

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

Development Application for \_\_\_\_\_  
Name of Applicant

Address of site 16 Cabarita Road, Avalon

*The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk 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 15/6/20 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 16 Cabarita Road, Avalon

Report Date: 15/6/20

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

MScGEOLAusIMM CP GEOL

Membership No.

222757

Company

White Geotechnical Group Pty Ltd

**GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER**  
**FORM NO. 1(a) - Checklist of Requirements for Geotechnical Risk Management Report for Development Application**

Development Application for	Name of Applicant
Address of site	<u>16 Cabarita Road, Avalon</u>

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

**Geotechnical Report Details:**

Report Title: Geotechnical Report <u>16 Cabarita Road, Avalon</u>
Report Date: <u>15/6/20</u>
Author: <u>BEN WHITE</u>
Author's Company/Organisation: <u>WHITE GEOTECHNICAL GROUP PTY LTD</u>

**Please mark appropriate box**

- ☒ Comprehensive site mapping conducted 26/3/20  
(date)
- ☒ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ☒ Subsurface investigation required
  - ☐ No Justification \_\_\_\_\_
  - ☒ Yes Date conducted 26/3/20
- ☒ Geotechnical model developed and reported as an inferred subsurface type-section
- ☒ Geotechnical hazards identified
  - ☒ Above the site
  - ☒ On the site
  - ☐ Below the site
  - ☐ Beside the site
- ☒ Geotechnical hazards described and reported
- ☒ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
  - ☒ Consequence analysis
  - ☒ Frequency analysis
- ☒ Risk calculation
- ☒ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.
- ☒ Design Life Adopted:
  - ☒ 100 years
  - ☐ Other \_\_\_\_\_  
specify
- ☒ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified
- ☒ Additional action to remove risk where reasonable and practical have been identified and included in the report.
- ☐ Risk assessment within Bushfire Asset Protection Zone.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal 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

## **GEOTECHNICAL INVESTIGATION:**

### **New Inclined Lifts at 16 Cabarita Road, Avalon**

#### **1. Proposed Development**

- 1.1** Construct two new inclined lifts. One from the garage to the uphill side of the house, and another from the downhill side of the house to the waterfront.
- 1.2** Details of the proposed development are shown on 4 drawings by Peter Downes Designs, drawings numbered A2 2003 00 to 03, dated 19/3/20.

#### **2. Site Description**

- 2.1** The site was inspected on the 26<sup>th</sup> March, 2020, and previously on the 26<sup>th</sup> September, 2017.
- 2.2** This residential property is on the low side of the road and has a NE aspect. The block is located on the steeply graded lower reaches and toe of a slope that falls to the waterfront at Pittwater. At the road frontage, the natural slope falls at an average angle of ~20° that gradually increases down slope to a maximum of ~28° on the lower side of the house. Along the lower boundary, the slope quickly eases as the waterfront is approached. The grade above the property rises at decreasing angles.
- 2.3** At the road frontage, a concrete driveway runs to a stable garage along the upper boundary of the property (Photo 1). On the downhill side of the garage, an excavation has been made into the slope for a level lawn above the house (Photo 2). The excavation is supported by rendered masonry retaining walls that appear well constructed (Photo 3). The one and two storey clad house displays no significant signs of movement in the external supporting walls (Photo 4). Construction work was currently underway on the downhill side of the property for a separate DA. This slope contains some embedded boulders (Photo 5). Most of the boulders appear to be sitting in stable positions. One of the boulders immediately above the near

completed boatshed appeared to have been slightly undercut and was held in place by a strap tied back into the slope above (Photo 6). The builder on site confirmed that the boatshed would have a green roof and would be backfilled to at least 100mm above the base of the boulder. The backfill would consist of gravel. This is considered appropriate to ensure the stability of the boulder into the future. Below the property, a jetty extends into Pittwater (Photo 7).

### 3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by the Newport Formation of the Narrabeen Group. This is described as interbedded laminite, shale and quartz to lithic quartz sandstone.

