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

Development Application for _____
Name of Applicant

Address of site 41 Coasters Retreat, Coasters Retreat

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 14/5/21 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 **41 Coasters Retreat, Coasters Retreat**
Report Date: 14/5/21

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 41 Coasters Retreat, Coasters Retreat

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 **41 Coasters Retreat, Coasters Retreat**

Report Date: 14/5/21

Author: BEN WHITE

Author's Company/Organisation: WHITE GEOTECHNICAL GROUP PTY LTD

Please mark appropriate box

☒ Comprehensive site mapping conducted **10/7/20**
(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 **10/7/20**

☒ 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 House at **41 Coasters Retreat, Coasters Retreat**

1. Proposed Development

1.1 Construct a new house by excavating to a maximum depth of ~0.8m.

1.2 Construct an inclined lift that runs from the Coasters Retreat waterfront reserve up the slope to the proposed new house.

1.3 Details of the proposed development are shown on 12 drawings prepared by Cornerstone Structures, drawings numbered A100 to A111, project number 210429, dated 29/4/21.

2. Site Description

2.1 The site was inspected on the 10th of July, 2020.

2.2 This residential property has a NW aspect. It is located on the moderate to steeply graded lower middle reaches of a hillslope. The natural slope rises from the downhill boundary of the property at an angle of ~14° before increasing in grade to a maximum angle of ~33° near the uphill boundary of the property. The slopes above and below the property increase in grade.

2.3 The property is accessed by boat and by timber steps which run up the slope (Photo 1). A moderately sloping lawn is located on the downhill side of the property (Photos 2 to 4). Detached Sandstone joint blocks that originate from the slope above are embedded in the lawn (Photos 5 & 6). The rocks appear to be in stable positions on the slope. A timber clad shed in good condition is located on the S side of the property (Photo 7). Hawkesbury Sandstone cliff faces up to ~5m high are outcropping uphill of the property (Photos 8 & 9). They display no undercutting or other geological defects and are considered stable. Many small to medium sized loose boulders are

scattered on the steep slope above the cliff faces (Photo 10). The boulders are in stable positions on the slope. Overall the slope across the property is considered stable. The adjoining neighbouring properties were observed to be in good order as seen from the subject property.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

One auger hole was put down to identify the soil materials. Six 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. This is not expected to be an issue for the testing on this site. But due to the possibility that the actual ground conditions vary from our interpretation there should be allowances in the excavation and foundation budget to account for this. We refer to the appended "Important Information about Your Report" to further clarify. The results are as follows:

AUGER HOLE 1 (~RL30.1) **–** AH1 (photo 11)

Depth (m)	**Material Encountered**
0.0 to 0.7	**TOPSOIL**, sandy soil, dark brown, fine to medium grained, moist with fine trace organic matter.

Refusal @ 0.7m auger grinding on rock. No watertable encountered.

DCP TEST RESULTS ON NEXT PAGE

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** (~RL29.0)	**DCP 2** (~RL29.0)	**DCP 3** (~RL31.2)	**DCP 4** (~RL32.8)	**DCP 5** (~RL33.8)	**DCP 6** (~RL28.6)
0.0 to 0.3	2	5	7	6	9	4
0.3 to 0.6	4	4	4	11	8	4
0.6 to 0.9	5	4	12	5	12	6
0.9 to 1.2	1	5	23	#	25	28
1.2 to 1.5	#	9	15		40	34
1.5 to 1.8		30	14		#	25
1.8 to 2.1		3	17			23
2.1 to 2.4		#	20			4
2.4 to 2.7			9			#
2.7 to 3.0			#			
	Refusal @ 0.9m	Refusal @ 1.9m	Refusal @ 2.6m	Refusal @ 0.7m	End of Test @ 1.5m	Refusal @ 2.1m

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

DCP Notes:

DCP1 – Refusal @ 0.9m, DCP bouncing, red and orange rock fragments on dry tip.

