

Kuatro Build Pty Ltd
Suite 1, 3b Macquarie Street
Sydney NSW 2000

Attention: Mr. Ryan Soh

Project: Proposed Medium Density Residential Development
Project Location: 8 Forest Road Warriewood
Report Number: 16544-GR-4-1
Report Date: 6 November 2023

Re: Proposed Swimming Pool

This report provides a risk assessment for a proposed swimming pool that is to be added to the current development. The risk assessment is based on the results of a previous Alliance report, 'Geotechnical Summary & Risk Assessment Review Report' dated 9 January 2023 which provides a summary of the geotechnical investigations and risk assessments in accordance with Northern Beaches Council DA requirements undertaken on the site of proposed residential development at 8 Forest Road, Warriewood NSW. Kuatro Build Pty Ltd, principal contractors for the project, requested the assessment which was carried out by Alliance Geotechnical Pty Ltd (Alliance).

The site is being developed for residential housing with construction of four three-storey buildings (Building A – Building D) comprised of residential units with a maximum height of 10.5 m and construction of three two-storey buildings (Townhouses 1-14) comprised of residential units with a maximum height of 10.5 m. All buildings will be constructed over a common single basement. The development will also include an internal road network and associated infrastructure. It is also understood that a swimming pool has been added to the development and that a risk assessment is required for this addition.

Alliance was requested to provide geotechnical consulting services to assist with providing additional information on depths to bedrock for foundation design options, detailed settlement analysis of foundation options and general excavation and earthworks procedures as well as design practitioner declaration for the proposed development from a geotechnical design perspective.

Several geotechnical investigations and reports have been carried out for the proposed development at the site. A preliminary contamination and geotechnical assessment was carried out by Cardno with the results presented in report CGS2698 dated 12 October 2015. This assessment included three boreholes to 16 m and twelve test pits to 2.5 m with recommendations on site classification of the residential lots, foundation conditions, pavement design for the internal road network and earthworks procedures and guidelines.

Cardno carried out an additional geotechnical assessment with the results presented in Report 81022041 dated 22 December 2021. This assessment involved carrying out six cone penetrometer tests (CPT's) across the proposed development footprint to depths of 11 m to 16 m with comments on earthworks, pavement thickness design, foundation conditions and footing design recommendations and retaining structures.

JK Geotechnics Pty Ltd (JK) carried out a geotechnical assessment with the results presented in report ref. 33371BMrpt2 dated 8 October 2020. This assessment was carried out in accordance with the risk management policy from Pittwater Council (now Northern Beaches Council) and was essentially providing a risk management assessment for the proposed development based on a site walkover, review of the Cardno preliminary contamination and geotechnical assessment report CGS2698, review of publicly available geotechnical reports and previous geotechnical investigations of the site or near surrounds undertaken by JK.

Alliance was requested to carry out a supplementary geotechnical investigation to establish the depth to bedrock and strength and quality of the bedrock once encountered in order to assess the viability of a piled foundation option for the proposed development. This involved drilling six test bores across the site to depths of 16.80 m to 26.38 m with point load testing of the rock core samples recovered. The detailed results of this investigation are presented in Report 14503-GR-1-1 dated 16 February 2022.

Alliance was further requested to carry out an additional supplementary geotechnical investigation and analysis report involving three phases of Cone Penetration Tests (CPT's) with a total of 33 CPT's being carried out over 3 months to provide information on the geological profile above the bedrock to carry out a detailed settlement analysis for a raft slab design being undertaken by the project structural engineers as the option of foundation piles founded in bedrock was not deemed viable given the depth of the bedrock. The results of the additional supplementary geotechnical investigation and analysis are presented in Report 14503-GR-1-2 dated 18 July 2022.

The Australian Geomechanics Society (AGS) Guideline for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning (2007) has been used to assess the levels of land stability risks associated with a development during and after completion of its construction. The risk assessment process involves the identification of hazards that could potentially affect the stability of the site and surrounding land, as well as identification of "elements at risk" should a landslide occur. We have reviewed the risk assessment carried out by JK Geotechnics in relation to both existing site conditions predevelopment and the site conditions post development. JK Geotechnics have identified that the potential landslide hazards associated with the site and the proposed development are:

- A Instability of the hillside slope upslope of the proposed access road.
- B Instability of the creek bank on the northern side of the proposed access road.
- C Instability of the rock outcrops exposed on the hillside to the south and west of the site.
- D Instability of the proposed basement retaining walls.

Based on the inspection of the site and proposed development, Alliance has determined that these hazards are a reasonable assessment for the site and the proposed development. The assessed risk to property has been assessed as very low to low for the identified hazards which is considered 'acceptable' in accordance with the Geotechnical Risk Management Policy for Pittwater. The associated risk to life was assessed as being about 10^{-7} which is also considered 'acceptable' in accordance with the Geotechnical Risk Management Policy for Pittwater. Alliance has reviewed the risk tables provided in the JK Geotechnics assessment and has determined that the calculations to determine the risk for each of the assessed hazards are appropriate.

The proposed swimming pool is to be located centrally of the site between the four apartment buildings as shown on the attached architectural plans. It is understood that excavation of approximately 2 m will be required for construction of the swimming pool with the strata consisting of interbedded hard sandy clay and dense clayey sand. There will be sufficient room to batter the sides of the excavation at 1:1 (H:V) and as such the risk associated with the excavation is considered very low and is in line with the previous assessment summarised above.

Written by



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