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

Development Application for _____
Name of Applicant

Address of site 49 Binburra 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 8/3/21 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 **49 Binburra Road, Avalon**
Report Date: 23/02/21

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 49 Binburra Road, Avalon

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 **49 Binburra Road, Avalon**

Report Date: 8/3/21

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted **23/2/21** (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 **23/2/21**
- ☒ 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:

Alterations and Additions and New Pool at **49 Binburra Road, Avalon**

1. Proposed Development

1.1 Install a new pool on the downhill side of the property by excavating to a maximum depth of ~2.5m.

1.2 Extend the uphill side of the house.

1.3 Construct a new deck on the downhill side of the house.

1.4 Various other internal and external alterations.

1.5 Details of the proposed development are shown on 17 drawings prepared by THW Architects, Job number 179, drawings numbered A 00 -B to A 03 -B, A 10 -B to A 13 -B, A 20 -B, and A 100 -B to A 107 -B, Issue B, dated 4/3/21.

2. Site Description

2.1 The site was inspected on the 23rd February, 2021.

2.2 This residential property is on the low side of the road and has a NW aspect. It is located on the gentle to moderately graded middle reaches of a hillslope. The natural slope falls across the property at an average angle of ~12°. The slope above the property continues at increasing angles. The slope below the property continues at decreasing angles.

2.3 At the road frontage, a stone-paved driveway runs to a concrete parking area on the uphill side of the property (Photo 1). The fill for the road is lawn-covered, battered to stable angles, and merges into the natural slope. Between the road frontage and the house is a gently sloping lawn (Photo 2). The part two-storey brick and timber framed and clad house is supported on brick walls (Photo 3). Cracking was observed in the NE and SW supporting walls of the house (Photos 4 & 5). However,

these walls will both be demolished as part of the proposed works. No other significant signs of movement were observed in the external supporting walls. An excavation has been made in the slope for the lower ground floor of the house. The cut is supported by a concrete retaining wall ~1.8m high that was observed to be tilting downslope to an angle of ~6° (Photo 6). This wall will also be demolished as part of the proposed works. A gently sloping lawn extends off the downhill side of the house to a garden area in the W corner of the property (Photo 7). An excavation has been made in the slope in the N corner of the property for a brick-paved area. The cut is supported by a treated timber retaining wall ~0.7m high that is in the slow process of collapse (Photo 8). This wall is also expected to be demolished as part of the proposed works.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by Hawkesbury Sandstone. However, the test results indicate the site is underlain by a more weathered rock than what is generally found in Hawkesbury Sandstone geology. It is most likely the boundary of the Hawkesbury Sandstone would be found further upslope and that the site is actually 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

One Auger Hole (AH) 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 attached. 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. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations.

See the appended "Important information about your report" for a more comprehensive explanation. The results are as follows:

AUGER HOLE 1 (~RL47.0) – AH1 (Photo 9)

Depth (m)	**Material Encountered**
0.0 to 0.1	**FILL**, disturbed sandy soil, dark brown, medium dense, dry, medium to coarse grained with fine trace organic matter.
0.1 to 0.7	**FILL**, disturbed clay derived from weathered shale, brown, dark brown and mottled orange, maroon, and grey, firm to very stiff, dry, fine to medium grained.

End of hole @ 0.7m in fill. No water table 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** (~RL48.2)	**DCP 2** (~RL47.7)	**DCP 3** (~RL47.0)	**DCP 4** (~RL46.0)	**DCP 5** (~RL47.6)	**DCP 6** (~RL50.0)
0.0 to 0.3	4	3	7	3	3	12
0.3 to 0.6	7	14	10	5	5	14
0.6 to 0.9	17	30	17	5	7	9
0.9 to 1.2	32	#	30	6	30	11
1.2 to 1.5	#		#	13	#	30
1.5 to 1.8				30		#
1.8 to 2.1				#		
	End of Test @ 1.2m	End of Test @ 0.9m	End of Test @ 1.2m	End of Test @ 1.8m	End of Test @ 1.1m	End of Test @ 1.5m

#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, grey, orange, and maroon clay in collar above tip.

DCP2 – End of test @ 0.9m, DCP still very slowly going down, maroon shale on wet tip.
DCP3 – End of test @ 1.2m, DCP still very slowly going down, maroon shale on dry tip.
DCP4 – End of test @ 1.8m, DCP still very slowly going down, orange shale on wet tip.
DCP5 – End of test @ 1.1m, DCP still very slowly going down, clean dry tip.
DCP6 – End of test @ 1.5m, DCP still very slowly going down, orange shale fragments on dry tip, maroon clay in collar above tip.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. Filling has been placed across the downhill side of the house to a depth of at least ~0.7m. In the test locations, underlying the filling, the ground materials consist of a thin silty soil over firm to hard clays. The clays merge into the underlying weathered rock at depths of between 0.6 to 1.5m below the current surface. The weathered zone is interpreted to be Extremely Low Strength Shale. This appears as a hard mottled clay upon excavation. 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 excavations.

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 Binburra Road above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The gentle to moderately graded slope that falls across the property and continues above and below is a potential

hazard (**Hazard One**). The proposed excavation is a potential hazard until the pool structure is in place (**Hazard Two**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The gentle to moderate slope that falls across the site and continues above and below failing and impacting on the proposed works.	The proposed excavation for the pool collapsing onto the work site before the pool structure is in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (30%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	5.5×10^{-7}/annum	4.6×10^{-4}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move the risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.

(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 a drainage easement be obtained from the downhill neighbouring property and all stormwater or drainage runoff from the proposed development be piped to the street below. If this option is not feasible, a spreader/dispersion trench is suitable as a last resort, provided flows are kept close to 'natural runoff' for the site with the use of on-site detention. 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 ~2.5m is required to install the proposed pool. It is expected the excavation will be through at least ~0.7m of manmade fill over a thin silty soil and firm to hard clay. Extremely Low Strength Shale is expected to be encountered at a depth of ~0.9m below the current surface. Excavations through fill, soil, clay, and Extremely Low Strength Shale can be carried out with an excavator and bucket.

12. Vibrations

No excessive vibrations will be generated by excavation through fill, soil, clay, or Extremely Low Strength Shale. Any vibrations generated by a domestic machine and bucket up to 16 ton will be below the threshold limit for infrastructure or building damage.

13. Excavation Support Requirements

The proposed excavation for the pool will reach a maximum depth of ~2.5m and will be set back sufficiently from any surrounding structures or boundaries.

The sides of the cut are expected to stand at near-vertical angles for short periods of time until the pool structure is installed provided the cut batters are kept from becoming saturated. If the cut batters through fill, soil, and clay remain unsupported for more than a few days before pool construction commences, they are to be supported with typical pool shoring, such as sacrificial form ply, until the pool structure is in place.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. Unsupported cut batters through fill, soil, and clay are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The covers are to be tied down with metal pegs or other suitable fixtures so they can't blow off in a storm. The materials and labour to construct the pool structure are to be organised so on completion of the excavation it can be constructed as soon as possible. The excavation is to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast.

All excavation spoil is to be removed from site following the current Environmental Protection Agency (EPA) waste classification guidelines.

14. Retaining Structures

For cantilever or singly-propped retaining structures, it is suggested the design be based on a triangular pressure 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
Fill, Sandy Soil, and Residual Clays	20	0.40	0.55
Extremely Low Strength Shale	22	0.25	0.35

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 likely hydrostatic pressures are to be accounted for in the structural design.

15. Foundations

The pool is expected to be partially seated in Extremely Low Strength Shale with areas in the firm to hard clays. To ensure a uniform bearing material, bucket piers may be required where weathered shale is not exposed.

The proposed extensions to the house and deck can be supported on piers taken to and embedded at least ~0.3m into the underlying Extremely Low Strength Shale. This material is expected at depths of between 0.6 to 1.5m below the current surface.

A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low Strength Shale. It should be noted that this material is a soft rock and a rock auger will cut through it so the builders should not be looking for refusal to end the footings.

As the bearing capacity of clay and shale reduces when it is wet, we recommend 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 layer of wet clay or 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.

16. Inspections

The client and builder are to familiarise themselves with the following required inspections as well as council geotechnical policy. We cannot provide geotechnical certification for the regulating authorities or the owner if the following inspections have 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

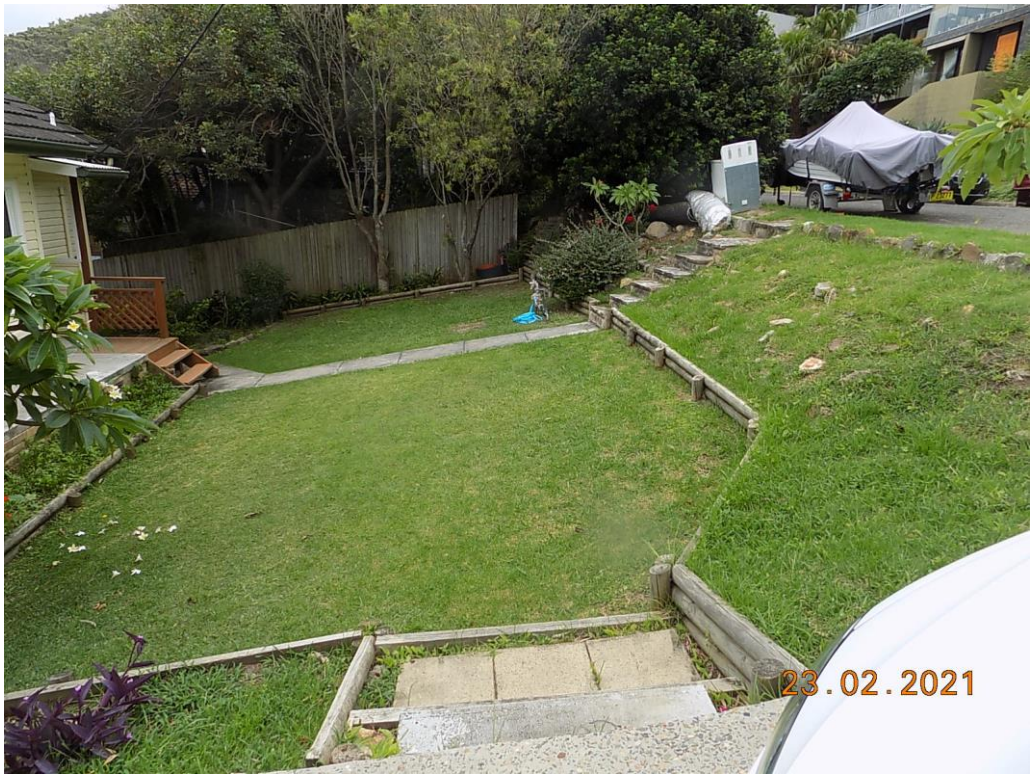


Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9: 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.

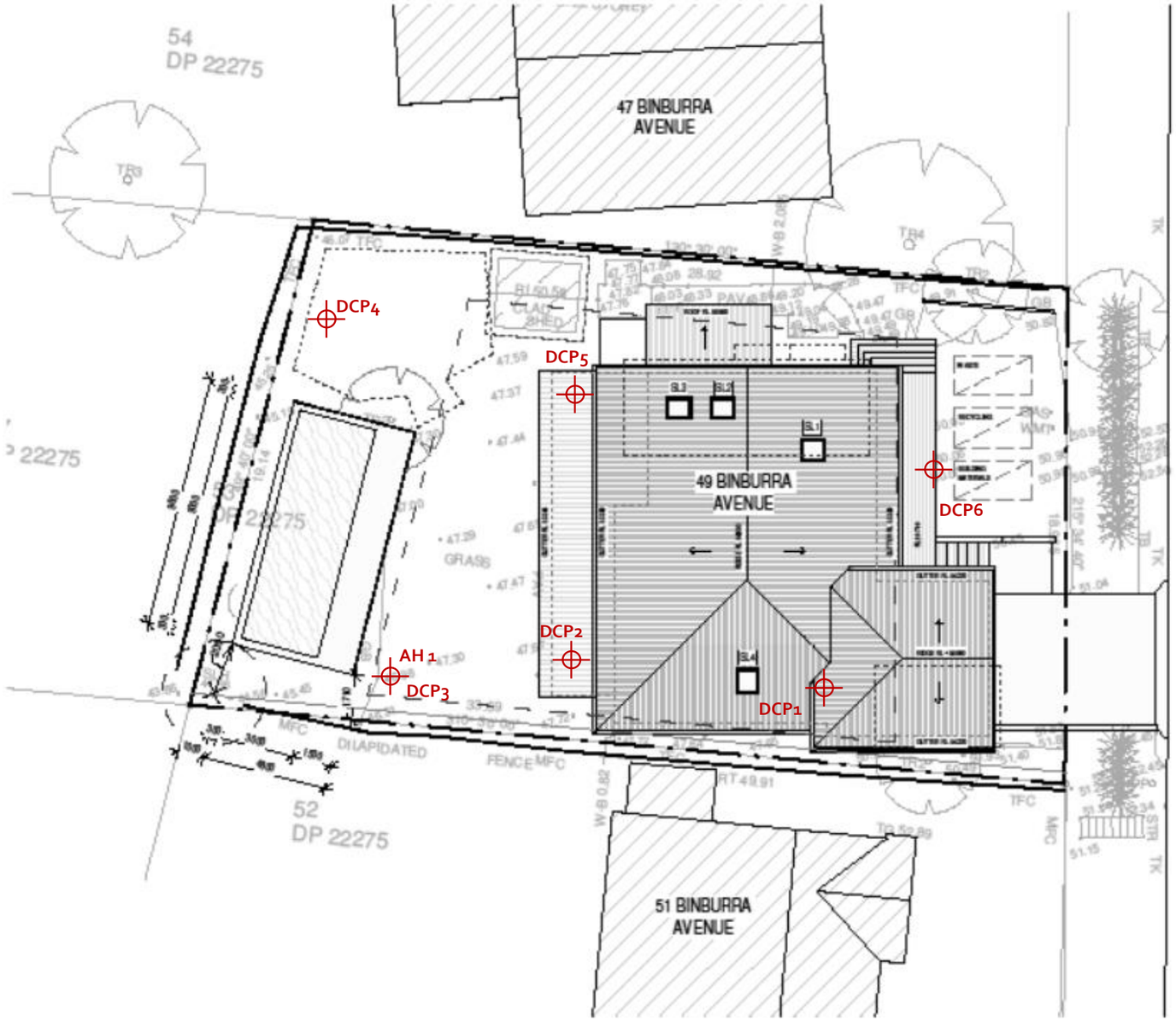
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



1 SITE PLAN
01 1 : 200

OPTION 2

0 10 20 m

DEMOLISHED
HIDDEN
OVERHEAD
EXISTING
PROPOSED
NEW WORKS

BUSHFIRE HAZARD ASSESSMENT 49 BINBURRA AVE, AVALON. NSW 2107
22ND FEBRUARY 2021

BUILDING ELEVATION	CONSTRUCTION STANDARD (BUSH FIRE)
NORTH	BAL-19 AS3959
SOUTH	BAL-19
EAST	BAL-19
WEST	BAL-12.5

BAL RATING FOR THE PROPOSED ALTERATIONS AND ADDITIONS

NOTE THE STAIRS, LANDINGS AND ALL DECKING ARE RATED AS BAL-29 AS PER SECTION 7.5 OF PBP 2019

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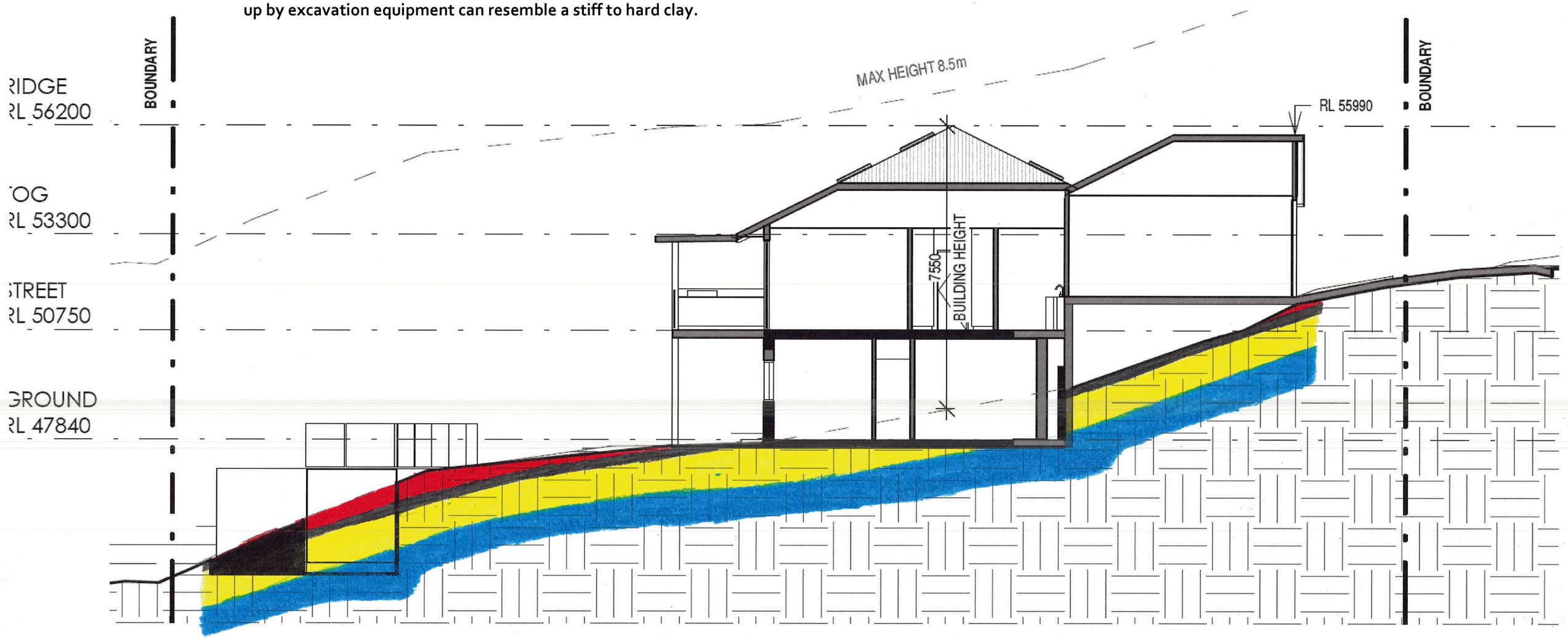
IS	DATE	COMMENTS
B	04/03/2021	DA
A	19/02/2021	PRELIMINARY DA

JOB NUM#	DRAWN BY	CHK. BY	PAGE SIZE
179	MV	TW	A3

PROJECT NAME: 49 BINBURRA AVE
SCALE: As indicated
DRAWING NAME: SITE & ROOF PLAN
DRAWING NUMBER: A 01 -B

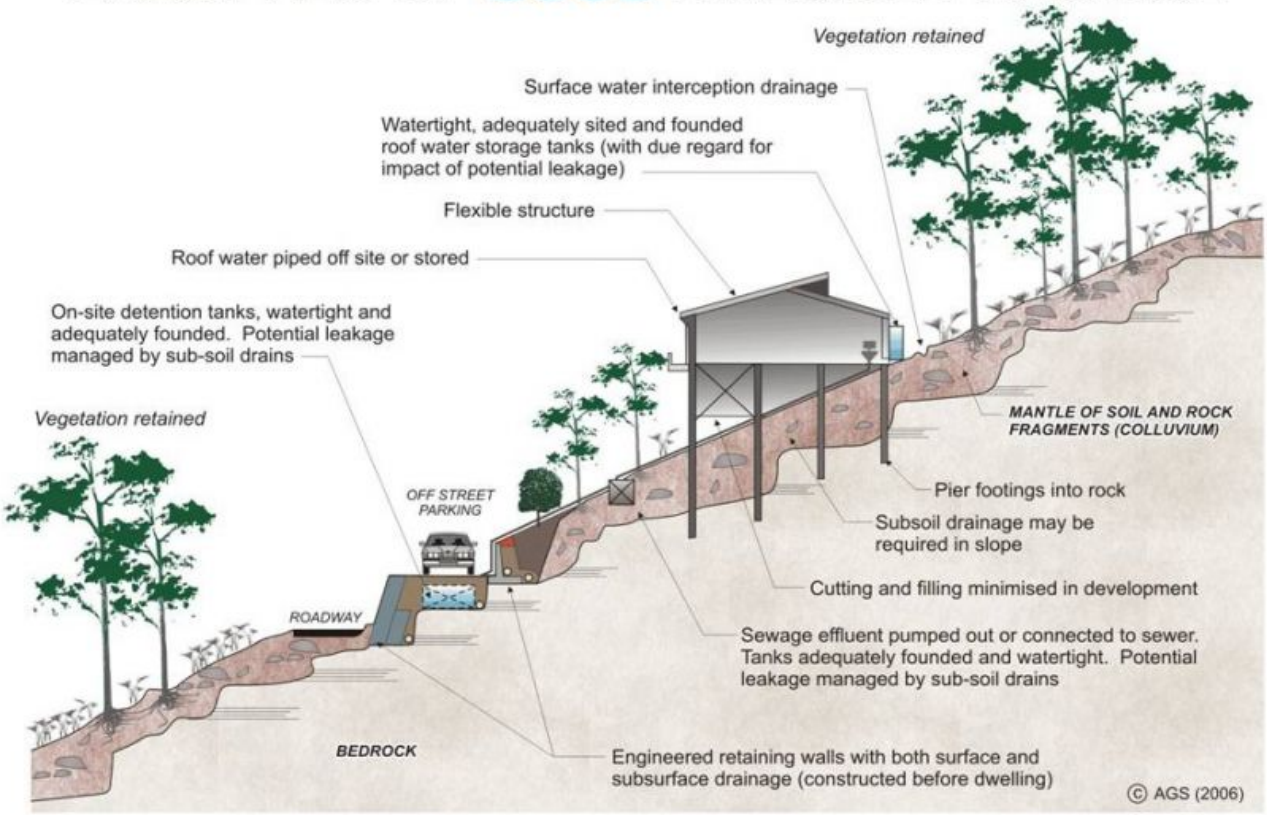
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

- Fill
- Topsoil
- Silty Clay – Firm to Hard
- Narrabeen Group Rocks – Extremely Low Strength Shale - after being cut up by excavation equipment can resemble a stiff to hard clay.



1 ANALYSIS SECTION 1

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE