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

Development Application for _____
Name of Applicant

Address of site 35a Queens Avenue, Avalon Beach

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 12/2/24 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 **35a Queens Avenue, Avalon Beach**
Report Date: 7/2/24

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**

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No: 10306

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 35a Queens Avenue, Avalon Beach

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 **35a Queens Avenue, Avalon Beach**

Report Date: 7/2/24

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted 6/2/24 (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 6/2/24
- ☒ 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 MScGEOL AIG., RPGeo

Membership No. 222757

Company **White Geotechnical Group Pty Ltd**

GEOTECHNICAL INVESTIGATION:

New House and Pool at **35A Queens Avenue, Avalon Beach**

1. Proposed Development

1.1 Construct a new two-story house by excavating to a maximum depth of ~3.3m.

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

1.3 Construct a carport on the downhill side of the property by excavating to a maximum depth of ~1.3m.

1.4 Details of the proposed development are shown on 12 drawings prepared by RAW D and C, drawings numbered CDC-000, DA-000, DA-101 to 102, DA-300 to DA-303, two additional drawings also numbered DA-300 and 301, and DA-402 to 403. All dated 10.01.24.

2. Site Description

2.1 The site was inspected on the 6th February, 2024.

2.2 This vacant residential property is accessed by a Right of Carriageway (ROW) off the uphill side of Queens Avenue and has a N aspect. It is located on the steeply graded middle reaches of a hillslope. The natural slope rises across the property at an average angle of ~22°. The slopes above and below the property continue at similar steep angles.

2.3 At the road frontage, a concrete ROW runs up and across the to a parking area at the E corner of the property (Photo 1). The steeply graded lawn (Photo 2) which extends across the entire property is terraced in timber and mortared dimensioned sandstone retaining walls reaching up to ~1.5m. Some of these walls have been constructed with a tilt back into the slope. One of the timber retaining walls which

continues onto the SE neighbouring property (Photo 3) was observed to be tilting downslope. This wall will be partially demolished as part of the proposed works

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 hand Auger Hole (AH) was put down to identify the soil materials. Seven Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. 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 have been an issue for 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 (~RL54.5) **–** AH1 (Photo 4)

Depth (m)	Material Encountered
0.0 to 0.1	**FILL**, brown, dense, dry, fine to medium grained.
0.1 to 0.2	**CLAYEY FILL**, light brown, stiff, dry, fine to medium grained.
0.2 to 0.4	**SANDY CLAY**, brown, hard, dry, fine to medium grained.

End of hole @ 0.4m. 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** (~RL64.2)	**DCP 2** (~RL62.0)	**DCP 3** (~RL61.5)	**DCP 4** (~RL61.0)	**DCP 5** (~RL58.0)	**DCP 6** (~RL54.5)	**DCP 7** (~RL55.6)
0.0 to 0.3	26	14	27	7	13	13	13
0.3 to 0.6	25	32	#	23	30	31	44
0.6 to 0.9	20	#		9	36	32	28
0.9 to 1.2	#			10	#	#	#
1.2 to 1.5				9			
1.5 to 1.8				#			
	Refusal on Rock @ 0.7m	Refusal on Rock @ 0.6m	Refusal on Rock @ 0.3m	Refusal on Rock @ 1.3m	Refusal on Rock @ 0.8m	Refusal on Rock @ 0.9m	Refusal on Rock @ 0.8m

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

DCP Notes:

DCP1 – Refusal on Rock @ 0.7m, DCP bouncing off rock surface, white and maroon impact dust on dry tip.

DCP2 – Refusal on Rock @ 0.6m, DCP bouncing off rock surface, orange clay on dry tip.

DCP3 – Refusal on Rock @ 0.3m, DCP bouncing off rock surface, clean dry tip, fine orange sandy clay in collar above tip.

DCP4 – Refusal on Rock @ 1.3m, DCP bouncing off rock surface, white impact dust on dry tip.

DCP5 – Refusal on Rock @ 0.8m, DCP bouncing off rock surface, orange, maroon, and white clay on dry tip.

DCP6 – Refusal on Rock @ 0.9m, DCP bouncing off rock surface, brown sandy clay on dry tip.

