilst the JK analysis was also undertaken based on these same conditions, prior to the more detailed site investigation recommended by JK. Therefore, the risk analyses are not based on the results of that detailed investigation and are therefore partially based on interpretation and expectation as opposed to actual/identified site conditions.

The detailed investigation by JK involved a better assessment of the bedrock profile than occurred by WGG however numerous zones of up to 1.0m in length during drilling returned "no core", as such significant sections of the geological profile are undefined or assumed to be due to "poor quality" rock. This information has not been incorporated into the risk analyses. These poor-quality zones create some concern for the stability of the excavation and the potential risk to persons within the site during the excavation.

Neither risk analysis considered the landslip risk to neighbouring properties. However, the separation distances of the excavation from side boundaries along with the shallow depth to bedrock and its strength and condition where returned indicates that risk levels will remain low for instability impacting neighbouring properties, structures or persons within these areas.

The JK investigation report recommendations are detailed and are considered to address the actual ground conditions identified, including areas of poor-quality rock. The recommended ground vibration limit is conservative but takes into account the variable aspects of ground vibration and should ensure a very low likelihood of impact to property whilst maintaining reasonable conditions for persons during the rock excavation phase. The report also details a geotechnical inspection/monitoring program that will allow for identification of ground variations and potential landslip hazards. They are therefore considered suitable to maintain excavation stability and protection of neighbouring properties.

All three reports supplied are therefore considered, when combined, to provide sufficient detail that will ensure geotechnical stability and allow the development to be undertaken in accordance with good engineering practice. The JK investigation report recommendations are considered the most suitable for development of an excavation and construction methodology by the builder.

Hope the above comments meet Council's requirements, if we can be of further assistance in regard to this matter please don't hesitate to contact the undersigned.

Yours faithfully,

Troy Crozier
Principal
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