### 4. Subsurface Investigation

Two auger holes were put down to identify the soil materials. Eight Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The locations of the tests are shown on the site plan. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. DCP6 likely encountered refusal on a footing for a retaining wall above. The results are as follows:

#### AUGER HOLE 1 (~RL3.0) – AH1 (Photo 8)

Depth (m)	Material Encountered
0.0 to 0.2	<b>TOPSOIL</b> , black/dark brown, loose, dry.
0.2 to 0.5	<b>CLAYEY SAND</b> , dark brown, medium dense, dry.

Refusal on rock @ 0.5m. Estimated to be a sandstone floater. No watertable encountered.

## AUGER HOLE 2 (~RL5.0) – AH2 (Photo 9)

Depth (m)	Material Encountered
0.0 to 0.1	<b>MULCH</b> , woodchips, dry.
0.1 to 0.4	<b>CLAYEY SAND</b> , dark brown, medium dense, dry.

Refusal on rock @ 0.4m. Estimated to be a sandstone floater. No watertable encountered.

DCP TEST RESULTS – Dynamic Cone Penetrometer								
Equipment: 9kg hammer, 510mm drop, conical tip.						Standard: AS1289.6.3.2 - 1997		
Depth(m) Blows/0.3m	DCP 1 (~RL3.0)	DCP 2 (~RL3.2)	DCP 3 (~RL5.0)	DCP 4 (~RL4.5)	DCP 5 (~RL3.0)	DCP 6 (~RL16.3)	DCP 7 (~RL16.3)	DCP 8 (~RL16.2)
0.0 to 0.3	4F	1F	6	3	7	7	11	6
0.3 to 0.6	6	16	19	15	14	#	13	21
0.6 to 0.9	24	#	45	42	36		12	8
0.9 to 1.2	40		#	#	25		16	20
1.2 to 1.5	#				#		15	28
1.5 to 1.8							14	22
1.8 to 2.1							22	14
2.1 to 2.4							22	25
2.4 to 2.7							#	35
2.7 to 3.0								#
	End of Test @ 1.2m	Refusal on Rock @ 0.6m	End of Test @ 0.9m	End of Test @ 0.9m	End of Test @ 1.0m	Refusal @ 0.2m	Refusal on Rock @ 2.4m	End of Test @ 2.7m

#refusal/end of test. F = DCP fell after being struck showing little resistance through all or part of the interval.

### DCP Notes:

DCP1 – End of test @ 1.2m, DCP still very slowly going down, clean dry tip.

DCP2 – Refusal on rock @ 0.6m, DCP bouncing off rock surface, expected to be floater, clean dry tip.

DCP3 – End of test @ 0.9m, DCP still very slowly going down, clean dry tip.

DCP4 – End of test @ 0.9m, DCP still very slowly going down, small amount of yellow shale fragments on dry tip.

DCP5 – End of test @ 1.0m, DCP still very slowly going down, clean dry tip.

DCP6 – Refusal @ 0.2m on possible concrete retaining wall footing, DCP bouncing, wet muddy tip.

DCP7 – Refusal on rock @ 2.4m, DCP bouncing off rock surface, wet muddy tip, grey and maroon clay in collar above tip.

DCP8 – End of test @ 2.7m, DCP still very slowly going down, grey clay on wet tip, grey and maroon clay in collar above tip.

## 5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. They consist of a thin sandy topsoil over a medium dense clayey sand that is underlain by a stiff to very stiff sandy clays and clays with rock fragments throughout the profile. In the location of the proposed upper inclined lift on the uphill side of the property, the clays merge into the weathered zone of the underlying shale at an average depth of ~2.4m below the current surface. Across the downhill side of the property, the clays merge into the weathered zone of the underlying shale at an average depth of ~1.0m below the current surface. It should be noted that sandstone floaters are expected throughout the profile. The weathered zone of the underlying rock is interpreted as Extremely Low Strength Shale. It is to be noted that this material is a soft rock and can appear as a mottled stiff clay when it is cut up by excavation equipment. See Type Section attached for a diagrammatical representation of the expected ground materials.

## 6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the clay and rock and through the cracks in the rock. Due to the slope and elevation of the block, the water table in the location is expected to be many metres below the base of the proposed works.

## 7. Surface Water

No evidence of significant surface flows were observed on the property during the inspection. Normal sheet wash from the slope above will be intercepted by the street drainage system for Cabarita Road above.

## 8. Geotechnical Hazards and Risk Analysis

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

### Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The steeply graded slope that falls across the property and continues above failing and impacting on the existing house or the proposed works.
LIKELIHOOD	'Unlikely' ( $10^{-4}$ )
CONSEQUENCES TO PROPERTY	'Medium' (25%)
RISK TO PROPERTY	'Low' ( $2 \times 10^{-5}$ )
RISK TO LIFE	$8.3 \times 10^{-7}$ /annum
COMMENTS	This level of risk is 'ACCEPTABLE'.

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

## 9. Suitability of the Proposed Development for the Site

The proposed development is suitable for the site. No geotechnical hazards will be created by the completion of the proposed development provided it is carried out in accordance with the requirements of this report and good engineering and building practice.

## 10. Stormwater

No significant additional stormwater runoff will be created by the proposed development.

## 11. Excavations

Apart from those for footings, no excavations are required.

## 12. Foundations

The proposed inclined lifts can be supported on concrete slabs and piers taken to and embedded into the underlying Extremely Low Strength Shale. This material is expected at an average depth of ~1.0m below the current surface on the downhill side of the property, and ~2.4m below the current surface on the uphill side of the property. A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low Strength Shale.

It is recommended the footings be dug, inspected, and poured in quick succession (ideally the same day if possible). If the footings get wet, they will have to be drained and the soft wet layer of shale on the footing surface will have to be removed before concrete is poured.

If a rapid turnaround from footing excavation to the concrete pour is not possible, a sealing layer of concrete may be added to the footing surface after it has been cleaned.

**NOTE:** If the contractor is unsure of the footing material required, it is more cost-effective to get the geotechnical consultant on site at the start of the footing excavation to advise on footing depth and material. This mostly prevents unnecessary over-excavation in clay-like shaly-rock but can be valuable in all types of geology.

## 13. Inspections

The client and builder are to familiarise themselves with the following required inspection as well as council geotechnical policy. We cannot provide geotechnical certification for the owners and Occupation Certificate if the following inspection has not been carried out during the construction process.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment is still onsite and before steel reinforcing is placed or concrete is poured.



White Geotechnical Group Pty Ltd.



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



Photo 1



Photo 2





Photo 3



Photo 4





Photo 5



Photo 6





Photo 7



Photo 8: AH1 – Downhole is from top to bottom





Photo 9: AH2 – Downhole is from top to bottom



## Important Information about Your Report

It should be noted that Geotechnical Reports are documents that build a picture of the subsurface conditions from the observation of surface features and testing carried out at specific points on the site. The spacing and location of the test points can be limited by the location of existing structures on the site or by budget and time constraints of the client. Additionally, the test themselves, although chosen for their suitability for the particular project, have their own limiting factors. The testing gives accurate information at the location of the test, within the confines of the test's capability. A geological interpretation or model is developed by joining these test points using all available data and drawing on previous experience of the geotechnical consultant. Even the most experienced practitioners cannot determine every possible feature or change that may lie below the earth. All of the subsurface features can only be known when they are revealed by excavation. As such, a Geotechnical report can be considered an interpretive document. It is based on factual data but also on opinion and judgement that comes with a level of uncertainty. This information is provided to help explain the nature and limitations of your report.

With this in mind, the following points are to be noted:

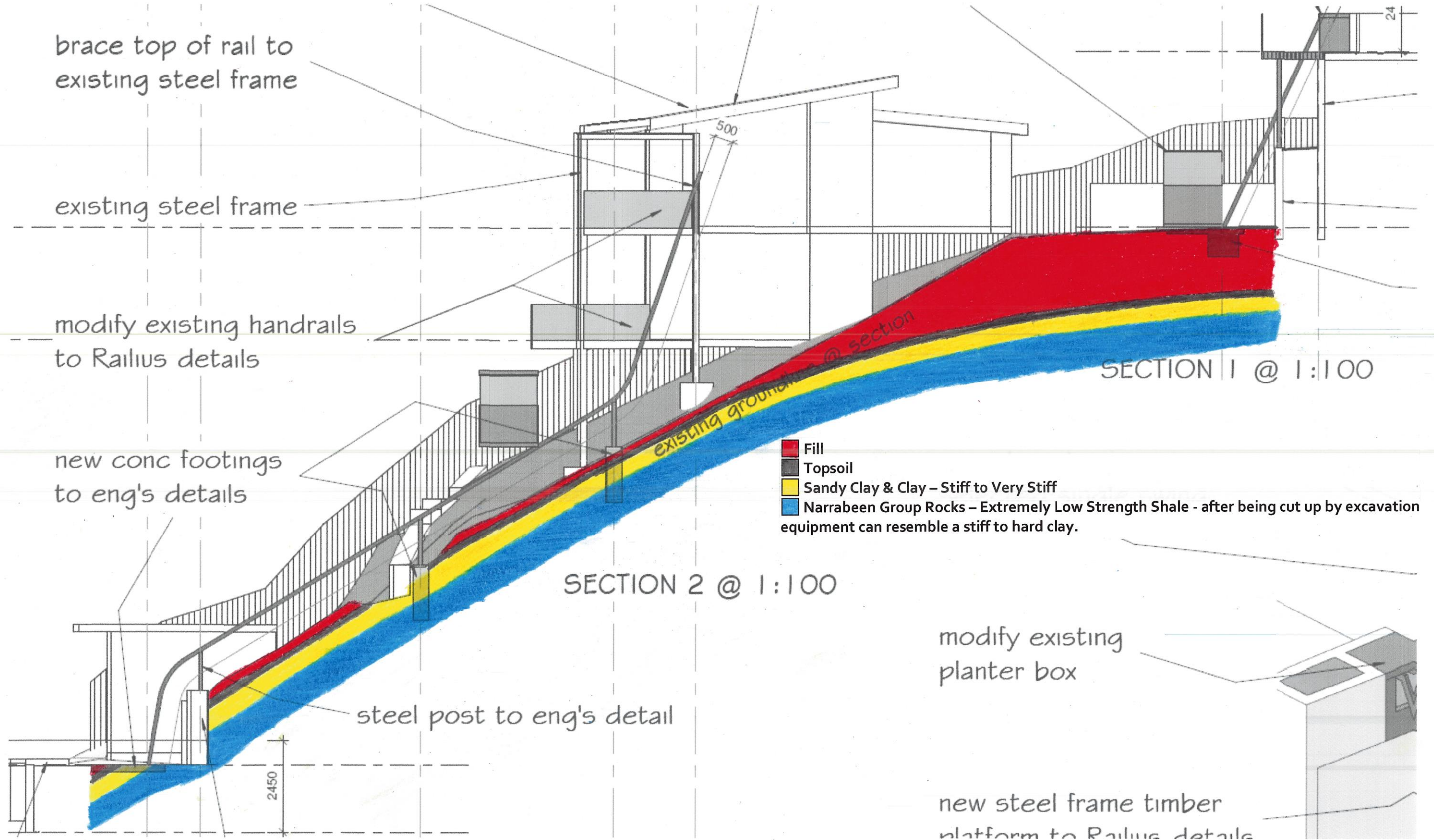
- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly to overcome if they are addressed early.
- If this report is used by other professionals during the design or construction process, any questions should be directed to White Geotechnical Group as only we understand the full methodology behind the report's conclusions.
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.
- This report should not be applied to any other project other than that outlined in section 1.0.
- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.







TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials





# EXAMPLES OF **GOOD** HILLSIDE PRACTICE



# EXAMPLES OF **POOR** HILLSIDE PRACTICE