DCP2 – Refusal @ 1.9m, DCP bouncing, orange and white rock fragments on dry tip.

DCP3 – Refusal @ 2.6m, DCP bouncing, whit impact dust and orange rock fragments on dry tip.

DCP4 – Refusal @ 0.7m, DCP bouncing, nothing on clean dry tip.

DCP5 – End of Test @ 1.5m, DCP still very slowly going down, orange and red rock fragments on dry tip.

DCP6 – Refusal @ 2.1m, DCP bouncing, orange sandy clay on dry tip.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger and the benches narrower. Where the slope eases, the

opposite is true. The rock is overlain by colluvium of sufficient density to its old age. In the test locations, the depth to rock ranged between 0.7 to 2.6m below the current surface. Many large floaters are located at the surface and are expected through the profile. The sandstone underlying the property is estimated to be Very Low to Medium Strength or better. 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 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 proposed works.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. It is expected that normal sheet wash will move onto the site from above the property during heavy down pours. Due to the steep slope above this is expected to flow at high velocities.

8. Geotechnical Hazards and Risk Analysis

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

RISK ANALYSIS SUMMARY ON NEXT PAGE

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'.

(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

It is recommended all stormwater or drainage runoff from the proposed development be piped to the existing easement. If this option is not feasible a spreader pipe system or infiltration/dispersion trench is suitable as a last resort, provided flows are kept close to natural runoff for the site. All stormwater is to be piped through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to a maximum depth of ~0.8m is required to construct the ground floor of the proposed new house. The excavation is expected to be through sandy soil (slope colluvium) with Medium Strength Sandstone expected near the base of the excavation.

It is envisaged that excavations through soil can be carried out with an excavator and bucket and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

The proposed excavations are set back sufficiently from any surrounding structures or boundaries so that vibrations from the excavation will not exceed tolerable limits for building or infrastructure damage.

13. Retaining Structures

For cantilever or singly propped retaining structures it is suggested the design be based on a triangular distribution of lateral pressures using the parameters shown in Table 1.

Table 1 – Likely Earth Pressures for Retaining Structures

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0
Soil	20	0.40	0.55
Medium Strength Sandstone	24	0.00	0.01

For rock classes refer to Pells et al "Design Loadings for Foundations on Shale and Sandstone in the Sydney Region". Australian Geomechanics Journal 1978.

It is to be noted that the earth pressures in Table 1 assume a level surface above the structure, do not account for any surcharge loads and assume retaining structures are fully drained.

Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

All retaining structures are to have sufficient back-wall drainage and be backfilled immediately behind the structure with free draining material (such as gravel). This material is to be wrapped in a non-woven Geotextile fabric (i.e. Bidim A34 or similar), to prevent the drainage from becoming clogged with silt and clay. If no back-wall drainage is installed in

retaining structures the full hydrostatic pressures are to be accounted for in the retaining structure design.

14. Foundations

Piers supported on Medium Strength Sandstone are suitable footings for the proposed new house and rainwater tanks. Medium Strength Sandstone is expected from exposed at the surface and to depths of between ~0.7m to ~2.6m below the current surface. To account for the possibility that large floaters are encountered we have conservatively reduced the foundation bearing pressure on rock, noting that a very large floater will act as a spread foundation. A maximum allowable bearing pressure of 400kPa can be assumed for footings on Medium Strength Sandstone.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if with the approval of the structural engineer the joint can be spanned or alternatively the footing can be repositioned so it does not fall over the joint.

The proposed inclined lift can be supported on pads cut to a minimum depth of 0.6m from the downhill edge of the footing into firm sandy clay. A maximum allowable bearing pressure of 100kPa can be assumed for footings supported on sandy clay.

NOTE: If the contractor is unsure of the footing material required it is more cost effective to get the geotechnical professional 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.

15. 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 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

Photo 9

Photo 10

Photo 11: AH1 – 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.

