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

Development Application for _____
Name of Applicant

Address of site 15 Hudson Parade, 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 12/06/20 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 **15 Hudson Parade, Avalon**

Report Date: 12/06/20

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 15 Hudson Parade, 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 **15 Hudson Parade, Avalon**

Report Date: 12/06/20

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted 28/05/20 (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 28/05/20

☒ 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:

Alterations and Additions at **15 Hudson Parade, Avalon.**

1. Proposed Development

1.1 Construct a concrete hardstand near the downhill property boundary by excavating to a maximum depth of ~1.0m. Construct another concrete hardstand near the downhill side of the house by filling to a maximum height of ~0.7m.

1.2 Demolish the existing carport. Construct a new secondary dwelling with carport below by excavating to a maximum depth of ~2.0m.

1.3 Terrace the slope above and beside the proposed secondary dwelling with low retaining walls up to ~0.5m high.

1.4 Details of the proposed development are shown on 15 drawings prepared by Annabelle Chapman Architect, project number 2004, drawings numbered 001, 002, 101, 101.1, 102, 103, 201, 202, 401 to 403, 501 and 502 are dated 10/06/2020. Drawings numbered 301 and 302 are dated 16/04/2020.

2. Site Description

2.1 The site was inspected on the 28th of May, 2020.

2.2 This residential property is on the high side of the road and has a N aspect. It is located on the moderately graded middle reaches of a hillslope. The natural slope rises across the property at an average angle of ~13°. The slope above the property rises at increasing angles. The grade below the site gradually eases

2.3 At the road frontage a concrete driveway runs to a carport near the lower boundary and a garage within the house (Photos 1 & 2). Filling has been placed above the carport and beside the driveway (Photo 3). It is supported by a combination of

concrete block and soldier pile retaining walls. The downhill side of the concrete block retaining wall is tilting to a maximum angle of ~3.5° downslope (Photo 4). This portion of the wall will be demolished as part of the proposed works. The E side of the concrete block retaining wall lines the common boundary (Photo 5). On the lower corner the wall has separated ~0.2m from the adjoining wall and it is tilting to a maximum angle of ~5.5° from vertical (Photo 6). See 'Section 16 Remedial Works'. The soldier pile retaining wall displays no significant signs of movement and is considered stable (Photo 3). The old, two storey brick house displays no significant signs of movement in the external supporting walls that could be associated with slope instability (Photo 7).

A ~2.0m cut has been made into the slope beside the SW side of the house (Photo 8). The excavation extends into the neighbouring property and is supported by a soldier pile retaining wall. The NW section of the retaining wall is tilting at up to ~3.7° from vertical. The upper E supporting steel post of the wall is braced by the suspended timber walkway that is attached to the subject house. The suspended timber walkway is located near the SW corner of the house (Photo 9). Under the walkway old sandstone block retaining walls support cuts and fills (Photos 10 & 11). The retaining walls are in a dilapidated state. See 'Section 16 Remedial Works'. An excavation has been made into slope beside the walkway for a lawn area (Photo 12). The cut is battered to an angle of ~45° and mortared sandstone flagging has been placed over the cut face. 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

Three Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. Four DCP tests from a previous geotechnical report completed in 2018 are shown (DCP4 to DCP7). 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 may have occurred for DCP2. 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:

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** (~RL33.9)	**DCP 2** (~RL34.8)	**DCP 3** (~RL34.7)	**DCP 4** (~RL31.7)	**DCP 5** (~RL31.7)	**DCP 6** (~RL35.6)	**DCP 7** (~RL35.8)
0.0 to 0.3	5	3	3	7	1F	1F	8
0.3 to 0.6	5	3	2	9	11	5	7
0.6 to 0.9	7	5	4	15	15	15	16
0.9 to 1.2	14	1	7	25	30	17	20
1.2 to 1.5	10	#	5	#	#	21	24
1.5 to 1.8	8		13			36	40
1.8 to 2.1	8		18			#	#
2.1 to 2.4	9		5				
2.4 to 2.7	30		#				
2.7 to 3.0	#						
	End of Test @ 2.7m	Refusal @ 0.9m	Refusal @ 2.2m	End of Test @ 1.2m	End of Test @ 1.3m	End of Test @ 1.8m	End of Test @ 1.8m

#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 @ 2.7m, DCP still very slowly going down, brown sandy soil on wet tip.
DCP2 – Refusal @ 0.9m, DCP bouncing, white impact dust on damp tip.
DCP3 – Refusal @ 2.2m, DCP bouncing, brown sandy soil on wet tip.
DCP4 – End of test @ 1.2m, DCP thudding on rock surface, clean dry tip.
DCP5 – End of test @ 1.3m, DCP thudding on rock surface, clean dry tip.
DCP6 – End of test @ 1.8m, DCP still very slowly going down, red shale on dry tip.
DCP7 – End of test @ 1.8m, DCP still very slowly going down, red shale on dry tip.

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 a fill and soil over clays. Fill has been placed above the existing garage. The clays merge into the weathered zone of the under lying rocks at depths of between ~0.9m to ~2.7m below the current surface. The weathered zone of the underlying rock is interpreted as Extremely Low Strength Shale. It is to be noted that this material is a soft rock and can appear as a mottled stiff clay when it is cut up by excavation equipment.

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 excavation for the carport extension is a potential hazard until retaining structures are in place (**Hazard Two**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that falls across the property and continues above failing and impacting on the property.	The proposed excavation failing and impacting the worksite before retaining walls are in place.
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	8.3×10^{-7}/annum	8.3×10^{-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)

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 Hudson Parade. 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 ~2.0m will be required to construct the new carport. Another excavation to a maximum depth of ~1.0m will be required for the proposed concrete hardstand near the downhill property boundary. The excavations are expected to be through fill and soil over firm to stiff clays. Excavations through fill, soil and clay can be carried out with an excavator and bucket.

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.

13. Excavation Support Requirements

An excavation to a maximum depth of ~2.0m will be required to extend the existing carport. The excavation is set back sufficiently from the property boundaries and adjoining structures to negate excavation induced instability.

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.

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. 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 Soil	20	0.40	0.55
Residual Clays	20	0.35	0.45

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

It is to be noted that the earth pressures in Table 1 assume a level surface above the structure, do not account for any surcharge loads and assume retaining structures are fully drained. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

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

15. Foundations

The proposed secondary dwelling, carport and hardstands can be supported on piers taken below the fill into the firm to stiff clays of the natural profile where some movement in accordance with a 'Class M' site can be tolerated. This ground material is expected at depths of between ~0.4m to ~1.8m below the current surface. A maximum allowable bearing pressure of 200kPa can be assumed for footings on firm to stiff clay.

For better quality footings or where little movement can be tolerated piers can be taken to Extremely Low Strength Shale. This ground material is expected at depths of between ~1.2m to ~2.7m 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.

Footings should be founded on the same footing material across the structure. Where the footing material does change across the structure construction joints or similar are to be installed to prevent differential settlement, where the structure cannot tolerate such 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.

16. Remedial Works

The concrete block and soldier pile retaining walls (Photos 5, 6, 8, 10 & 11) are to be monitored by the owners on an annual basis or after heavy prolonged rainfall events, whichever occurs first. A photographic record of these inspections is to be kept. Should further movement occur the walls are to be remediated so they meet current engineering standards. We can carry out these inspections upon request.

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.

- 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.

White Geotechnical Group Pty Ltd.

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

Photo 1

Photo 2

Photo 3

Photo 4

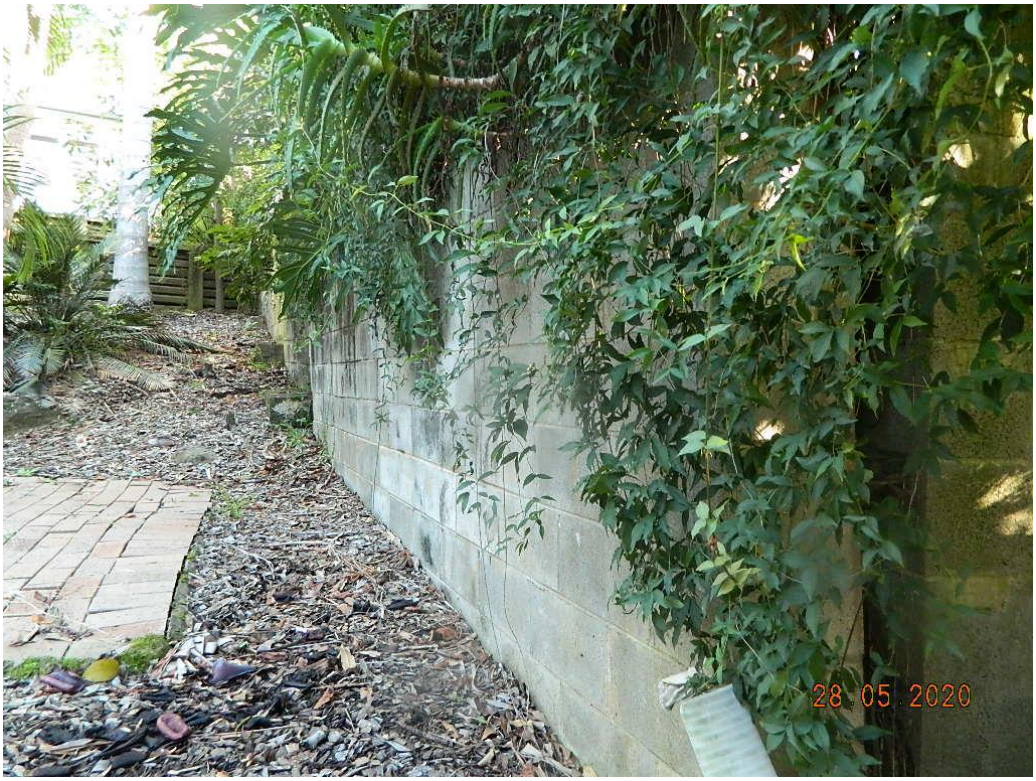


Photo 5

Photo 6

Photo 7

Photo 8

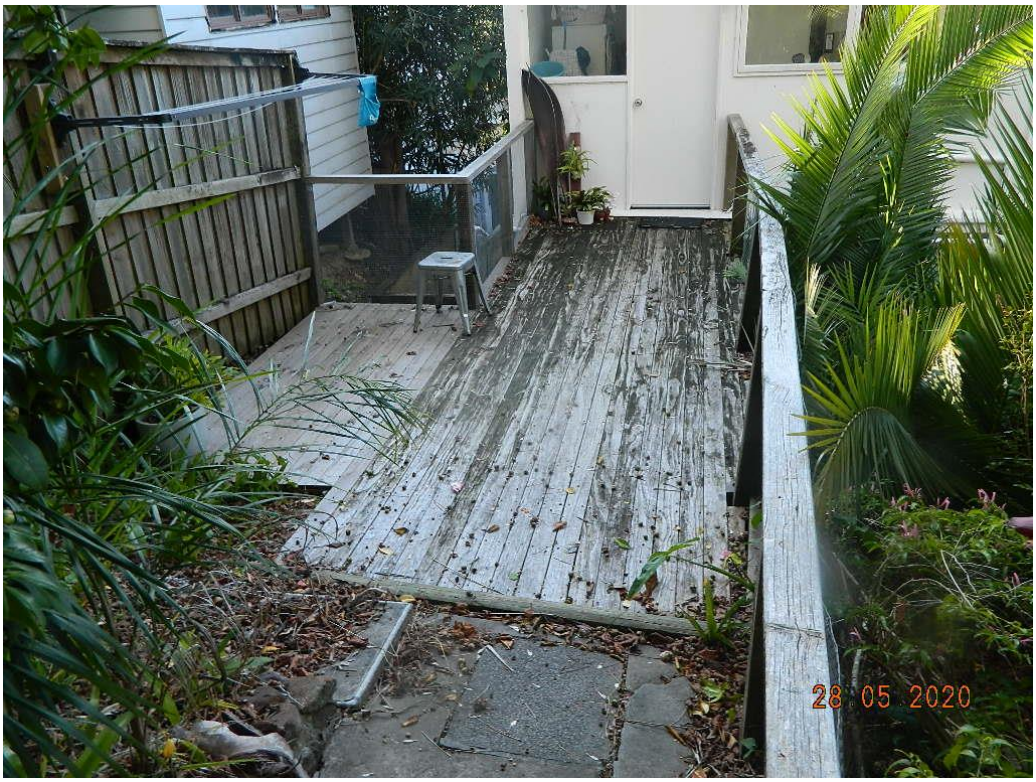


Photo 9

Photo 10

Photo 11

Photo 12

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.

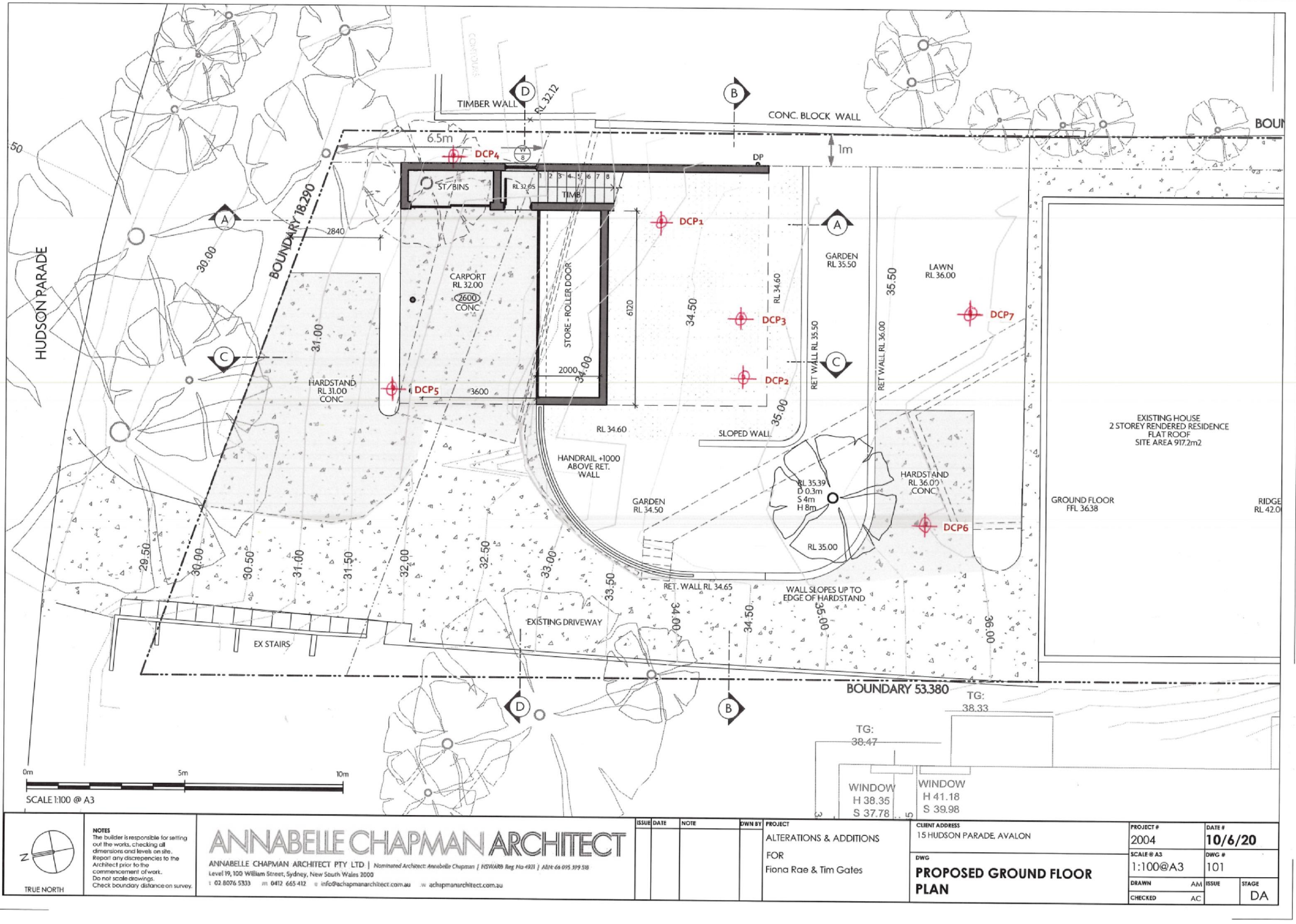
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



TRUE NORTH

NOTES
The builder is responsible for setting out the works, checking all dimensions and levels on site. Report any discrepencies to the Architect prior to the commencement of work. Do not scale drawings. Check boundary distance on survey.

ANNABELLE CHAPMAN ARCHITECT

ANNABELLE CHAPMAN ARCHITECT PTY LTD | *Nominated Architect: Annabelle Chapman | NSWARB Reg No 4921 | ABN: 66 095 399 518*
Level 19, 100 William Street, Sydney, New South Wales 2000
t 02 8076 5333 m 0412 665 412 e info@achapmanarchitect.com.au w achapmanarchitect.com.au

ISSUE	DATE	NOTE	DWN BY

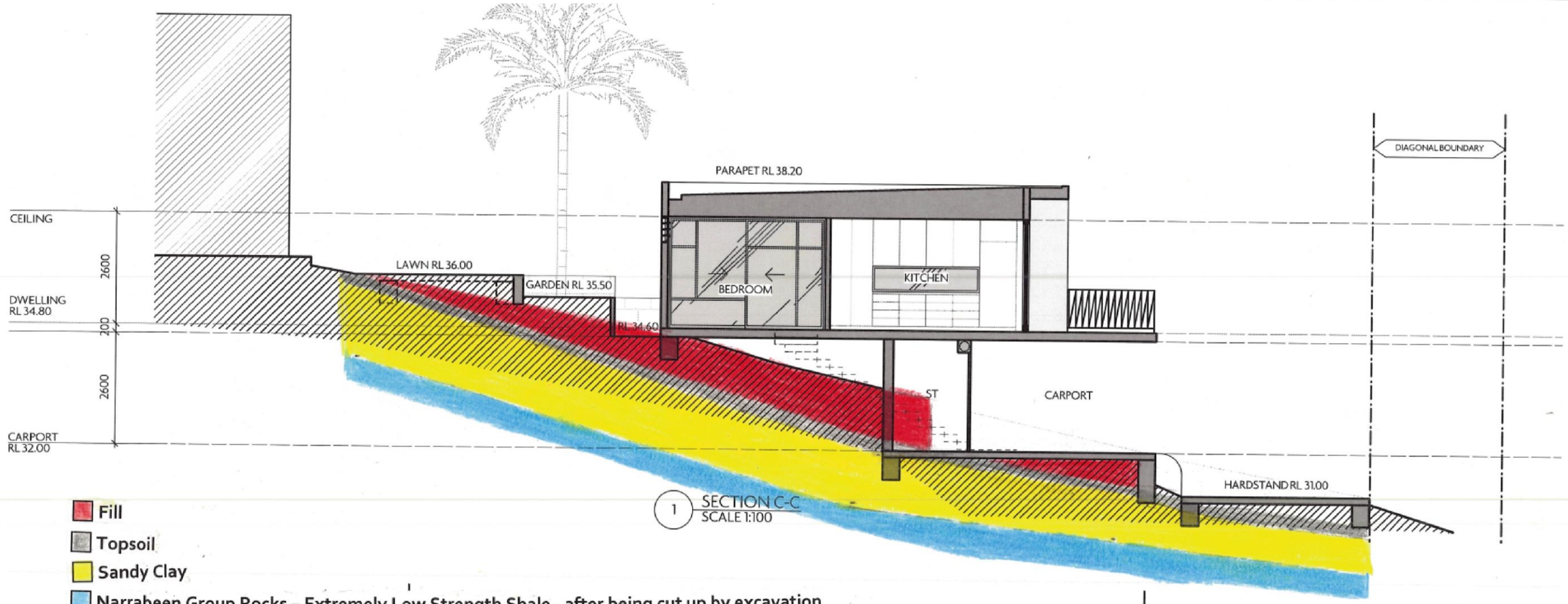
PROJECT
ALTERATIONS & ADDITIONS
FOR
Fiona Rae & Tim Gates

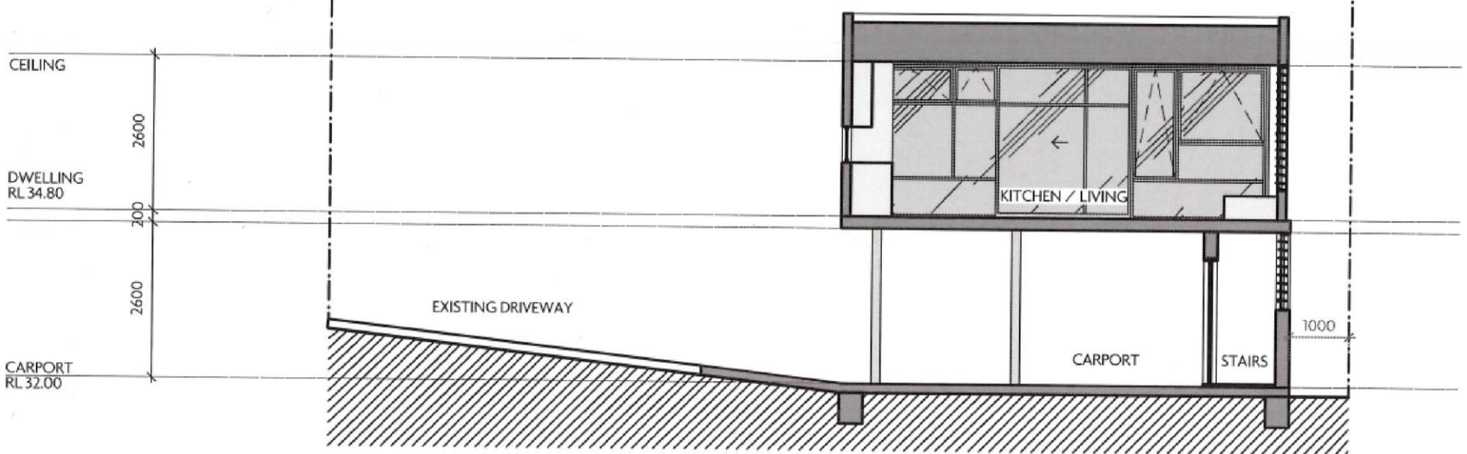
CLIENT ADDRESS
15 HUDSON PARADE, AVALON

DWG
PROPOSED GROUND FLOOR PLAN

PROJECT # 2004	DATE # 10/6/20
SCALE @ A3 1:100@A3	DWG # 101
DRAWN AM	ISSUE
CHECKED AC	STAGE DA

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials





0m 5m 10m

SCALE 1:100 @ A3

TRUE NORTH

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The builder is responsible for setting out the works, checking all dimensions and levels on site. Report any discrepencies to the Architect prior to the commencement of work. Do not scale drawings. Check boundary distance on survey.

ANNABELLE CHAPMAN ARCHITECT

ANNABELLE CHAPMAN ARCHITECT PTY LTD | *Nominated Architect: Annabelle Chapman | NSWARB Reg No 4921 | ABN: 66 095 399 518*
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ISSUE	DATE	NOTE	DWN BY

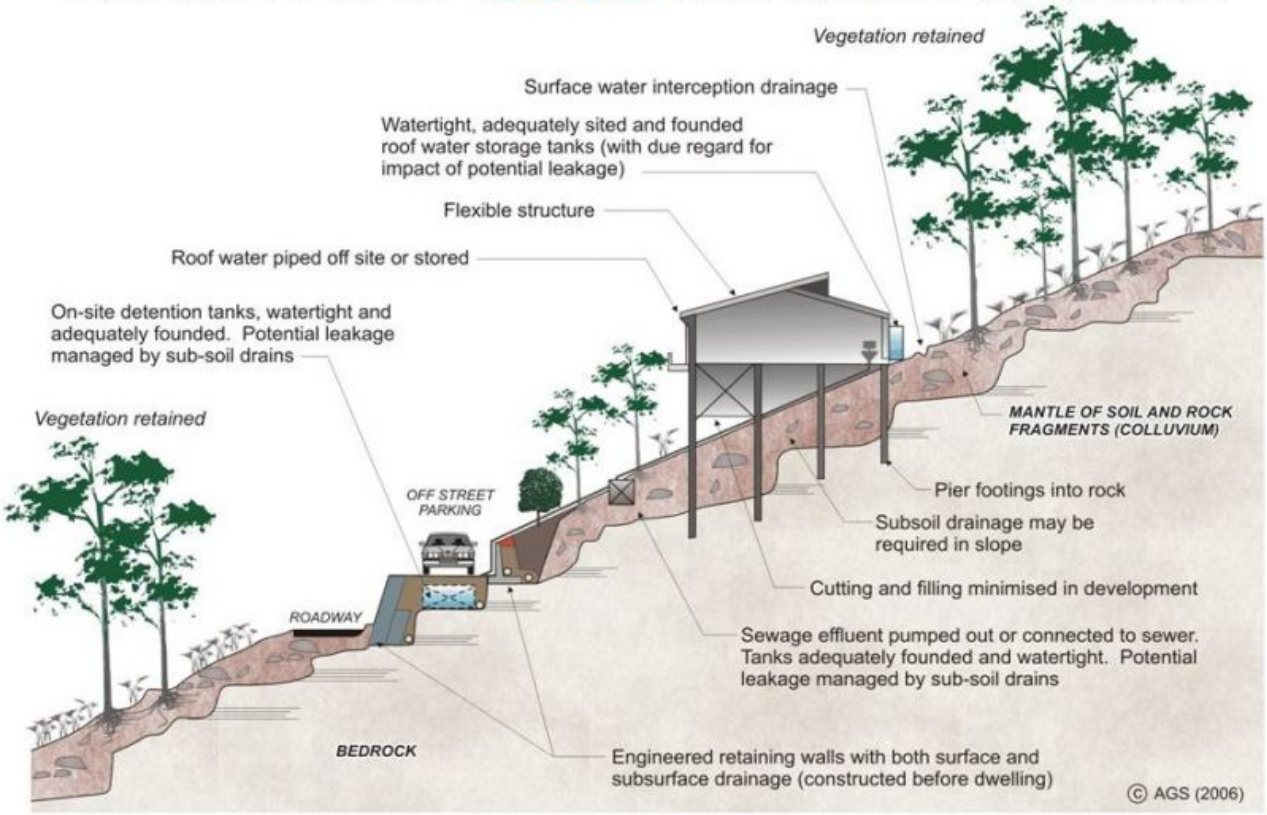
PROJECT
ALTERATIONS & ADDITIONS
FOR
Fiona Rae & Tim Gates

CLIENT ADDRESS
15 HUDSON PARADE, AVALON

DWG
SECTIONS C-C & D-D

PROJECT #	DATE #
2004	**16/4/20**
SCALE @ A3	DWG #
1:100@A3	302
DRAWN AM	ISSUE / STAGE
CHECKED AC	DA

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE