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

Development Application for _____
Name of Applicant

Address of site **2 Herbert Avenue, Newport**

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 07/06/16 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 $2million.
I have:

Please mark appropriate box

☒ 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

☒ I 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 paragraph 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy fro 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 am of the opinion that the Development Application only involves Minor Development/Alterations that do not require a Detailed Geotechnical Risk Assessment and hence my report is in accordance with the Geotechnical Risk Management Policy for Pittwater – 2009 requirements for Minor Development/Alterations.

☐ Provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: Geotechnical Report **2 Herbert Avenue, Newport**

Report Date: 06/06/16

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 **2 Herbert Avenue, Newport**

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 **2 Herbert Avenue, Newport**

Report Date: 06/06/16

Author : BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted 03/06/16 (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 03/06/16

☒ 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 & Additions at **2 Herbert Avenue, Newport**

1. Proposed Development

1.1 Construct a carport along the upper boundary of the property.

1.2 Construct an additional level under the house.

1.3 Extend the upper and lower sides of the house.

1.4 Various internal and external modifications.

1.5 Details of the proposed development are shown on 7 drawings prepared by JJ Drafting, job number 506/16, drawings numbered DA 1 to 7 dated January 2016.

2. Site Description

2.1 The site was inspected on the 3rd June, 2016.

2.2 This residential property is on the low side of the road and has a W aspect. The block is located on the moderately graded lower reaches of a hillslope that falls to Pittwater. From the road frontage the natural slope falls at average angle of ~16° to the lower boundary. The slope above and below the property continues at similar angles.

2.3 At the road frontage a concrete driveway runs to a concrete paved car parking area under the house (Photo 1 & 2). The fill batter for the driveway is supported by an old stack rock retaining wall that is inclined upslope and shows no significant signs of movement (Photo 3). The area beside the driveway has been terraced with an old formed concrete retaining wall that has failed on its N side (Photo 4). The plans indicate the N side of the wall will be demolished as part of the proposed works. The S side of the wall that will remain currently appears stable (Photo 5). The single storey steel, brick and timber framed house is in good condition for its age. Its supporting steel posts stand vertical. The concrete slab for the parking area under the house displays cracking and minor settlement in areas however it poses no risk to life or property (Photo 6 & 7). A low elevation, mortared rock retaining wall supports a fill for the downhill side of the car parking area (Photo 8). It displays minor cracking but is currently considered stable. The land surface surrounding the house, driveway and parking area is mostly lawn covered.

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

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 location 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. With this in mind 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** (~RL 36.3)	**DCP 2** (~RL 35.5)	**DCP 3** (~RL 34)	**DCP 4** (~RL 33.5)	**DCP 5** (~RL 30.2)	**DCP 6** (~RL 29.6)
0.0 to 0.3	24	1F	17	2F	2F	2F
0.3 to 0.6	11	9	3F	9	8	7
0.6 to 0.9	17	12	11	15	13	12
0.9 to 1.2	20	16	12	19	16	20
1.2 to 1.5	26	29	24	24	29	28
1.5 to 1.8	31	40	39	36	35	36
1.8 to 2.1	42	#	#	#	#	#
2.1 to 2.4	#					
	End of Test @ 2.1m	End of Test @ 1.7m	End of Test @ 1.8m	End of Test @ 1.6m	End of Test @ 1.7m	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 @ 2.1m, DCP still very slowly going down, orange and purple shale fragments on dry tip.
DCP2 – End of test @ 1.7m, DCP thudding on rock surface, orange shale fragments on dry tip.
DCP3 – End of test @1.8m, DCP still very slowly going down, purple and white shale fragments on dry tip.
DCP4 – End of test @ 1.6m, DCP thudding on rock surface, white and purple shale fragments on dry tip.
DCP5 – End of test @ 1.7m, DCP still very slowly going down, orange and red shale fragments on dry tip.
DCP6 – End of test @ 1.8m, DCP still very slowly going down, orange and red shale fragments on dry tip.

5. Geological Interpretation

The slope materials are colluvial at the near surface and residual at depth. They consist of a thin sandy topsoil over sandy clays and clays with rock fragments throughout the profile. In the test locations the sandy clays and clays merge into the weathered zone of the under lying rocks at an average depth of ~1.7m below the current surface, being slightly deeper where filling has been placed. 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 clay and rock and through the cracks in the rock.

Due to the slope and elevation of the block, the water table in the location is expected to be many metres below the base of the proposed excavation.

7. Surface Water

No evidence of significant surface flows were observed on the property during the inspection. Normal sheet wash from the slope above will be intercepted by the street drainage system.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, beside or below the property. The moderately graded slope that falls across the property is a potential hazard (**Hazard One**). The proposed excavation is potential hazards until the retaining walls are in place (**Hazard Two**).

SEE THE RISK ANALYSIS SUMMARY OVER THE PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderately graded slope that falls across the property failing and impacting on the existing house or the proposed works.	The proposed excavation impacting on the suspended concrete slab for the carport on the neighbouring property to the S (Photo 9).
LIKELIHOOD	'Unlikely' (10^{-4})	'Likely' (10^{-2})
CONSEQUENCES TO PROPERTY	'Minor' (9%)	'Medium' (20%)
RISK TO PROPERTY	'Low' (5×10^{-6})	'High' (2×10^{-3})
RISK TO LIFE	8.3×10^{-7}/annum	3.2×10^{-4}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk 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.

Stormwater from the existing house is discharged around its perimeter. We recommend all stormwater be piped through a drainage easement obtained from the downhill neighbouring property to the street below. If this option is not feasible an infiltration/dispersion trench is suitable as a last resort, provided flows are kept close to natural runoff for the site or designed to a flow rate as determined by infiltration testing. All stormwater is to be piped through any tanks that may be required by the regulating authorities.

11. Excavations.

An excavation to a maximum depth of ~ 1.6m is required to install the level area above the house. It is expected to be through a shallow sandy topsoil over a firm to stiff clay with extremely low strength shale

near the base. It is envisaged the excavation can be carried out with a bucket and excavator and rock hammers will not be required.

12. Vibrations.

It is expected the proposed excavation will be carried out with an excavator and bucket and the vibrations produced through soil and clay will be below the threshold limit for building damage.

13. Excavation Support Requirements

The S side of the proposed excavation to level the area above the existing house will be as close as ~0.5m to a partly suspended concrete slab for a carport on the adjoining neighbouring property. The portion of the suspended carport slab that lines the common boundary is supported on two, poorly constructed, stack brick and paver piers that do not meet current engineering standards (Photo 9). The lower pier (Photo 10) and the land surface along the neighbouring property will be inside the excavations zone of influence. In this instance the zone of influence is the area above a theoretical 45^{o} line from the base of the excavation towards the surrounding structures and boundaries.

Where the cut is adjacent to the neighbouring carport, for a distance of at least 2.5m we recommend contiguous piers be installed before the cut commences so no ground movement is possible. For ease of construction it may be easier to extend the piers along the length of the S cut which extends a distance of ~4.0m

Where ground support is not required the soil portions of the excavation are to be battered temporarily at 1.0 Vertical to 1.7 Horizontal (30°) until the retaining walls are in place. Cut batters through firm to stiff clay and extremely low strength shale will stand at near vertical angles for short periods of time until the retaining walls are installed provided the cut batters are kept from becoming saturated.

The cut batters through soil and clay are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The covers are to be tied down with metal pegs or other suitable fixtures so they can't blow off in a storm. Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. 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.

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 ~1.6m will be placed on the downhill side of the existing house to create a level area. 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 0.3 before being moderately compacted. Tracking the machine over the loose fill in 1 to 2 passes should be sufficient. Immediately behind the retaining structure (say to 1.5m) the fill is to be compacted with light weight equipment such as a hand held plate compactor so as not to damage the retaining wall. Where light weight equipment is used fills are to be laid in a loose thickness not exceeding 0.2m before being compacted. No structures are to be supported on fill.

15. Retaining Walls

Retaining walls supporting soil, clay and fill can be designed for a lateral earth pressure coefficient K_a of 0.35 and assume a bulk density of 20kN/m^3. Assume a bulk density of 22 kN/m^3 and a K_a of 0.3 for cuts through extremely low strength shale.

Any surcharge loads that may act on the retaining wall are to be accounted for in the design.

All retaining walls are to have sufficient back wall drainage and be backfilled immediately behind the wall 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 walls likely hydrostatic pressures are to be accounted for in the retaining wall design.

16. Site Classification

The site classification in accordance with AS2870-2011 is Class M.

17. Foundations

The proposed carport structure is to be supported on piers taken to and potted at least ~0.3m into the underlying extremely low strength shale. Required pier depths to encounter and pot into this material are expected to be ~2.0m below the current surface. It should be noted that extremely low strength shale is a soft rock that a rock auger will cut through so the builders should not be looking for refusal to end the footings. A maximum allowable pressure of 600kPa can be assumed for footings supported on extremely low strength shale.

Given the age of the existing house it is likely supported on the firm to stiff clays of the natural profile. The proposed extensions can be supported on pads or shallow piers taken to the firm to stiff clays of the natural profile where some movement in accordance with a 'Class M' site can be tolerated. The required footing depth is expected to be at least ~0.5m below the natural surface, from the downhill side of the footing. 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 an average depth of ~1.7m below the current surface. Ideally footings should be founded on the same footing material across the old and new structures. 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 clay and shale reduces when it is wet we recommend the footings be dug, inspected and poured in quick succession (ideally the same day if possible). If the footings get wet they will have to be drained and the soft layer of wet clay or shale on the footing surface will have to be removed before concrete is poured.

If a rapid turnaround from footing excavation to the concrete pour is not possible a sealing layer of concrete may be added to the footing surface after it has been cleaned.

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

SEE THE REQUIRED INSPECTIONS OVER THE PAGE

18. Inspections

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

- All footings are to be inspected and approved by the geotechnical professional before concrete is placed.

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

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 tests 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 professional. 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.

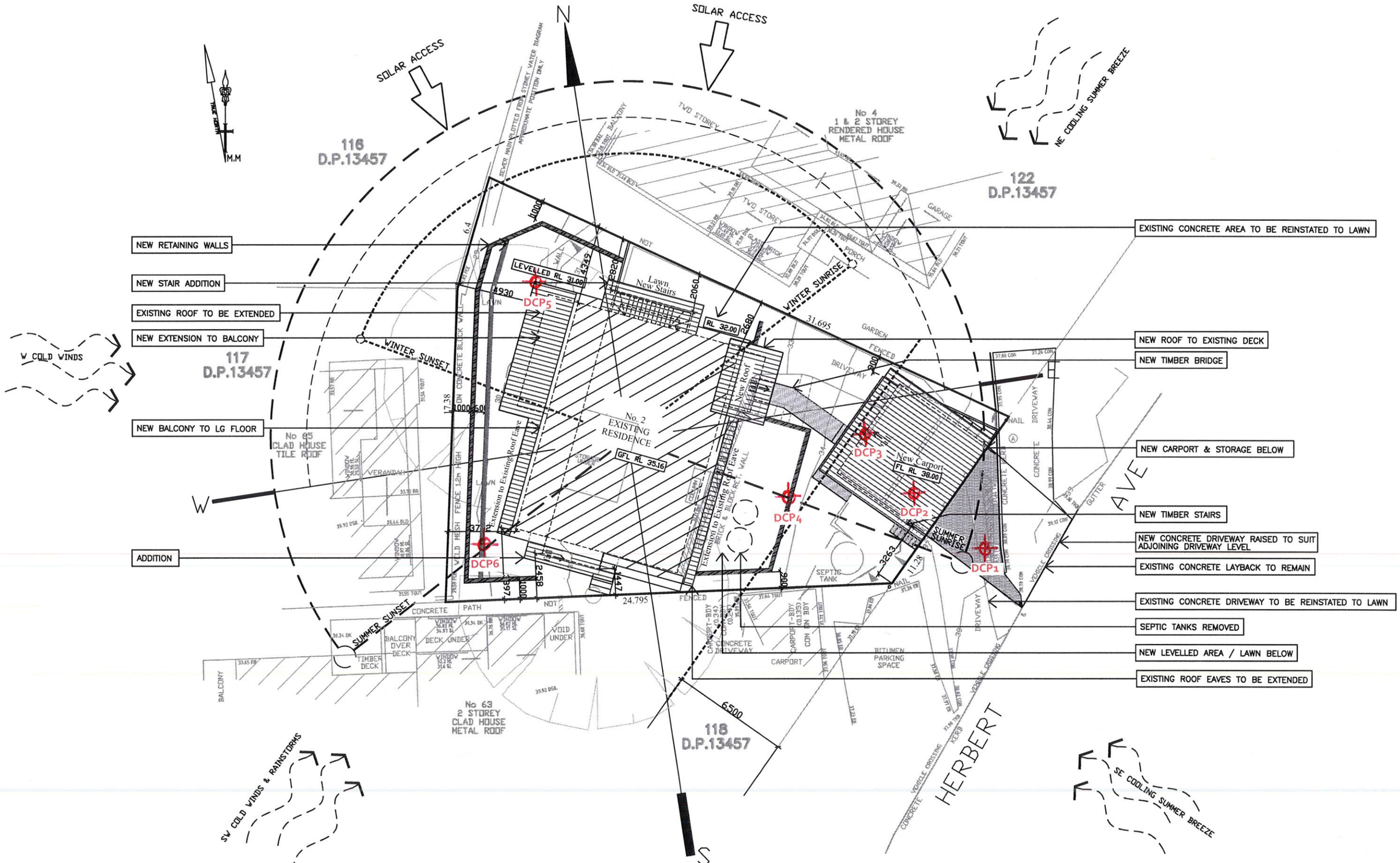
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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 AREA: 478.5sqm
LOT 121 DP 13457

SITE ANALYSIS PLAN

NOTES:
- All structures including stormwater & drainage to engineer's details
- Do not obtain dimensions by scaling drawings
- All dimensions are to be checked on site prior to starting work
- These drawings are to be read in conjunction with all other consultant's drawings and specifications
- All workmanship & materials shall be in accordance with the requirements of current editions including amendments of the relevant SAA Codes of Practice, the Building Code of Australia and loemens
- New materials are to be used throughout unless otherwise noted
- Concrete footings, slab, structural beams or any other structural members are to be designed by a practicing engineer.

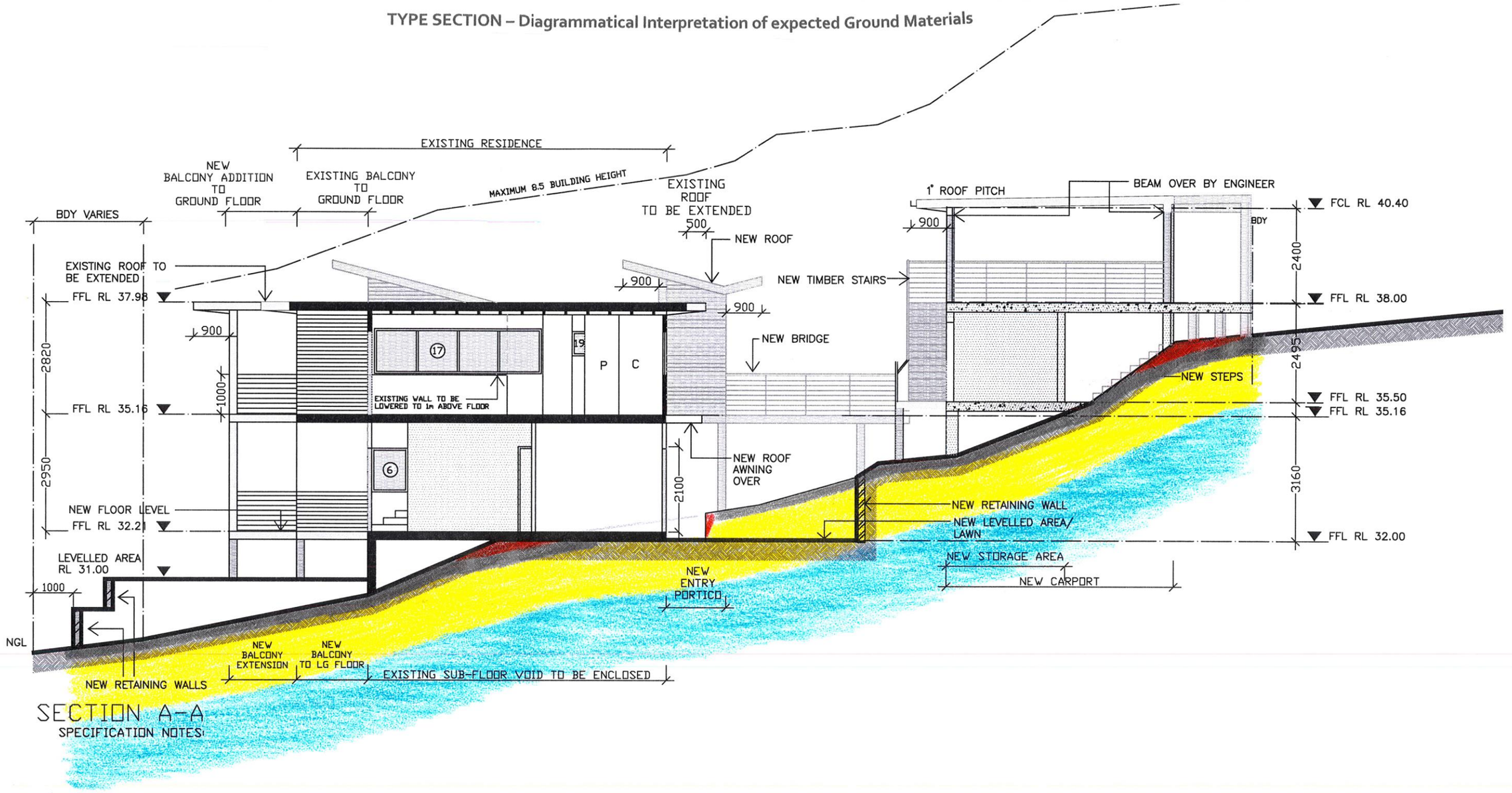
JJ Drafting
174 Garden St, North Narrabeen, NSW, 2101
PO Box 687, Dee Why, NSW, 2099
Mob. 0414 717 541
Email. jjdraft@tpg.com.au

Project:
ALTERATIONS & ADDITIONS & NEW CARPORT AT 2 HERBERT AVENUE, NEWPORT
Title:
SITE ANALYSIS PLAN

Scale: 1:200
Date: January 2016

Job No. : 506/16
Dwg No. DA 1

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



SECTION A-A

SPECIFICATION NOTES:

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

SECTION

NOTES:

- All structures including stormwater & drainage to engineer's details
- Do not obtain dimensions by scaling drawings
- All dimensions are to be checked on site prior to starting work
- These drawings are to be read in conjunction with all other consultant's drawings and specifications
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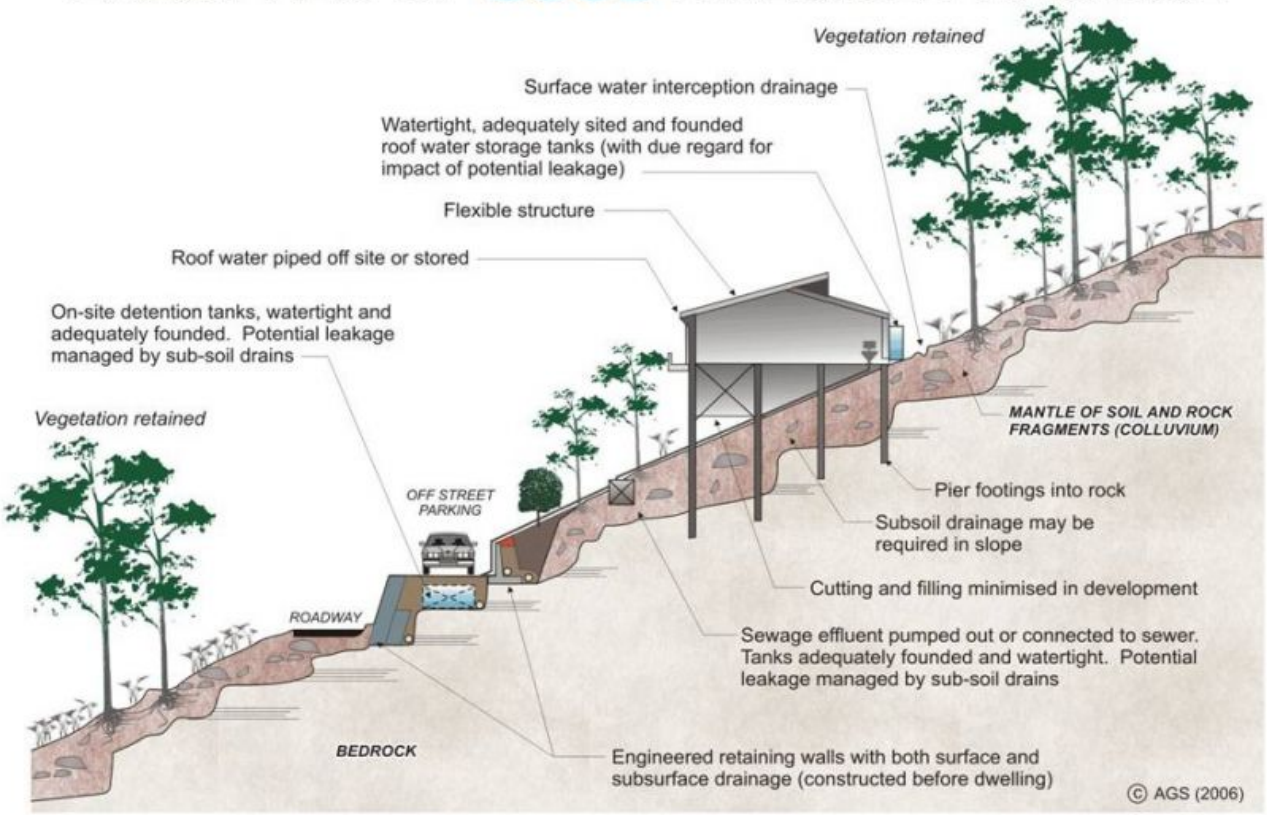
Project:
ALTERATIONS & ADDITIONS AND A NEW CARPORT AT 2 HERBERT AVENUE, NEWPORT
Title:
SECTION

Scale: 1:100
Date: January 2016

Job No. : 506/16
Dwg No. DA 7

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE