

**GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1 – To be submitted with Development Application**

Development Application for _____	Name of Applicant
Address of site <u>100A & 102 Wakehurst Parkway, Elanora Heights</u>	

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Ben White on behalf of White Geotechnical Group Pty Ltd
(Insert Name) (Trading or Company Name)

on this the 5/6/23 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least \$10million.

I:
Please mark appropriate box

- have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.
- have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report


Geotechnical Report Details:

Report Title: Geotechnical Report <u>100A & 102 Wakehurst Parkway, Elanora Heights</u>
Report Date: <u>5/6/23</u>
Author: <u>BEN WHITE</u>
Author's Company/Organisation: <u>WHITE GEOTECHNICAL GROUP PTY LTD</u>

Documentation which relate to or are relied upon in report preparation:

<u>Australian Geomechanics Society Landslide Risk Management March 2007.</u>
<u>White Geotechnical Group company archives.</u>

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.


Signature _____
Name Ben White
Chartered Professional Status MScGEOLAusIMM CP GEOL
Membership No. 222757
Company White Geotechnical Group Pty Ltd

100A & 102 Wakehurst Parkway, Elanora Heights

Minor Works Assessment

1. Proposed Development

A geotechnical site inspection was carried out on the 6th April, 2023.

Details of the proposed development are shown on 1 drawing prepared by High Design, drawing number 2/2 1020 23, dated March, 2023. No work is required for the proposed development as it only involves a boundary adjustment. As such, the development is considered minor in scope from a geotechnical perspective.

2. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed below or beside the properties. The steeply graded land surface that rises across the properties and continues above is a potential hazard (**Hazard One**).

Hazard One – Qualitative Risk Assessment on Property

The properties are on the high side of the road and have a S aspect. The properties encompass the base and a portion of an E-W trending ridge of an escarpment. From the road frontage the slope rises at average angles of $\sim 7^\circ$ before quickly increasing to $\sim 31^\circ$ below a rock face that caps the escarpment. The slope above the properties gradually decreases in grade. The slope below the properties eases to near level angles.

102 Wakehurst Parkway, Elanora Heights: At the road frontage, a concrete driveway runs to a paved parking area and garage on the S side of the house. Gardens and a lawn area encompass the house frontage. The two storey brick and timber framed and clad house is supported on a concrete slab, brick walls and timber posts. The external supporting walls and posts stand vertical and show no significant signs of movement. A gently sloping lawn area rises from the uphill side of the house halfway up the property. Sandstone floaters are scattered on the uphill side of the lawn area. A steep and densely vegetated slope rises from

the uphill side of the lawn area to the base of a ~6.0m high sandstone cliff face (Photos 1 to 3). The cliff face is made up of widely jointed massive medium strength sandstone. Some minor undercutting was observed along a bedding plane halfway up the rock face (Photo 2) but no significant geological defects that could impact the stability of the rock face were observed above the property. The rock face is considered to be currently stable in this location. The property continues for another ~40m to the uphill boundary and could not be accessed due to the rock face. No significant signs of movement that could have occurred in recent geological history were observed on the property.

100A Wakehurst Parkway, Elanora Heights: The property is accessed by a concrete right of carriageway (ROW) which runs up the slope to a parking area and garage. Uphill of the garage is a large sandstone boulder in a stable position. The part three storey concrete and steel clad house is supported by concrete block walls, formed concrete walls and steel posts. The supporting walls and posts stand vertical and show no significant signs of movement. Each level of the house has been cut into the slope on the uphill side. The cuts are supported by formed concrete retaining walls up to ~2.3m high and in good condition. A suspended timber deck in good condition extends off the E side of the house. Medium Strength Hawkesbury Sandstone bedrock steps up the slope beside the house. Another timber deck is located uphill of the house. Large dislodged sandstone joint blocks are sitting in stable positions on the slope next the deck. Uphill of the deck is sandstone cliff face that is estimated to be at least ~8m high. No significant geological defects were observed on the exposed rock face that could affect its stability.

The likelihood of the steep slope and large rock face on the properties mass failing and impacting on the properties is assessed as 'Unlikely' (10^{-4}). The consequences to properties of such a failure are assessed as 'Medium' (15%). The risk to property is 'Low' (2×10^{-5}).

Hazard One – Quantitative Risk Assessment on Property

For loss of life risk can be calculated as follows:

$R_{(LoI)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$ (See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

Annual Probability

No evidence of significant movement was observed on the property that could have occurred in recent geological history. The large rock face (Photos 1 to 3) appears to be currently stable.

$$P_{(H)} = 0.002/\text{annum}$$

Probability of Spatial Impact

The probability of the subject houses being impacted when a landslide occurs is estimated to be 0.05.

$$P_{(S:H)} = 0.05$$

Possibility of the Location Being Occupied During Failure

The average household is taken to be occupied by 4 people. It is estimated that 1 person is in the house for 20 hours a day, 7 days a week. It is estimated 3 people are in the house 12 hours a day, 5 days a week.

For the person most at risk:

$$\frac{20}{24} \times \frac{7}{7} = 0.83$$

$$P_{(T:S)} = 0.83$$

Probability of Loss of Life on Impact of Failure

Based on the volume of land sliding and its likely velocity when it hits the house, it is estimated that the vulnerability of a person to being killed when a landslide occurs is 0.01.

$$V_{(D:T)} = 0.01$$

Risk Estimation

$$R_{(LoI)} = 0.002 \times 0.05 \times 0.83 \times 0.01 \\ = 0.00000083$$

$R_{(LoI)} = 8.3 \times 10^{-7}/\text{annum}$ **NOTE:** This level of risk is 'ACCEPTABLE', provided the recommendations in 'Section 3 Ongoing Maintenance' are carried out.

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The steeply graded slope and large rock face midway up to the properties (Photos 1 to 3) mass failing and impacting on the properties.
LIKELIHOOD	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})
RISK TO LIFE	$8.3 \times 10^{-7}/\text{annum}$
COMMENTS	This level of risk is 'ACCEPTABLE', provided the recommendations in Section 3 are carried out.

(See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

3. Ongoing Maintenance

Where slopes are steep and approach or exceed 30° , such as midway up the properties, it is prudent for the owners to occasionally inspect the slope (say annually or after heavy and prolonged rainfall events, whichever occurs first). Should any of the following be observed: movement or cracking in retaining walls, cracking in any structures, cracking or movement in the slope surface, tilting or movement in established trees, leaking pipes, or newly observed flowing water, or changes in the erosional process or drainage regime, then a geotechnical consultant should be engaged to assess the slope. We can carry out these inspections upon

request. The risk assessment in **Section 2** is subject to this ongoing maintenance being carried out.

4. Conclusion

Provided the recommendations in **Section 3** are carried out, the properties have an 'Acceptable Risk Level' in accordance with the 2009 Geotechnical Risk Management Policy for Pittwater.

White Geotechnical Group Pty Ltd.



Dion Sheldon
BEng(Civil)(Hons),
Geotechnical Engineer.

Reviewed By:



Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist.



Photo 1



Photo 2



Photo 3