DCP7 – Refusal on Rock @ 0.8m, DCP bouncing off rock surface, maroon and 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 up 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 shallow soils over clays that fill the bench step formation. Filling has been placed across the slope for landscaping. In the test locations, the

rock was encountered at depths of between 0.3 to 1.3m below the current surface, being slightly deeper due to the presence of fill and the stepped nature of the underlying bedrock. The sandstone underlying the property is estimated to be medium strength or better as all the DCP tests bounced at refusal. Similar strength rock is expected to underlie the entire site. It is interpreted that a thin layer of Very Low Strength Sandstone overlies the buried rock in some locations as the DCP ended after a high blow count for majority of the tests. The Very Low Strength Rock is expected to be encountered at depths of between 0.3m and 0.6m below the current surface. 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. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of 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. This will move down the slope at a relatively high velocity due to the steep slope.

Should the owners be aware, or if at a later time, become aware that overland flows enter the property during prolonged heavy rainfall, our office is to be contacted so appropriate drainage can be designed and installed to intercept the flows. It is a condition of the risk assessment in **Section 8** that this be done.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The steeply graded slope that rises across the property and continues above and below at similar angles is a potential hazard (**Hazard One**). The vibrations from the proposed excavations are a potential hazard

(**Hazard Two**). The proposed excavations are a potential hazard until retaining walls are in place (**Hazard Three**). The proposed excavation for the ground floor undercutting the footings for the SE neighbouring house is a potential hazard (**Hazard Four**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The steep slope that rises across the property and continues above and below failing and impacting on the property.	The vibrations produced during the proposed excavations impacting on the surrounding structures.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	9.1×10^{-7}/annum	5.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE' provided that the recommendations in **Sections 7 & 16** are followed.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12** are to be followed.

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

RISK ANALYSIS SUMMARY CONTINUED ON NEXT PAGE

HAZARDS	Hazard Three	Hazard Four
TYPE	A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process.	The proposed excavation for the ground floor undercutting the footings of the SE neighbouring house causing failure.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (10%)	'Medium' (20%)
RISK TO PROPERTY	'Moderate' (5×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	6.6×10^{-5}/annum	5.3×10^{-5}/annum
COMMENTS	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** are to be followed.	This level of risk to life and property is 'UNACCEPTABLE'. To move 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

The fall is to Queens Avenue. Roof water from the developments are to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

Three excavations are required for the proposed development:

- An excavation to a maximum depth of ~1.3m for the carport on the downhill side of the property.

- An excavation to a maximum depth of ~3.3m for the ground floor of the proposed house.
- An excavation to bench the slope for the first floor of the house, pool, and landscaping on the uphill side of the property.
    - The lower step will reach a maximum depth of ~0.6m.
    - The middle step will reach a maximum depth of ~2.0m.
    - The upper step will reach a maximum depth of ~1.4m.
    - The minimum distance between each step is ~1.8m.

The excavations are expected to be through shallow fill, sandy clay, and Very Low Strength Sandstone with Medium Strength Sandstone expected at depths of between 0.3m and 1.3m below the surface in the area of the proposed excavations.

It is envisaged that excavations through fill, clay, and Very Low Strength sandstone can be carried out with an excavator and bucket, and excavations through Medium Strength Rock will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through fill, sandy clay, and Very Low Strength Sandstone will be below the threshold limit for building damage utilising a domestic-sized excavator up to 16 tonnes. It is expected that the majority of the excavations will be through Medium Strength Sandstone or better.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the NE neighbouring garage, and SE neighbouring house. Allowing ~0.5m for backwall drainage, the setbacks from the proposed excavations to the existing structures are as follows:

- ~1.5m from the SE neighbouring house.
- ~4.9m from the NE neighbouring garage.

Dilapidation reporting carried out on the NE and SW neighbouring properties is recommended prior to the excavation works commencing to minimise the potential for spurious building damage claims.

Close controls by the contractor over rock excavation are recommended so excessive vibrations are not generated.

Excavation methods are to be used that limit peak particle velocity to 5mm/sec at the house walls. Vibration monitoring will be required to verify this is achieved. Vibration monitoring must include a light/alarm so the operator knows if vibration limits have been exceeded. The equipment is to log and record vibrations throughout the excavation works.

In Medium Strength rock or better techniques to minimise vibration transmission will be required. These include:

- Rock sawing the excavation perimeter to at least 1.0m deep prior to any rock breaking with hammers, keeping the saw cuts below the rock to be broken throughout the excavation process.
- Limiting rock hammer size.
- Rock hammering in short bursts so vibrations do not amplify.
- Rock breaking with the hammer angled away from the nearby sensitive structures.
- Creating additional saw breaks in the rock where vibration limits are exceeded, as well as reducing hammer size as necessary.
- Use of rock grinders (milling head).

Should excavation induced vibrations exceed vibration limits after the recommendations above have been implemented, excavation works are to cease immediately and our office is to be contacted.

It is worth noting that vibrations that are below thresholds for building damage may be felt by the occupants of the neighbouring houses.

13. Excavation Support Requirements

Bulk excavation for the ground floor of the house

The excavation for the ground floor of the proposed house will reach a maximum depth of ~3.3m at the location of bedroom 3. Allowing for 0.5m of back wall drainage, the setbacks from the proposed excavation to the existing structures/boundaries are as follows:

- ~0.5m from the SE common boundary.
- ~1.5m from the SE neighbouring house.

As such, the SE common boundary, and the SE neighbouring house will lie within the zone of influence of the proposed excavation. In this instance, the zone of influence is the area above a theoretical 45° line through clay from the base of the excavation or top of Medium Strength Rock, whichever is encountered first, towards the surrounding structures and boundaries. This line reduces to 30° through fill and soil.

Given that rock was found to a maximum depth of 1.4m, and the neighbouring house is set back 1.5m from the cut, assuming standard foundation depths, it is likely the SE neighbouring house is founded below the zone of influence of the proposed excavation. However, to ensure the integrity of the neighbouring property (land), we recommend that the SE side of the excavation through fill, sandy clay, and Very Low Strength Sandstone will need to be temporarily or permanently supported prior to the commencement of the excavation through rock, or during the excavation process in a staged manner, so cut batters are not left unsupported. The support will need to be designed by the structural engineer. See the site plan attached for the minimum extent of the required shoring shown in blue.

Where room permits, the fill, sandy clay, and Very Low Strength Sandstone portions of the remaining sides of the excavations are expected to stand temporarily at batter angles of 30° (1.0 Vertical to 1.7 Horizontal). Medium Strength Sandstone or better is expected to stand at vertical angles unsupported subject to approval by the geotechnical consultant.

Bulk stepped excavation for the first floor, pool, and landscaping

The excavation for the proposed works on the uphill side of the property will reach a maximum depth of ~2.5m. Allowing for 0.5m of back wall drainage, the setbacks from the proposed excavations to the existing structures/boundaries are as follows:

- ~1.1m from the uphill boundary
- ~1.2m from a concrete driveway above the property

Due to the shallow depth of rock at the location of the works on the uphill side, no structures or boundaries are expected to lie within the zone of influence of the excavation.

The fill, sandy clay, and Very Low Strength Sandstone portions of the excavation face are to be battered temporarily at 1.0 Vertical to 1.7 Horizontal (30°) until the retaining walls are in place. Medium Strength Sandstone or better is expected to stand at vertical angles unsupported subject to approval by the geotechnical consultant.

Bulk excavation for the carport

The excavation for the proposed carport will reach a maximum depth of ~1.3m into the slope on the downhill side of the property. Allowing for 0.5m of back wall drainage, no structures or boundaries are expected to lie within the zone of influence of the excavation.

The fill, sandy clay, and Very Low Strength Sandstone portions of the excavation face are to be battered temporarily at 1.0 Vertical to 1.7 Horizontal (30°) until the retaining walls are in place. Medium Strength Sandstone or better is expected to stand at vertical angles unsupported subject to approval by the geotechnical consultant.

Advice applying to all excavations

During the excavation process, the geotechnical consultant is to inspect the cuts in 1.5m intervals as they are lowered to ensure the ground materials are as expected and no wedges

or other geological defects are present that could require additional support. Should additional ground-support be required, this will likely involve the use of mesh, sprayed concrete, and rock bolts.

On steep sites such as this one, to help maintain excavation stability, it is critical upslope runoff be diverted from the proposed excavations with temporary or permanent drainage measures. Temporary measures may be trenches and sandbag mounds and permanent measures could be a wide diameter dish drain or similar. These are to be installed before any excavation work commences.

All unsupported cut batters through fill, sandy clay and Very Low Strength Sandstone 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 cannot blow off in a storm. The materials and labour to construct the pool structure/retaining walls are to be organised so on completion of the excavations they can be constructed as soon as possible. The excavations are to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast.

Upon completion of the excavation, it is recommended all cut faces aside from those for the pool be supported with retaining walls to prevent any potential future movement of joint blocks in the cut face that can occur over time, when unfavourable jointing is obscured behind the excavation face. Additionally, retaining walls will help control seepage and to prevent minor erosion and sediment movement.

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 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 and Topsoil	20	0.40	0.55
Residual Clays	20	0.35	0.45
Very Low Strength Sandstone	22	0.22	0.35
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 wall, do not account for any surcharge loads and assume retaining walls 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.

15. Foundations

The proposed house and carport are expected to be partially seated on Medium Strength Sandstone. This is a suitable foundation material. This material is expected to be exposed across the uphill side of the excavations. Where it is not exposed, and where the footprints

of the proposed house and carport do not fall over the excavations, piers socketed at least 0.1m into Medium Strength Sandstone (as measured from the downhill side of each footing) are suitable footings for the proposed works. This is due to the steep grade of the slope across the location of the proposed works. The piers on the downhill side are expected to encounter Medium Strength Sandstone at depths of between ~0.3m to ~1.3m below the current surface.

The proposed pool is expected to be seated entirely on Medium Strength Sandstone. This is a suitable foundation material.

A maximum allowable bearing pressure of 1000kPa 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.

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. Site Maintenance/Remedial Works

Where slopes approach or exceed 20°, such as on this site, it is prudent for the owners to occasionally inspect the slope (say annually or after heavy 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 8** is subject to this site maintenance being carried out.

17. Geotechnical Review

The structural plans are to be checked and certified by the geotechnical engineer as being in accordance with the geotechnical recommendations. On completion, a Form 2B will be issued. This form is required for the Construction Certificate to proceed.

18. Inspections

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

- During the excavation process, the geotechnical consultant is to inspect the cut faces as they are lowered in 1.5m intervals to ensure ground materials are as expected and that there are no wedges or other defects present in the rock that may require additional support.

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

White Geotechnical Group Pty Ltd.

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

Reviewed By:

Ben White M.Sc. Geol.,
AIG., RPGeo Geotechnical & Engineering.
No. 10306
Engineering Geologist.

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No:
10306

Photo 1

Photo 2

Photo 3

Photo 4 – AH1 - (downhole is 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.

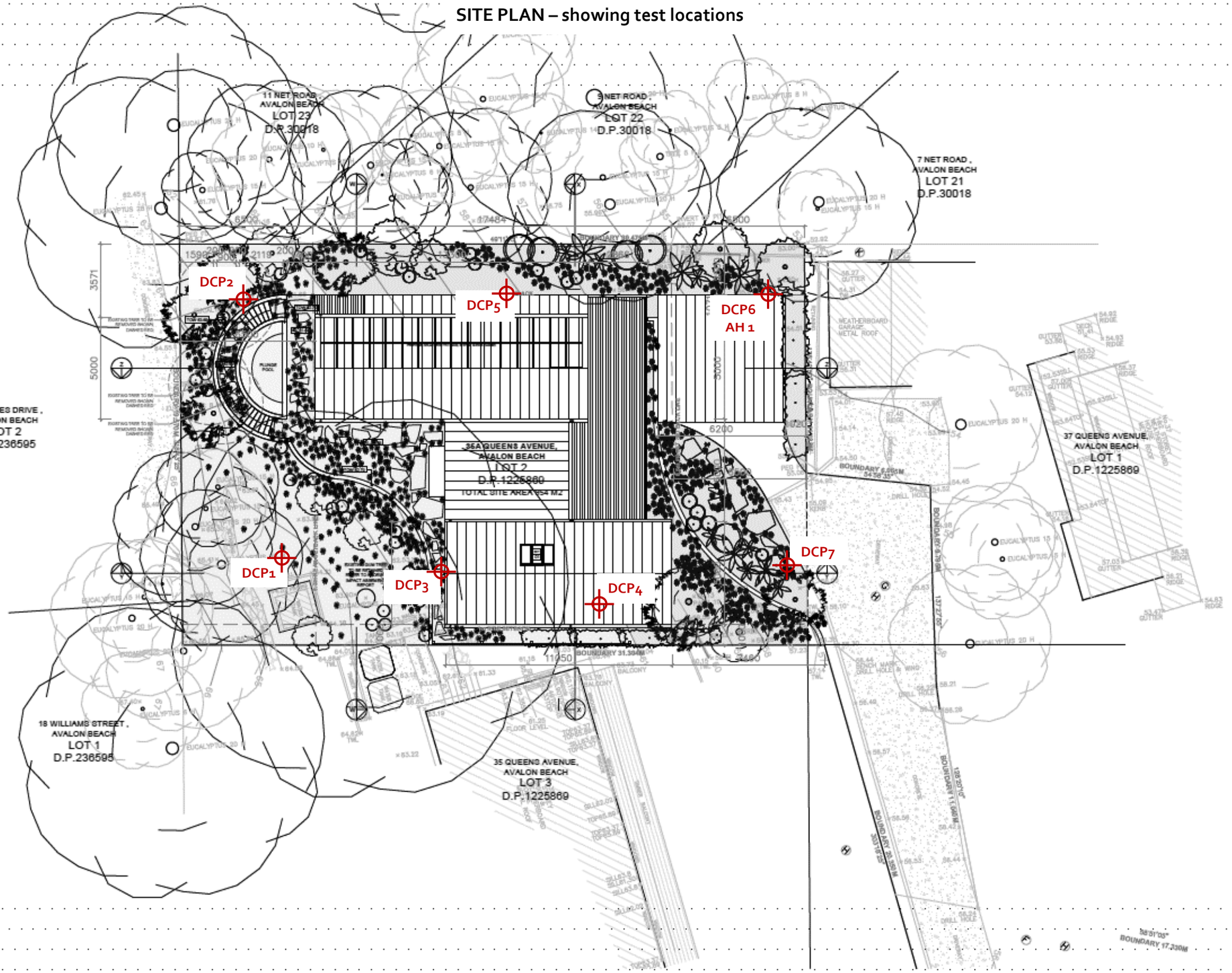
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar 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

SITE CALCULATIONS

TOTAL SITE AREA (INC. BATTLE AXE): 954 SQ.M
PRIMARY SITE AREA (EXC. BATTLE AXE) 596 SQ.M
CARPORT FLOOR AREA: 38.5 SQ.M
DRIVEWAY AREA: 16 SQ.M
GROUND FLOOR AREA: 60 SQ.M
GROUND FLOOR EXTERNAL DECK AREA: 29 SQ.M
FIRST FLOOR AREA: 66 + 55 + 30 = 151 SQ.M
FIRST FLOOR EXTERNAL DECK AREA: 41.5 SQ.M
FIRST FLOOR EXTERNAL PAVED AREA: TBC
EXTERNAL STAIR AREA: 12 SQ.M
TOTAL ROOF AREA (INC. CAR PORT): 208 SQ.M
TOTAL HABITAL INTERNAL FLOOR AREA: 211 SQ.M

TOTAL SOFT LANDSCAPE AREA: 331 SQ.M (55%)
TOTAL HARDSTAND AREA: 265 SQ.M (45%)



SITE PLAN 1:100 @ A1 OR 1:200 @A 3

NORTH

LEGEND:

7.03 DENOTES EXISTING SPOT LEVEL

RL 7.10 DENOTES PROPOSED LEVEL

NOTE: THESE DRAWINGS ARE NOT FOR CONSTRUCTION. CONCEPT DESIGN ONLY.
NOTE: DO NOT SCALE OFF THIS DRAWING
NOTE: ALL WORKS TO BE IN ACCORDANCE WITH THE NCC.
NOTE: ALL WORKS TO BE IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS.
NOTE: ALL WORKS TO BE IN ACCORDANCE WITH THE BASIX REQUIREMENTS

KEY:

DENOTES AREA OF SHADOW CAST AS A RESULT OF THE PROPOSED DWELLING

PROJECT: PROPOSED NEW DWELLING	**PROJECT STAGE:** DA
CLIENT: TREGONING	**DRAWING TITLE:** SITE PLAN
LOCATION: 35A QUEENS AVE, AVALON BEACH, NSW.	**SCALE:** 1:100 @ A3
DATE OF ISSUE: 10.01.2024	**DRAWING NO.** DA-000
	REVISION: -

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GROUND FLOOR PLAN – showing minimum extent of required shoring

GROUND FLOOR PLAN 1:100 @A 3

NORTH

LEGEND:

7.03 DENOTES EXISTING SPOT LEVEL

RL 7.10 DENOTES PROPOSED LEVEL

KEY:

DENOTES AREA OF SHADOW CAST AS A RESULT OF THE PROPOSED DWELLING

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PROJECT:
PROPOSED NEW DWELLING

CLIENT:
TREGONING

LOCATION:
35A QUEENS AVE, AVALON BEACH, NSW.

PROJECT STAGE:
DA

DRAWING TITLE:
GROUND FLOOR PLAN

SCALE:
1:100 @ A3

DATE OF ISSUE:
10.01.2024

DRAWING NO.
DA-101

REVISION:
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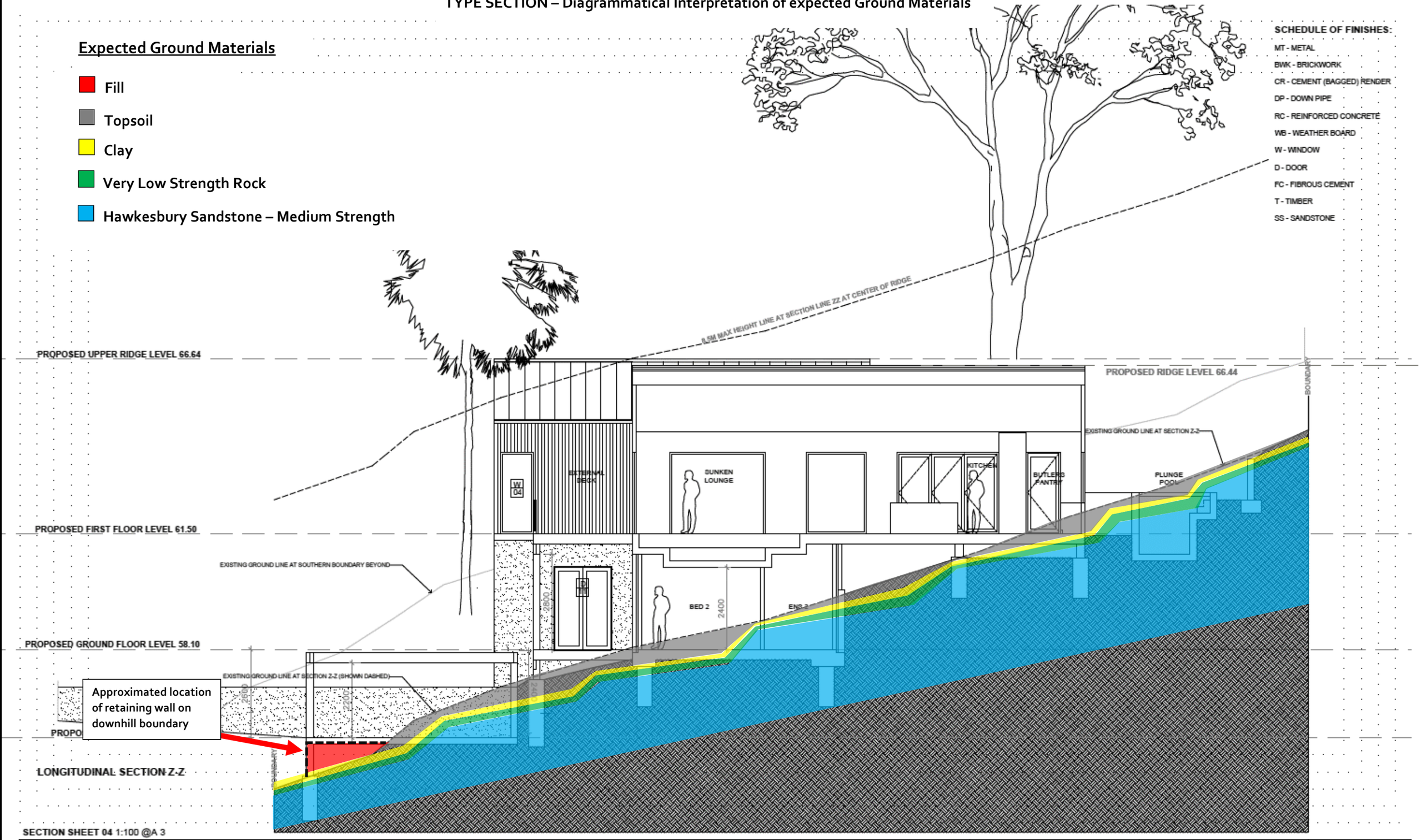
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Expected Ground Materials

- Fill
- Topsoil
- Clay
- Very Low Strength Rock
- Hawkesbury Sandstone – Medium Strength

SCHEDULE OF FINISHES:

MT - METAL
BWK - BRICKWORK
CR - CEMENT (BAGGED) RENDER
DP - DOWN PIPE
RC - REINFORCED CONCRETE
WB - WEATHER BOARD
W - WINDOW
D - DOOR
FC - FIBROUS CEMENT
T - TIMBER
SS - SANDSTONE



LONGITUDINAL SECTION Z-Z

SECTION SHEET 04 1:100 @A 3

LEGEND:

7.03 DENOTES EXISTING SPOT LEVEL

RL 7.10 DENOTES PROPOSED LEVEL

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KEY:

DENOTES AREA OF SHADOW CAST AS A RESULT OF THE PROPOSED DWELLING

PROJECT:
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CLIENT:
TREGONING

LOCATION:
35A QUEENS AVE, AVALON BEACH, NSW.

PROJECT STAGE:
DA

DRAWING TITLE:
SECTION
SHEET 04

SCALE:
1:100 @ A3

DATE OF ISSUE:
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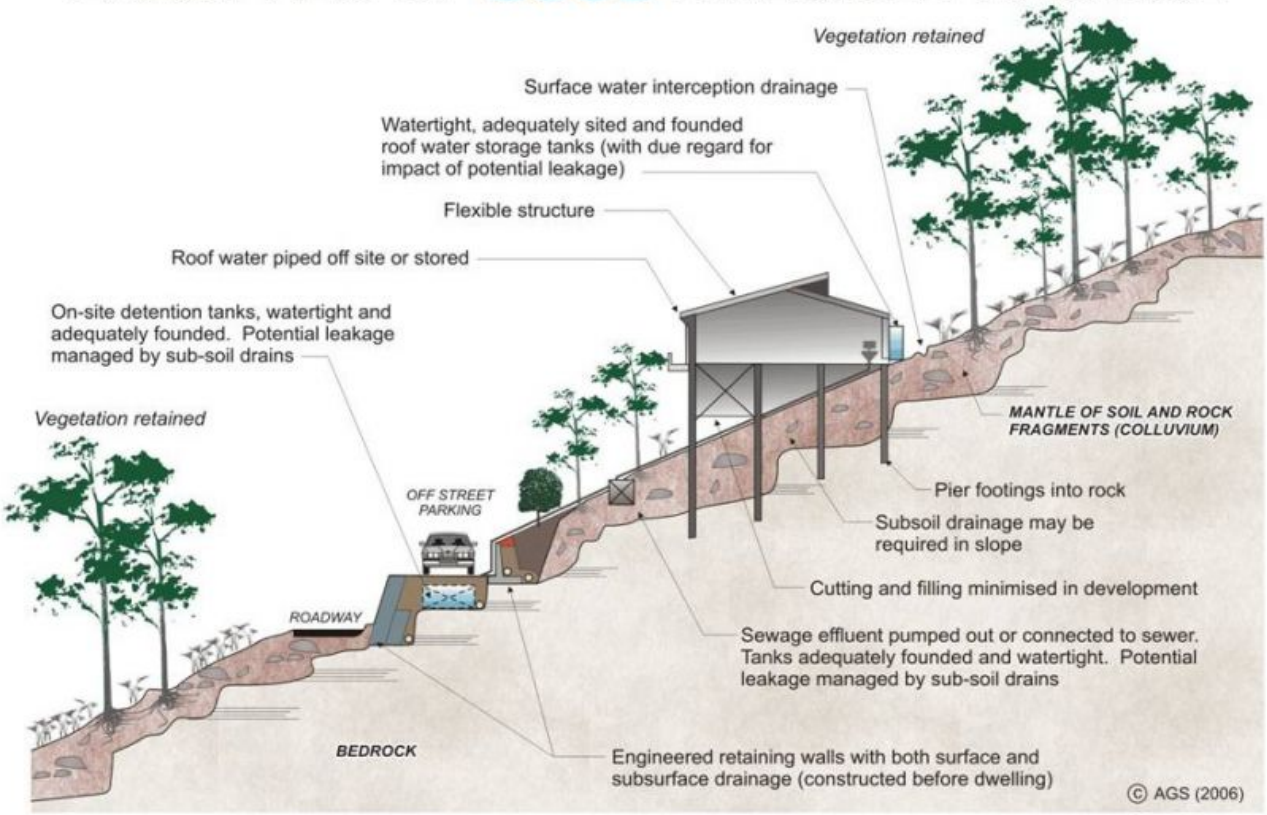
EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE