

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

Development Application for _____
Name of Applicant
Address of site 39 Chisholm Avenue, Avalon

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 7/3/24 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 39 Chisholm Avenue, Avalon
Report Date: 7/3/24
Author: BEN WHITE
Author's Company/Organisation: WHITE GEOTECHNICAL GROUP PTY LTD

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

Australian Geomechanics Society Landslide Risk Management March 2007.
White Geotechnical Group company archives.

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 MScGEOL AIG., RPGeo
Membership No. 10306
Company White Geotechnical Group Pty Ltd



39 Chisholm Avenue, Avalon

Minor Works Assessment

1. Proposed Development

A geotechnical site inspection was carried out on the 6th March, 2024 and previously on the 15th October, 2015.

Details of the proposed development are shown on 9 drawings prepared by Sean Smyth Design, project number 0115, drawings numbered A01 to A03 and A05 to A10, Issue C, dated 8/1/24. The work involves an extension of the roof of the house and other minor internal and external alterations to the house. The roof extension will be founded on the existing house structure or on near level ground at the base of an existing cut. As such, the development is considered minor in scope from a geotechnical perspective.

2. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate to steeply graded slope that falls across the property and continues above and below is a potential hazard (Hazard One).

Hazard One – Qualitative Risk Assessment on Property

The property is on the low side of the road and has an E aspect. It is located on the moderate to steeply graded middle to upper reaches of a hillslope. The natural slope falls across the property at an average angle of ~16°.

At the southern side of the road frontage, spaced concrete piers with infilled concrete panels support a fill for the road. No signs of movement were observed in this area. A suspended concrete driveway provides access to the property and runs to a garage. The supporting steel structure of the driveway and garage appears stable. A cut has been made into the slope to construct the lower level of the house. The northern side of the cut is either supported by a stable gabion basket retaining wall or is battered back to stable angles. The southern side is

supported by a brick retaining wall that has been constructed so it is slightly inclined uphill. It displays minor cracking but it is currently considered stable. An old, rough treated pine retaining wall supports a garden bed above the brick wall. The two storey clad house is supported on brick walls, brick piers, and concrete block walls. No signs of movement were observed in its supporting brick walls and piers. One of the supporting concrete block walls displays a stepped and vertical crack through the blockwork and mortar (Photo 1) and appears to have settled. Bricks and fibreboard packing have been placed above the settled wall to provide contact with the house structure (Photo 2). See 'Section 3 Ongoing Maintenance'. A timber deck extends off the lower northern side of the house (Photo 3). Its supporting timber posts are tilting to a maximum of $\sim 5^\circ$ downhill (Photos 4 & 5). These posts have been constructed with the tilt and do not appear to have moved significantly since the previous inspection in 2015. However, to be prudent, the advice in 'Section 3 Ongoing Maintenance' is to be followed. A pool that shows no significant signs of movement is located on the downhill side of the house. The area below the house has been terraced with keystone and timber retaining walls up to $\sim 1.7\text{m}$ high. Some of these walls are tilting downslope slightly (Photos 6 to 8). See 'Section 3 Ongoing Maintenance'.

The slope above the property continues at similar angles. The slope below the property gradually decreases in grade. The likelihood of the land surface on, above, or below the property failing and impacting on the property is assessed as 'Unlikely' (10^{-4}). The consequences to property of such a failure are assessed as 'Medium' (12%). 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

The annual probability of a landslide occurring is estimated to be 0.001.

$$P_{(H)} = 0.001/\text{annum}$$

Probability of Spatial Impact

The probability of the subject house being impacted when a landslide occurs is estimated to be 0.1.

$$P_{(S: H)} = 0.1$$

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

$$\begin{aligned} R_{(LoI)} &= 0.001 \times 0.1 \times 0.83 \times 0.01 \\ &= 0.00000083 \end{aligned}$$

$R_{(LoI)} = 8.3 \times 10^{-7}/\text{annum}$ **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 moderate to steep slope that falls across the property and continues above and below failing and impacting on the property.
LIKELIHOOD	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (12%)
RISK TO PROPERTY	'Low' (2×10^{-5})
RISK TO LIFE	8.3×10^{-7} /annum
COMMENTS	This level of risk is 'ACCEPTABLE', provided the recommendation in Section 3 are followed.

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

3. Ongoing Maintenance

The cracked concrete block wall (Photos 1 to 2), tilting timber posts (Photos 3 to 5) and tilting retaining walls across the site (Photos 6 to 8) are to be monitored by the owners on an annual basis or after heavy and prolonged rainfall events, whichever occurs first. A photographic record of these inspections is to be kept. Should further movement occur the walls or posts are to be remediated or replaced so that they meet current engineering standards. We can carry out these inspections upon request.

4. Conclusion

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

White Geotechnical Group Pty Ltd.

Reviewed By:



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



Nathan Gardner B.Sc. (Geol. & Geophys. & Env. Stud.)
AIG., RPGeo Geotechnical & Engineering.
No. 10307
Engineering Geologist & Environmental Scientist.





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8