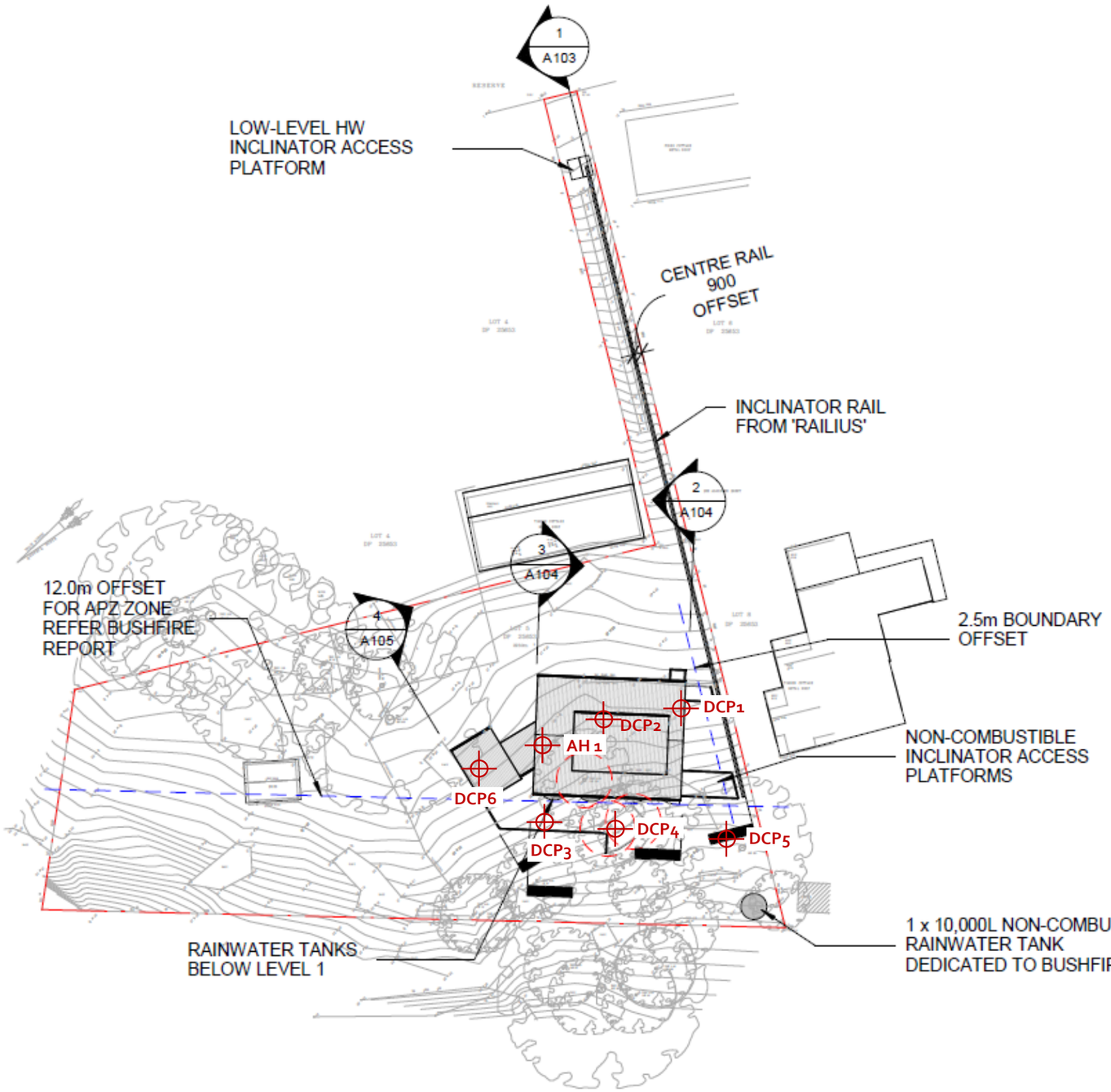
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

SITE PLAN – showing test locations



INDICATES TREES TO BE REMOVED. REFER TO ARBICULTURAL REPORT

REFER TO HYDRAULIC CONSULTANTS DRAWINGS AND REPORT FOR STORM AND WASTEWATER

REFER BUSHFIRE REPORT FOR BUSHFIRE REQUIREMENTS

cornerstone structures

No.	Description	Date

41 COASTERS RETREAT, COASTERS RETREAT NSW, 2108

Project Number: 210429

SITE PLAN

A102

Date 29/04/21

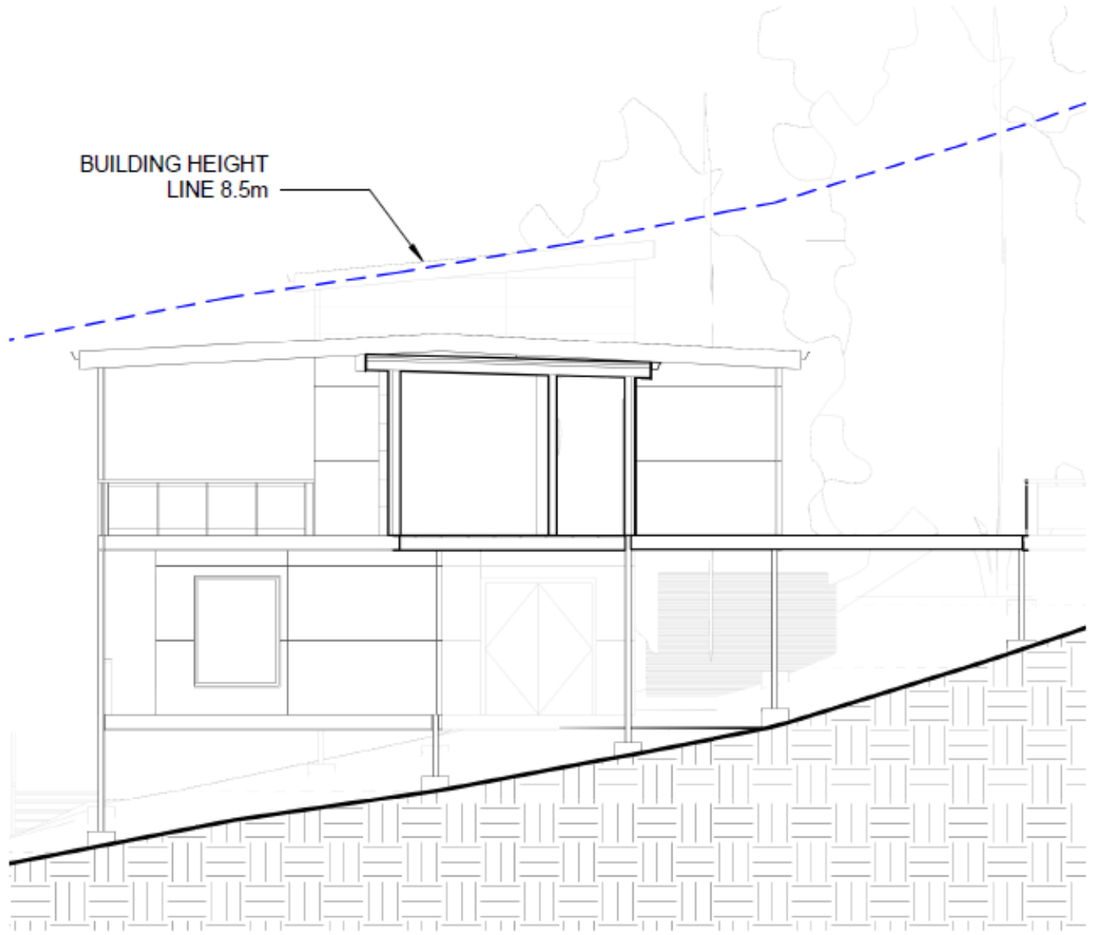
Scale 1 : 500

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Section 2

2

1 : 100



Section 3

3

1 : 100

Colluvium

Hawkesbury Sandstone – Medium Strength

corner stone structures

No.	Description	Date

41 COASTERS RETREAT, COASTERS RETREAT NSW, 2108

Project Number: 210429

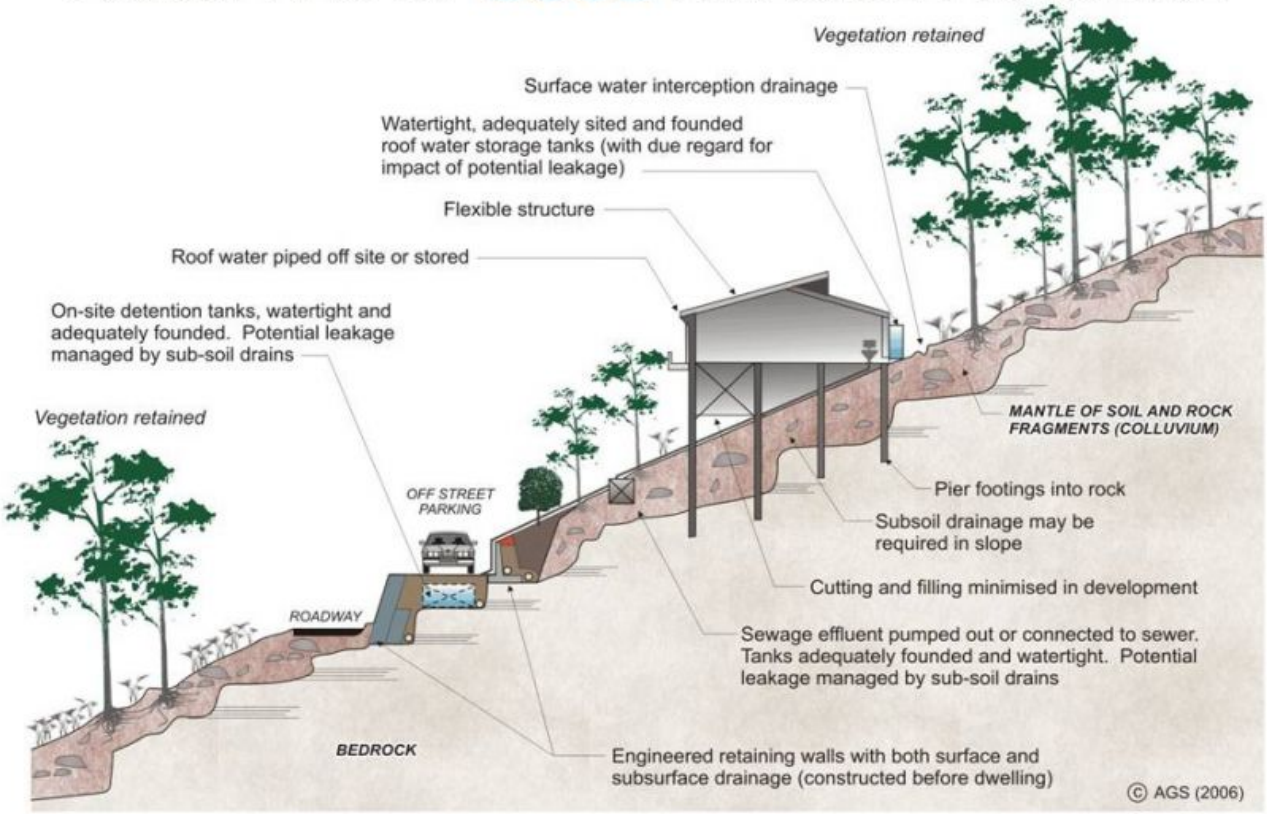
SITE SECTIONS 2

Date 29/04/21

A104

Scale 1 : 100

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE