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

Development Application for _____
Name of Applicant

Address of site 61 Dress Circle 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 4/9/20 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 **61 Dress Circle Road, Avalon**
Report Date: 4/9/20

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 61 Dress Circle 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 **61 Dress Circle Road, Avalon**

Report Date: 4/9/20

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **24/8/20**
(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 **24/8/20**

☒ 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:

Additions and Alterations at **61 Dress Circle Road, Avalon**

1. Proposed Development

1.1 Demolish the uphill portion of the existing driveway. Construct a new driveway by excavating to a maximum depth of ~1.8m.

1.2 Construct a new driveway/parking area downhill of the existing pool.

1.3 Landscape a new lawn area on the downhill side of the house by filling to a maximum depth of ~0.8m.

1.4 Construct a new garage with studio above by excavating to a maximum depth of ~2.7m.

1.5 Extend the existing balcony to the NE.

1.6 Details of the proposed development are shown on 8 drawings prepared by Jamie King Landscape Architect, project number 2065, drawings numbered Sht-101 to Sht-108, dated 16/6/2020. Additional Details of the proposed development are shown on 6 landscape drawings prepared by Jamie King Landscape Architect, project number 2065, drawings numbered Sht-101 to Sht-106, dated 22/6/2020.

2. Site Description

2.1 The site was inspected on the 24th of August, 2020.

2.2 This residential property is on the high side of the road and has a SE aspect. The block is located on the moderately graded middle reaches of a hillslope. The slope falls across the property at an average angle of ~13°. The slope above the property continues at similar angles and the slope below the property decreases in grade.

2.3 At the road frontage a concrete driveway runs up the slope to a parking area on the downhill side of the house (Photos 1 & 2). Fill has been placed to form level lawn areas on the NE side of the driveway and below the parking area (Photo 3). The lower lawn fill is unsupported but is battered back at stable angles. Some of the fill was not planted with lawn or other vegetation but we note that this will be removed as part of the proposed driveway excavation (Photo 4). The upper lawn is supported by a low timber retaining wall. SW of the driveway is a swimming pool in good condition (Photo 5). The part two storey rendered brick house is supported by brick walls and a concrete slab (Photos 6 & 7). The house is cut into the slope on the uphill side. The visible portion of the cut for the house is supported by a stable concrete retaining wall reaching ~2.3m high (Photo 8). Garden and lawn areas are located above the cut. No signs of slope instability were observed on the property. The adjoining neighbouring properties were observed to be in good order as seen from the street and subject property.

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

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 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 (~RL33.7) **–** AH1 (photo 9)

Depth (m)	**Material Encountered**
0.0 to 0.4	**TOPSOIL**, sandy soil, dark brown, moist fine to medium grained with fine trace organic matter.
0.4 to 0.6	**SANDY CLAY**, orange, firm to stiff, moist.

End of hole @ 0.6m in firm to stiff sandy clay. 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** (~RL27.8)	**DCP 2** (~RL28.3)	**DCP 3** (~RL31.6)	**DCP 4** (~RL33.7)	**DCP 5** (~RL33.8)	**DCP 6** (~RL30.6)
0.0 to 0.3	6	4	3	6	5	4
0.3 to 0.6	15	4	4	8	11	4
0.6 to 0.9	11	8	9	9	9	5
0.9 to 1.2	11	25	14	8	21	7
1.2 to 1.5	14	40	17	12	#	8
1.5 to 1.8	14	#	25	8		9
1.8 to 2.1	13		4	#		13
2.1 to 2.4	16		#			14
2.4 to 2.7	18					15
2.7 to 3.0	18					40
3.0 to 3.3	40					#
3.3 to 3.6	#					
	End of Test @ 3.3m	End of Test @ 1.4m	Refusal @ 1.8m	Refusal @ 1.6m	Refusal @ 1.1m	End of Test @ 3.0m

#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 @ 3.3m, DCP still very slowly going down, orange shale fragments on dry tip.
DCP2 – End of test @ 1.4m, DCP still very slowly going down, orange impact dust on moist tip.
DCP3 – Refusal @ 1.8m, DCP bouncing off rock surface, light brown/white sandy clay on moist tip.
DCP4 – Refusal @ 1.6m, DCP bouncing off rock surface, orange impact dust on dry tip.
DCP5 – Refusal @ 1.1m, DCP bouncing off rock surface, white impact dust on moist tip.
DCP6 – End of test @ 3.0m, DCP still very slowly going down, white impact dust on dry tip, orange clay on collar.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of fill and a thin sandy topsoil over sandy clays. Fill has been placed to form level lawn areas on the downhill side of the property. The clays merge into the weathered zone of the under lying rocks at depths of between 1.1m to 3.3m below the current surface, being deeper in the filled areas. The weathered zone of the underlying rock is interpreted as Extremely Low to Low Strength Rock. 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 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 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.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate slope that falls across the property and continues above and below is a potential hazard (**Hazard One**). The proposed excavations for the driveway and garage are a potential hazard until retaining structures are in place (**Hazard Two**). The vibrations produced during the proposed excavation for the garage impacting on the subject house and the neighbouring properties is a potential hazard (**Hazard Three**). The proposed excavation for the garage undercutting the rendered masonry wall supporting the NE neighbouring building is a potential hazard (**Hazard Four**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate slope that falls across the property and continues above and below failing and impacting on the property.	The proposed excavations (up to a depth of ~2.7m) collapsing onto the worksite and impacting the neighbouring property to the NE during the excavation process.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2 x 10^{-5})	'Moderate' (2 x 10^{-4})
RISK TO LIFE	8.3 x 10^{-7}/annum	8.3 x 10^{-6}/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)

HAZARDS	Hazard Three	Hazard Four
TYPE	The vibrations produced during the proposed excavation for the garage impacting on the subject house and neighbouring properties.	The proposed excavation for the garage undercutting the NE neighbouring rendered masonry wall.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (35%)
RISK TO PROPERTY	'Moderate' (2 x 10^{-4})	'Moderate' (2 x 10^{-4})
RISK TO LIFE	5.3 x 10^{-7}/annum	8.3 x 10^{-6}/annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in **Sections 11 & 12** 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.

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 Dress Circle Road. All stormwater from the proposed development is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to a maximum depth of 1.8m will be required to construct the proposed driveway. The excavation is expected to be through fill and sandy soil over firm to stiff sandy clays.

Another excavation to a maximum depth of 2.7m will be required to construct the proposed garage. The excavation is expected to be through topsoil over firm to stiff sandy clays, with Extremely Low to Low Strength Rock expected at depths from between ~1.6m to ~1.8m below the current surface

Excavations through soil, clay and Extremely Low to Low Strength Rock can be carried out with an excavator and bucket. If Medium Strength Rock is encountered it will require grinding or rock sawing and breaking.

12. Vibrations

It is expected the proposed excavations will be carried out with an excavator and bucket and the vibrations produced will be below the threshold limit for building or infrastructure damage.

If Medium Strength Rock or better is encountered, excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the subject house and neighbouring structures to the NE. 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 10mm/sec at the subject house and property boundaries. Vibration monitoring will be required to verify this is achieved.

If a milling head is used to grind the rock, vibration monitoring will not be required. Alternatively, if rock sawing is carried out around the perimeter of the excavation boundaries in not less than 1.0m lifts, a rock hammer up to 300kg could be used to break the rock without vibration monitoring. Peak particle velocity will be less than 10mm/sec at the subject house and property boundaries using this method provided the saw cuts are kept well below the rock to broken.

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

13. Excavation Support Requirements

Bulk Excavation for Driveway

An excavation to a maximum depth of 1.8m will be required to construct the proposed driveway. Allowing for backwall-drainage, the excavation will be set back ~0.8m from the NE common boundary and ~1.1m from the NE neighbouring garage. The NE common boundary will be within the zone of influence of the excavation. The NE neighbouring garage is cut into the slope below the base of the proposed excavation and therefore will be outside the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 30° line through fill and soil from the base of the excavation towards the surrounding structures and boundaries.

Along the NE common boundary the fill, soil and clay portion of the excavation is to be supported as the excavation is progressed with temporary or permanent support.

Along the SW side of excavation, the fill and soil portion of the excavation is to be battered temporarily at 1.0 Vertical to 2.0 Horizontal (26°) until the retaining walls are in place. Excavations through clay will stand unsupported for a short period of time until the retaining walls are in place, provided the cut batters are kept from becoming saturated.

Bulk Excavation for Garage

An excavation to a maximum depth of 2.7m will be required to construct the proposed garage. Allowing for backwall-drainage, the excavation will be set back ~0.7m from the NE common boundary and ~1.0m from the NE neighbouring rendered masonry house. The NE common boundary and NE neighbouring house will be within the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 45° line through clay from the base of the excavation towards the surrounding structures and boundaries.

The plans show that the base of the excavation for the garage will be ~0.3m below the base of the adjoining house ground floor slab. If the excavation comes underneath the existing foundations of the house, the house will need to be underpinned prior to the excavation commencing.

To ensure the integrity of the NE property, ground support will need to be installed along the NE side of the excavation with the support installed before the excavation commences. See the site plan attached for the minimum required extent of the shoring shown in blue. For ease of design and construction it may be considered suitable to install piers around the entire perimeter. A spaced pile retaining wall is a suitable method of support. Pier spacing for spaced piers is typically ~2.0m but can vary between 1.6 to 2.4m depending on the design. All piers can be supported by embedment and/or bracing installed as the excavation is lowered. To drill the pier holes for the wall, a powerful excavator or small pilling rig that can excavate through medium strength rock will be required. If a machine of this type is not available, we

recommend carrying out core drilling before the construction commences to confirm the strength of the rock and to ensure the excavation equipment is capable of reaching the required depths. As the excavation is lowered in 1.5m lifts, infill sprayed concrete panels or similar are added between the piers to form the spaced wall. Drainage is installed behind the panels. The walls are to be tied into the garage structure after which any temporary bracing can be removed.

The geotechnical consultant is to inspect the drilling process of the entire first pile and the ground materials at the base of all pier holes/excavations for ground support purposes.

Along the NW side of excavation, the soil portion (top 0.7m) of the excavation is to be battered temporarily at 1.0 Vertical to 2.0 Horizontal (26°) until the retaining walls are in place. Excavations through clay and Extremely Low to Low Strength Rock will stand unsupported for a short period of time until the retaining walls are in place, provided the cut batters are kept from becoming saturated.

Advice Applying to Both Excavations

During the excavation process, the geotechnical consultant is to inspect the cut face in 1.5m intervals as it is lowered to ensure ground materials are as expected and that additional support is not required.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. All unsupported cut batters are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The materials and labour to construct the 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. If the retaining walls are not constructed within a few days of the excavation being completed temporary shoring will be required.

All excavation spoil is to be removed from site or is to be supported by engineered retaining walls.

14. Fill

Filling to a maximum depth of ~0.8m will be required for landscaping on the downhill side of the house. If the proposed driveway is to be supported by fill on the uphill side, it will require filling to a maximum depth of ~1.0m.

The surface is to be prepared before any fills are laid by removing any organic matter and topsoil. Fills are to be laid in a loose thickness not exceeding 0.3m.

The fills used for landscaping are to be moderately compacted by tracking the machine over the loose fill in 1 to 2 passes.

For ease of construction it is recommended the driveway be supported on piers taken through the fill, however if the proposed driveways/parking area are to be supported on fill they will need to be laid and compacted as engineered fill, as follows:

Non-cohesive Soils - compact to a dry density ratio not less than 70% standard. Soil can be kept moist to aid in compaction. Compact the upper 150mm to a dry density ratio of not less than 80% standard.

Cohesive Soils – compact to a dry density ratio not less than 95% standard. The moisture content during compaction should be maintained at ± 2% of Standard Optimum. Compact the upper 150mm to a dry density ratio of not less than 100% standard.

Immediately behind the retaining walls (say to 1.5m), the fills are to be compacted with light weight equipment such as a hand-held plate compactor so as not to damage the retaining walls. Where light weight equipment is used, fills are to be laid in a loose thickness not exceeding 0.2m before being compacted. The geotechnical consultant is to inspect and test the fill for the driveway at 1.0m thick intervals as it is laid to ensure it has been adequately compacted while the earthmoving equipment is still on site.

15. 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	Passive
Soil and Fill	20	0.40	0.55	N/A
Residual Clays	20	0.35	0.45	Kp 2.0 ultimate
Extremely Low Strength Rock	22	0.25	0.35	Kp 2.5 ultimate
Rock up to Low Strength	24	0.25	0.35	Kp 2.5 ultimate

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. It should be noted that passive pressure is an ultimate value and should have an appropriate safety factor applied. No passive resistance should be assumed for the top 0.4m to account for any disturbance from the excavation.

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.

16. Foundations

The proposed garage and studio can be supported on a thickened edge/raft slab directly on the exposed Extremely Low to Low Strength Rock on the uphill side. Where the rock drops away with the slope on the downhill side, piers will be required to maintain a uniform bearing pressure across the structure. A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low to Low Strength Rock.

The foundations of the existing house are currently unknown. Where the footing material changes across the structure construction joints or similar are to be installed to prevent differential settlement, where the structure cannot tolerate such movement in accordance with a Class M site.

The proposed concrete driveway on the downhill side may be supported off the natural surface after any organic matter has been stripped. A maximum allowable bearing pressure of 100kPa can be assumed for soil of the natural surface. For ease of construction we recommend the uphill side of the proposed driveway be supported on piers taken to the firm to stiff clay of the natural profile. A maximum allowable bearing pressure of 200kPa can be assumed for footings supported on the firm to stiff clays of the natural profile.

The uphill side of the proposed new driveway/parking area (downhill of the existing pool) may be supported off the natural surface after any organic matter has been stripped. For ease of construction we recommend the downhill side of the proposed driveway/parking area be supported on piers taken below the existing fill into the firm to stiff clay of the natural profile.

Alternatively the proposed driveways and parking area can be supported on fill, provided it be placed following the advice in '**Section 14** Fill'.

Where the foundation material across the driveway structure changes, expansion joints are to be installed to separate the different foundation materials and to accommodate minor differential movement.

As the bearing capacity of shale and clay 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 shale or clay 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 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.

REQUIRED INSPECTIONS ON NEXT PAGE

17. 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 Occupation Certificate if the following inspections have not been carried out during the construction process.

- The geotechnical professional is to inspect the drilling process of the entire first pile of the retaining wall and the ground materials at the base of all the piers before any concrete is placed.
- During the excavation process, the geotechnical consultant is to inspect the cut face in 1.5m intervals as it is lowered to ensure ground materials are as expected and that additional support is not required.
- 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.
- If engineered fills are laid the geotechnical consultant is to inspect and test the fill when compacted thickness is not more than 1.0m.

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.

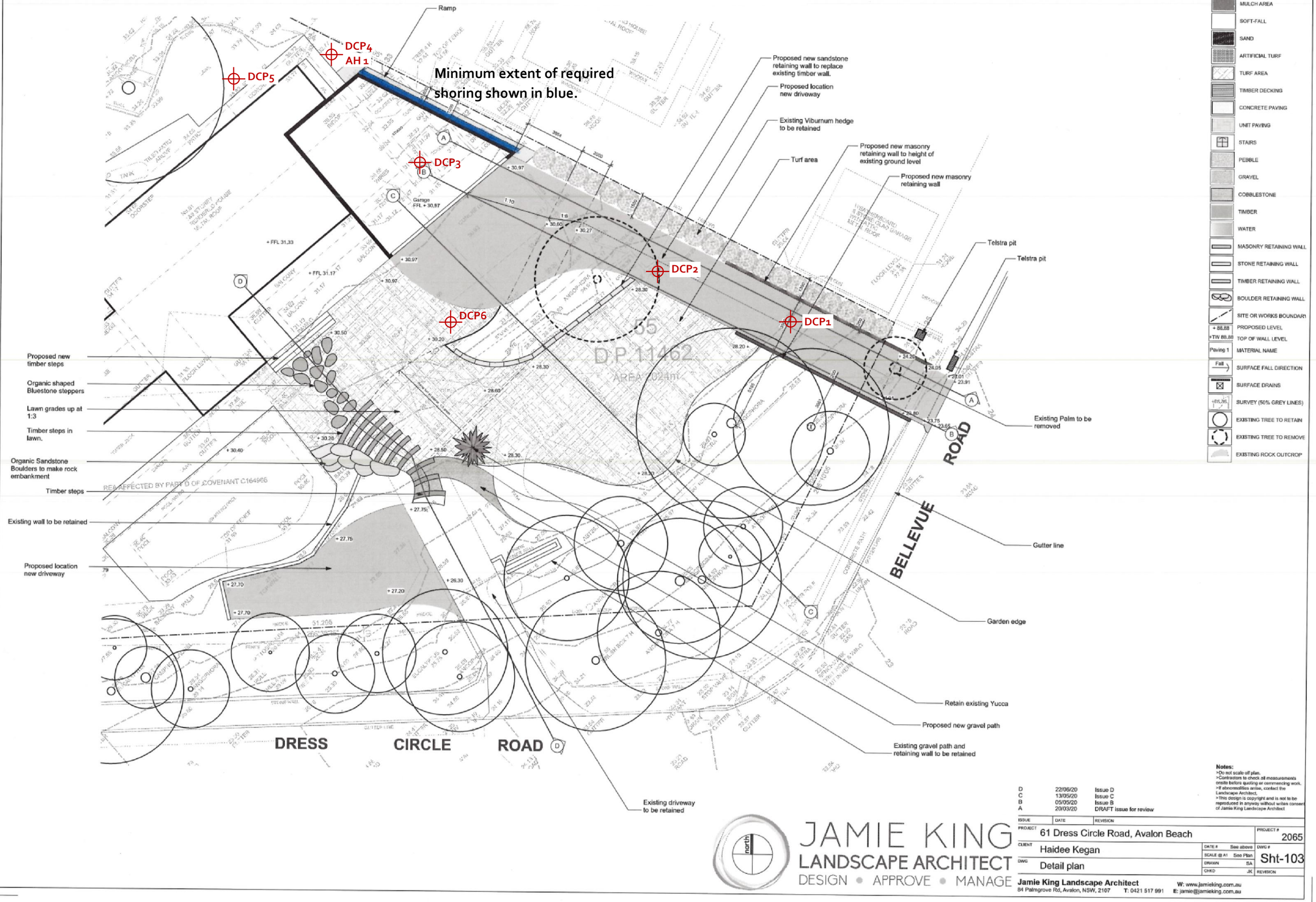
- This report should not be applied to any other project other than that outlined in section 1.0.

- 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.

Detail plan
1:100@A1 1:200@A3. Do not scale off plan

SITE PLAN – showing test locations



Legend

- MULCH AREA
- SOFT-FALL
- SAND
- ARTIFICIAL TURF
- TURF AREA
- TIMBER DECKING
- CONCRETE PAVING
- UNIT PAVING
- STAIRS
- PEBBLE
- GRAVEL
- COBBLESTONE
- TIMBER
- WATER
- MASONRY RETAINING WALL
- STONE RETAINING WALL
- TIMBER RETAINING WALL
- BOULDER RETAINING WALL
- SITE OR WORKS BOUNDARY
- + 88.88 PROPOSED LEVEL
- +TW 88.88 TOP OF WALL LEVEL
- Paving 1 MATERIAL NAME
- Fall SURFACE FALL DIRECTION
- SURFACE DRAINS
- +85.35 SURVEY (50% GREY LINES)
- EXISTING TREE TO RETAIN
- EXISTING TREE TO REMOVE
- EXISTING ROCK OUTCROP

D	22/06/20	Issue D
C	13/05/20	Issue C
B	05/05/20	Issue B
A	20/03/20	DRAFT issue for review

Notes:
>Do not scale off plan.
>Contractors to check all measurements onsite before quoting or commencing work.
>If abnormalities arise, contact the Landscape Architect.

JAMIE KING
LANDSCAPE ARCHITECT
DESIGN • APPROVE • MANAGE

PROJECT	61 Dress Circle Road, Avalon Beach
PROJECT #	2065
CLIENT	Haidee Kegan
DATE #	See above
SCALE @ A1	See Plan
DWG	Detail plan
DRAWN	SA
CHKD	JK
DWG #	Sht-103
REVISION	

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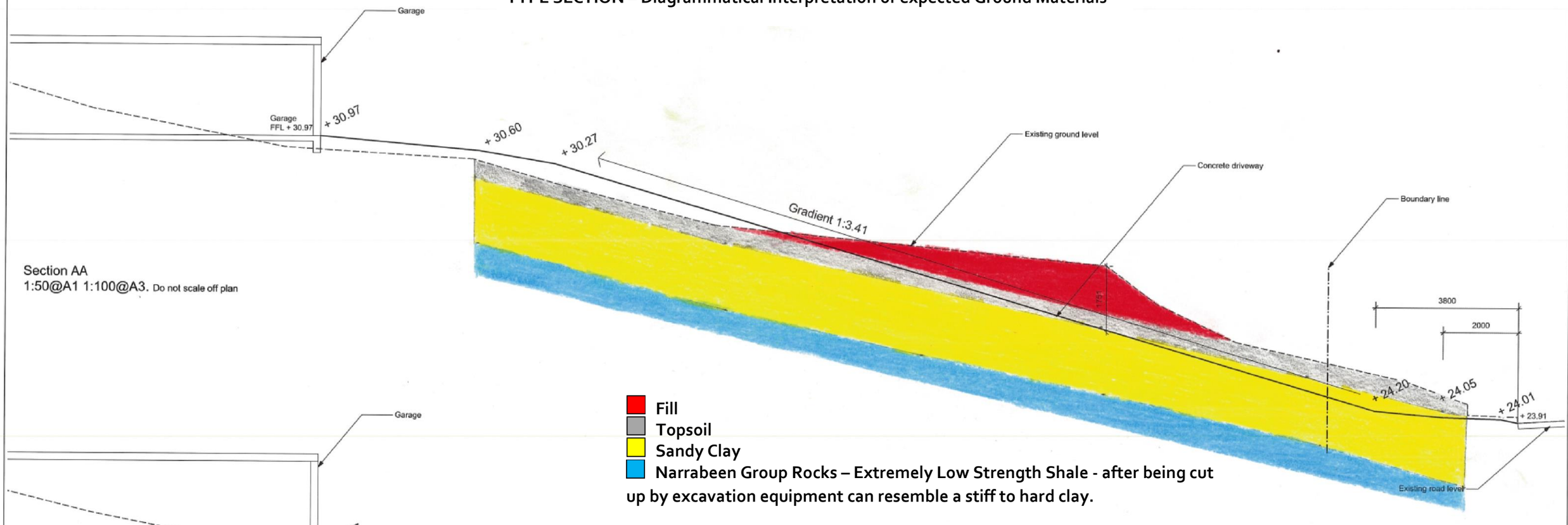
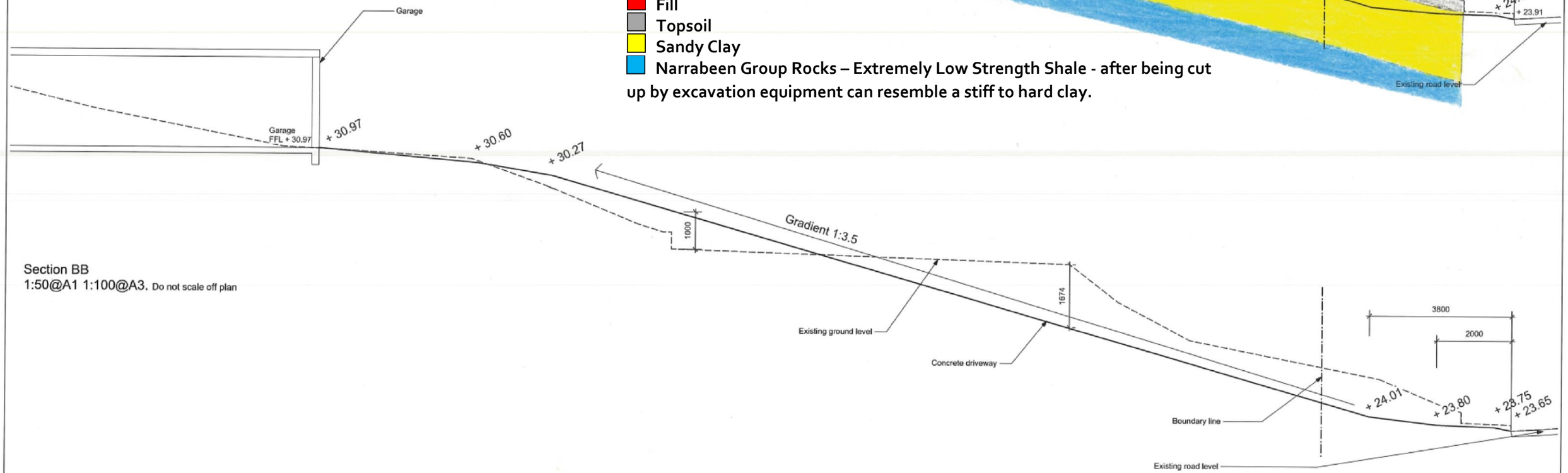
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Section AA
1:50@A1 1:100@A3. Do not scale off plan

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



Section BB
1:50@A1 1:100@A3. Do not scale off plan

D	22/06/20	Issue D
C	13/05/20	Issue C
B	05/05/20	Issue B
A	20/03/20	DRAFT issue for review

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DESIGN • APPROVE • MANAGE

PROJECT	61 Dress Circle Road, Avalon Beach		PROJECT # 2065
CLIENT	Haidee Kegan	DATE # See above	DWG # Sht-104
DWG	Sections	SCALE @ A1 See Plan	
		DRAWN SA	
		CHKD JK	REVISION

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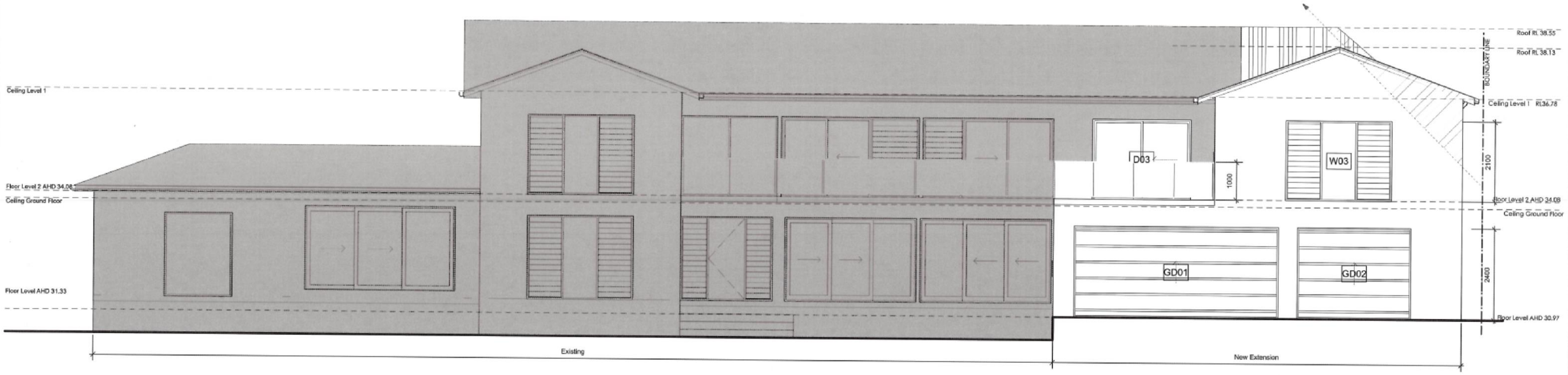
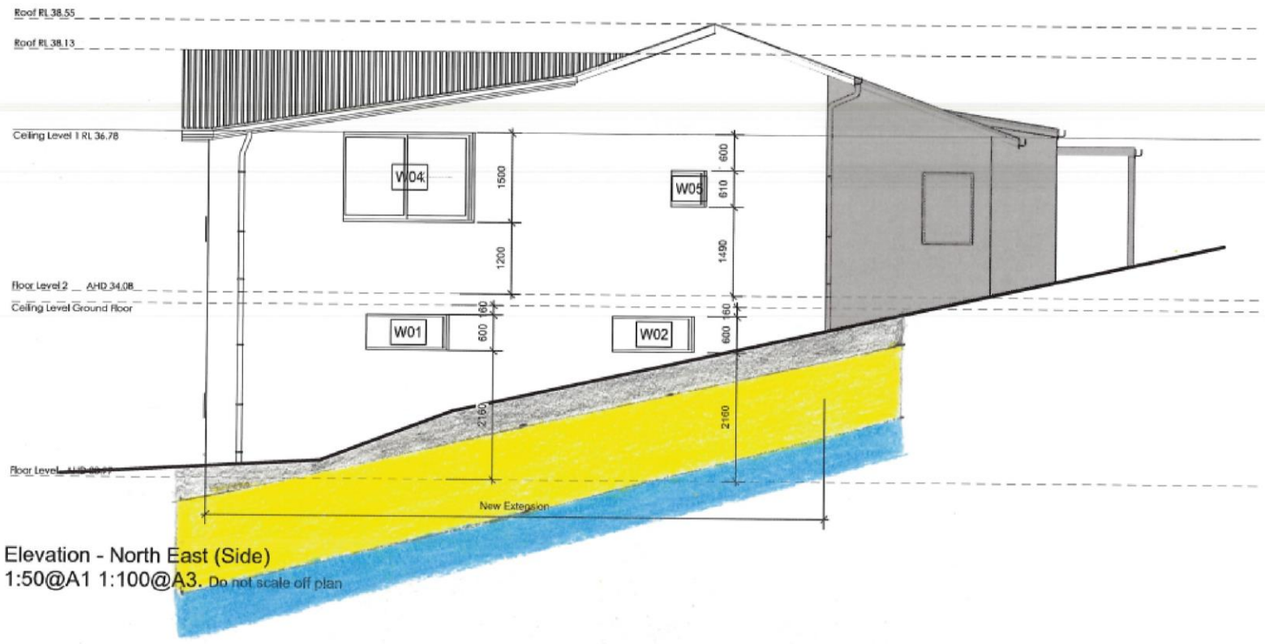
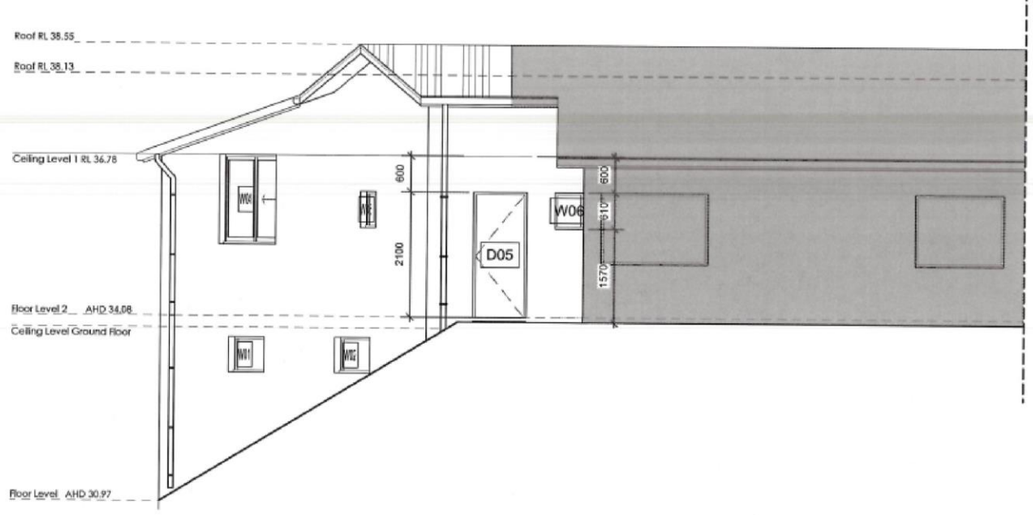
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Elevation - South East (Front)
1:50@A1 1:100@A3. Do not scale off plan



Elevation - North East (Side)
1:50@A1 1:100@A3. Do not scale off plan



Elevation - South West (Rear)
1:50@A1 1:100@A3. Do not scale off plan

- Topsoil
- Sandy Clay
- Narrabeen Group Rocks – Extremely Low to Low Strength Rock

DRAFT - NOT FOR CONSTRUCTION

Notes:
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ISSUE	DATE	REVISION
C	16/06/20	DRAFT issue for review
B	30/04/20	DRAFT issue for review

JAMIE KING
LANDSCAPE ARCHITECT
DESIGN • APPROVE • MANAGE

PROJECT	61 Dress Circle Road, Avalon Beach	PROJECT # 2065
CLIENT	Haidee Kegan	DATE # See above; DWG # Sht-105
		SCALE @ A1 See Plan
DWG	Elevation	DRAWN WPS; CHKD JK; REVISION

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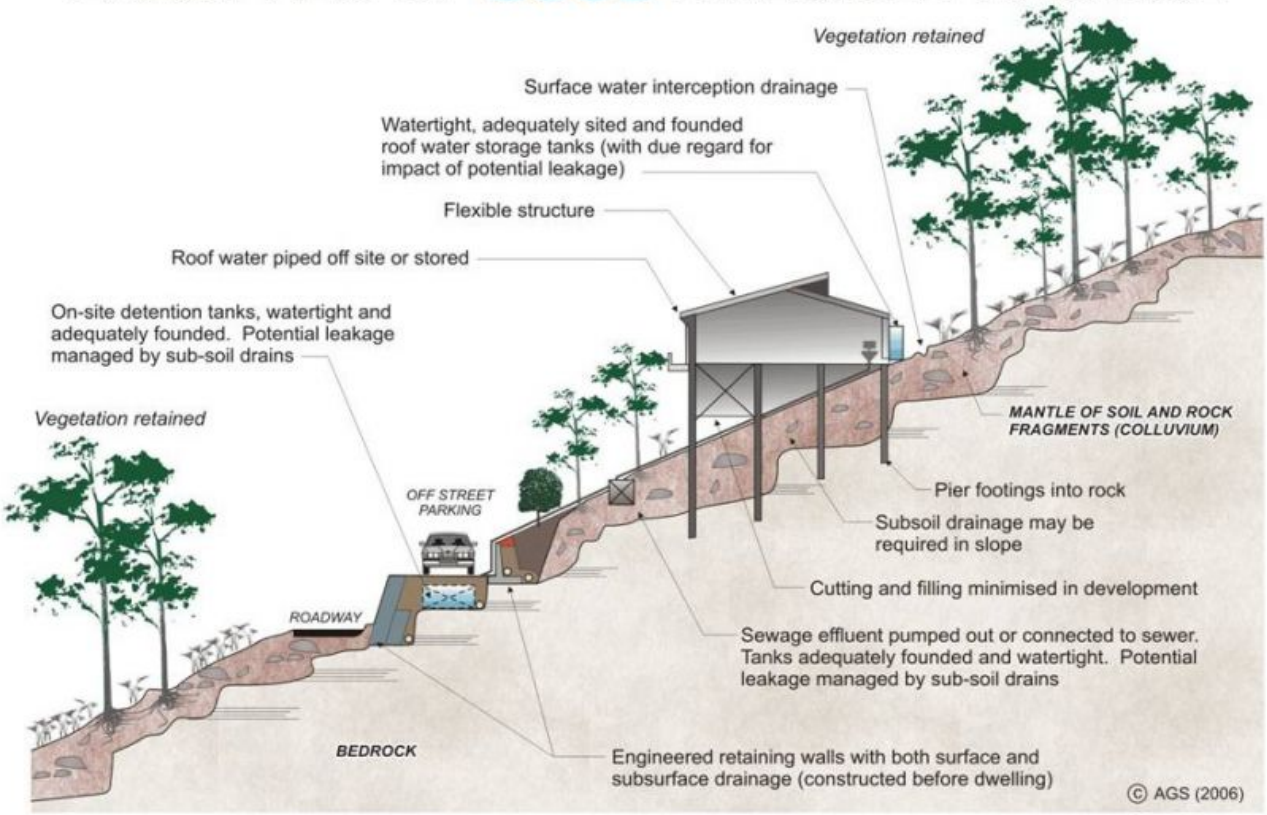
EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE