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

Development Application for _____
Name of Applicant

Address of site 57 Mona Vale Road, Mona Vale

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 28/6/21 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $10million.

I:
Please mark appropriate box

☒ have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☒ am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☐ have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.

☐ have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

☐ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

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

Geotechnical Report Details:

Report Title: Geotechnical Report **57 Mona Vale Road, Mona Vale**
Report Date: 28/6/21

Author: BEN WHITE

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

Documentation which relate to or are relied upon in report preparation:

Australian Geomechanics Society Landslide Risk Management March 2007.

White Geotechnical Group company archives.

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature _____

Name Ben White

Chartered Professional Status MScGEOLAusIMM CP GEOL

Membership No. 222757

Company White Geotechnical Group Pty Ltd

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1(a) - Checklist of Requirements for Geotechnical Risk Management Report for Development Application

Development Application for _____
Name of Applicant

Address of site 57 Mona Vale Road, Mona Vale

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 **57 Mona Vale Road, Mona Vale**

Report Date: 28/6/21

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **23/6/21**
(date)

☒ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)

☒ Subsurface investigation required
- ☐ No Justification _____
- ☒ Yes Date conducted **23/6/21**

☒ Geotechnical model developed and reported as an inferred subsurface type-section

☒ Geotechnical hazards identified
- ☒ Above the site
- ☒ On the site
- ☐ Below the site
- ☐ Beside the site

☒ Geotechnical hazards described and reported

☒ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Consequence analysis
- ☒ Frequency analysis

☒ Risk calculation

☒ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009

☒ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009

☒ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009

☒ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.

☒ Design Life Adopted:
- ☒ 100 years
- ☐ Other _____
specify

☒ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified

☒ Additional action to remove risk where reasonable and practical have been identified and included in the report.

☐ Risk assessment within Bushfire Asset Protection Zone.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature _____

Name Ben White

Chartered Professional Status MScGEOLAusIMM CP GEOL

Membership No. 222757

Company White Geotechnical Group Pty Ltd

GEOTECHNICAL INVESTIGATION:

New Pool and Landscaping at **57 Mona Vale Road, Mona Vale**

1. Proposed Development

1.1 Construct a new pool and pool area on the uphill side of the property by excavating to a maximum depth of ~2.4m into the slope.

1.2 Re-landscape the downhill side of the property by filling to a maximum height of ~1.5m.

1.3 Details of the proposed development are shown on 7 drawings prepared by Jamie King Landscape Architect, Project number 21097, drawings numbered Sht-101 to Sht-106 and Sht-201, Issue B, dated 20/6/21.

2. Site Description

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

2.2 This residential property is currently under construction as part of a separate application. The property is on the high side of the road and has a SE aspect. It is located on the gentle to moderately graded upper middle reaches of a hillslope. The natural slope rises across the property at an average angle of ~10°. The land surface above the property continues at increasing angles before easing to the crest of the slope. The slope below the property continues at gradually easing angles.

2.3 The cut for Mona Vale Road is lawn-covered and battered to stable angles (Photo 1). Between the cut batter and the house is a gently sloping garden area (Photo 2). The house is currently under construction as part of a separate application (Photo 3). Currently, an unsupported excavation has been made in the slope to a maximum depth of ~1.2m to create a level platform for the house (Photo 4). The excavation is proposed to be extended as part of the proposed works for the pool area. We recommend the cut batter be temporarily supported until the retaining wall

is constructed or until the proposed excavation works commence, whichever occurs first.

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

The ground materials exposed in an as-dug excavation for the house, on the uphill side of the property, were recorded (EXC1). Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The locations of the tests are shown on the site plan attached. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to be an issue for the testing on this site. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations. See the appended "Important information about your report" for a more comprehensive explanation. The results are as follows:

EXCAVATION 1 (~RL41.6) – EXC1 (Photo 5)

Depth (m)	Material Observed
0.0 to 0.2	**CLAYEY SOIL**, dark brown, dense, damp, fine to medium grained with fine trace organic matter.
0.2 to 0.5	**CLAY**, brown, firm, damp, fine grained.
0.5 to 1.1	**EXTREMELY LOW TO LOW STRENGTH SHALE**, grey and mottled orange and maroon, damp, fine grained.

Base of excavation @ 1.1m in Low Strength Shale.

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** (~RL38.6)	**DCP 2** (~RL37.9)	**DCP 3** (~RL41.6)	**DCP 4** (~RL41.6)
0.0 to 0.3	F	2	8	5
0.3 to 0.6	5	6	5	10
0.6 to 0.9	9	13	30	6
0.9 to 1.2	15	30	#	30
1.2 to 1.5	30	#		#
1.5 to 1.8	#			
	End of Test @ 1.5m	End of Test @ 1.2m	End of Test @ 0.9m	End of Test @ 1.2m

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

DCP Notes:

DCP1 – End of test @ 1.5m, DCP still very slowly going down, brown and orange shale on wet muddy tip.
DCP2 – End of test @ 1.2m, DCP still very slowly going down, brown, orange, and maroon shale on wet muddy tip.
DCP3 – End of test @ 0.9m, DCP still very slowly going down, orange clay on wet tip.
DCP4 – End of test @ 1.2m, DCP still very slowly going down, brown clay on wet 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 thin clayey soil over firm to stiff clays. The clays merge into the underlying weathered rock at depths of between 0.6 to 1.5m below the current surface. The weathered zone was observed to consist of Extremely Low to Low Strength Shale within the exposed excavation face (Photo 5). See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks.

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

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 below or beside the property. The gentle to moderately graded slope that rises across the property and continues above is a potential hazard (**Hazard One**). The proposed excavations are a potential hazard until retaining walls are in place (**Hazard Two**). The proposed fill is a potential hazard (**Hazard Three**). The as dug excavation is a potential hazard until retaining walls are in place (**Hazard Four**).

RISK ANALYSIS SUMMARY ON THE NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The gentle to moderate slope that rises across the site and continues above failing and impacting on the proposed works.	The excavations (up to a depth of ~2.4m) collapsing onto the work site before retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (25%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	5.5×10^{-7}/annum	3.8×10^{-5}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	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.

HAZARDS	Hazard Three	Hazard Four
TYPE	The proposed fill failing and impacting on the subject property before the retaining walls are in place.	The as-dug excavation for the house collapsing onto the work site before retaining walls are in place (Photo 4).
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Minor' (10%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (5×10^{-5})
RISK TO LIFE	6.6×10^{-5}/annum	8.3×10^{-7}/annum
COMMENTS	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in **Section 14** are to be followed.	This level of risk to property is 'TOLERABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 2.3** 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 Mona Vale Road. Roof water from the development is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

A stepped excavation will be required to construct the proposed pool and pool area. The step for the pool area is to be a maximum depth of ~1.9m and the step for the pool is to be a maximum depth of ~1.7m with a minimum distance of ~1.2m between the steps. At its deepest point, the combined excavation depths will be ~2.4m from the current ground surface. The excavations are expected to be taken through a thin clayey soil over firm to stiff clays with Extremely Low to Low Strength Shale expected at depths of between 0.6 to 1.2m.

Excavations through soil, clay, and Extremely Low to Low Strength Shale can be carried out with an excavator and bucket.

12. Vibrations

Possible vibrations generated during excavations through soil, clay, and Extremely Low to Low Strength Shale will be below the threshold limit for building damage.

13. Excavation Support Requirements

Bulk Excavation for Proposed Pool Area

The excavation will reach a maximum depth of ~1.9m and, allowing for back-wall drainage, will be set back ~0.3m from the upper boundary, ~0.5m from the E boundary, and ~0.9m from the W common boundary. No structures on any property will be within the zone of influence of the excavation. However, the upper, E, and W common boundaries will fall within the zone

of influence of the excavation. As such, the cut will require temporary support to maintain the integrity of the W neighbouring property and public reserve above and to the E of the subject property until permanent retaining walls are in place.

The upper and E common boundary fences are to be braced before the excavation commences.

The cut will require staged sacrificial temporary support such as braced form ply or similar support installed along the upper, E, and W sides as the excavation is progressed in spans not less than 2.0m horizontally. The support is to be designed by the structural engineer. The temporary support is to remain in place until the retaining walls are built. Alternatively, a staged permanent retaining wall can be installed as above or in a 'hit-one-miss-two' sequence. There are other shoring options that can be designed by the Structural Engineer in consultation with the Geotechnical Consultant. See the attached site plan for the minimum required extent of the shoring.

Bulk Excavation for Proposed Pool

The excavation for the proposed pool will reach a maximum depth of ~1.7m and will be set back sufficiently from any surrounding structures or boundaries.

The cut batters are expected to stand at near-vertical angles for a very short period of time until the pool structure is installed provided they are kept from becoming saturated. If the cut batters through soil, clay, and Extremely Low to Low Strength Shale remain unsupported for more than a day, they are to be supported with typical pool shoring, such as sacrificial form ply, until the pool structure is in place.

Unsupported cut batters through for the pool excavation through, clay, and Extremely Low to Low Strength Shale 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.

Advice Applying to Both Excavations

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/pool structure 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 following the current Environmental Protection Agency (EPA) waste classification guidelines.

14. Fill

From the plans, it is apparent that filling to a maximum height of ~1.5 will be placed on the downhill side of the property for a new lawn area. All fill brought onto site is to be certified as 'clean fill' with a VENM certificate or similar documentation in accordance with EPA guidelines.

No fill is to be laid until retaining walls are in place. Filling to this depth without appropriate compaction will result in a significant settlement.

To avoid excessive settlement, the fill is to be placed in loose layers not exceeding 0.3m thick before being compacted as follows:

The surface is to be prepared before fills are lain. Strip the existing topsoil and remove all organic matter, stockpiling for later use as topsoil or remove from site.

Non-Cohesive Soils (sandy fills)

The proposed fill for landscaping is to be compacted over the prepared surface to a Minimum Density Index (ID) of 65%.

Cohesive Soils (clayey fill & excavated bedrock)

The proposed fill for landscaping is to be compacted over the prepared surface to at least 95% of Standard Maximum Dry Density.

The geotechnical consultant is to inspect and test the fill as it is laid in not more than 1.0m rises to ensure the required density has been achieved.

Filling within 1.5m behind retaining walls should be compacted with light weight equipment such as a hand-operated plate compacter or similar so as to not damage the wall. Where hand-held equipment is used, the loose depth of placed fill should not exceed 150mm before compaction occurs. No pavements or structures are to be supported on fill.

15. Retaining Structures

For cantilever or singly-propped retaining structures, it is suggested the design be based on a triangular pressure distribution of lateral pressures using the parameters shown in Table 1.

Table 1 – Likely Earth Pressures for Retaining Structures

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0
Fill, Soil, and Residual Clays	20	0.40	0.55
Extremely Low Strength Rock	22	0.25	0.35
Rock Up to Low Strength Rock	24	0.25	0.35

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

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

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

16. Foundations

The proposed pool is expected to be seated in the Extremely Low to Very Low Strength Shale. Likewise, the proposed retaining walls supporting the pool area are expected to be seated on the Extremely Low to Low Strength Shale exposed at the base of the excavation. This is a suitable foundation material. A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low to 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.

Retaining wall footings for the landscaping on the downhill side of the property can be supported on the firm to stiff clays of the natural profile. A maximum allowable bearing pressure of 200kPa can be assumed for footings on firm to stiff clays.

As the bearing capacity of clay and Extremely Low to Low Strength Shale reduces when it is wet, we recommend the footings be dug, inspected, and poured in quick succession (ideally the same day if possible). If the footings get wet, they will have to be drained and the soft layer of wet clay or shale on the footing surface will have to be removed before concrete is poured.

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

NOTE: If the contractor is unsure of the footing material required, it is more cost-effective to get the geotechnical consultant on site at the start of the footing excavation to advise on

footing depth and material. This mostly prevents unnecessary over-excavation in clay-like shaly-rock but can be valuable in all types of geology.

17. Geotechnical Review

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

18. Inspection

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

- The geotechnical consultant is to inspect and test the fill in not more than 1.0m rises. This is to ensure the required density has been achieved during compaction.

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

White Geotechnical Group Pty Ltd.

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

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5: EXC1 – 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.

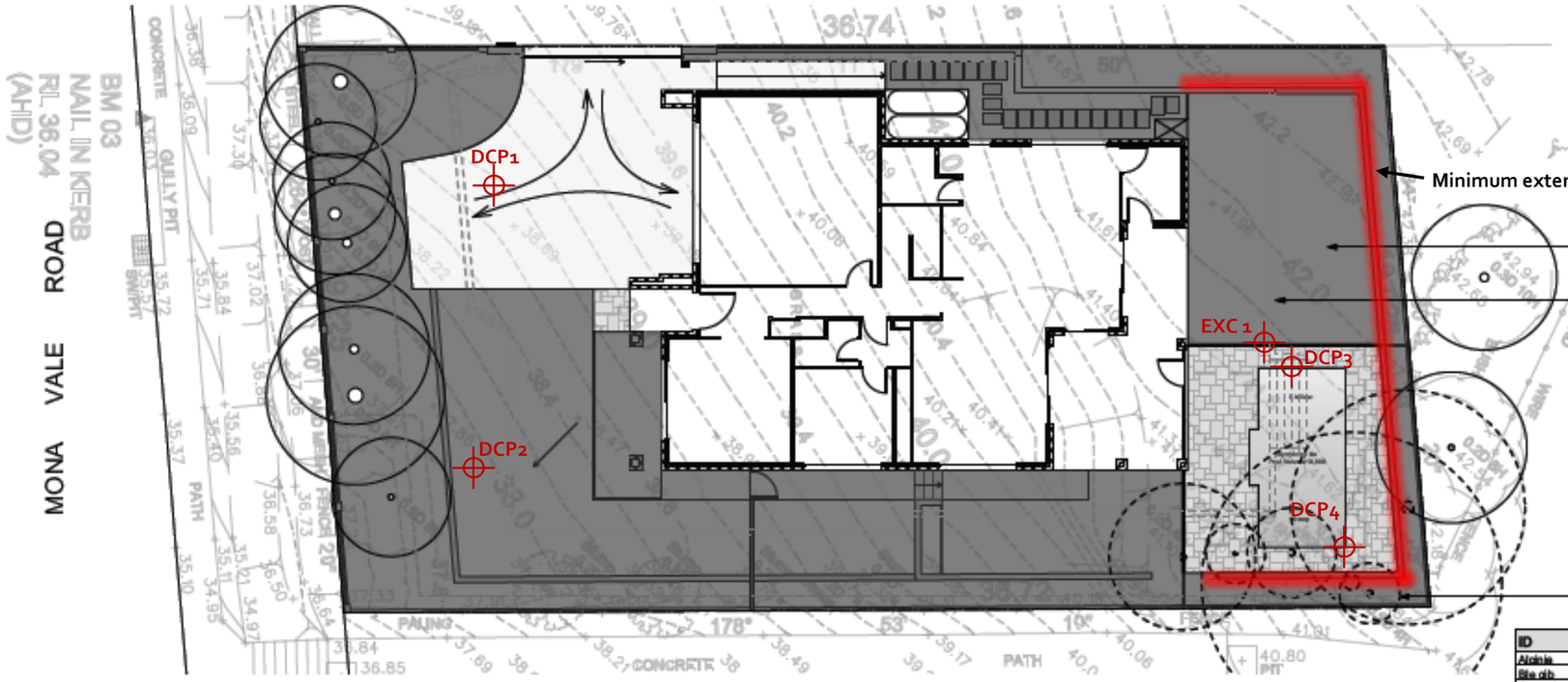
- This report should not be applied to any other project other than that outlined in section 1.0.

- 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.

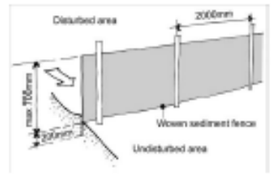
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.

Master Landscape Plan
1:100@A1 1:200@A3. Do not scale off plan

SITE PLAN – showing test locations



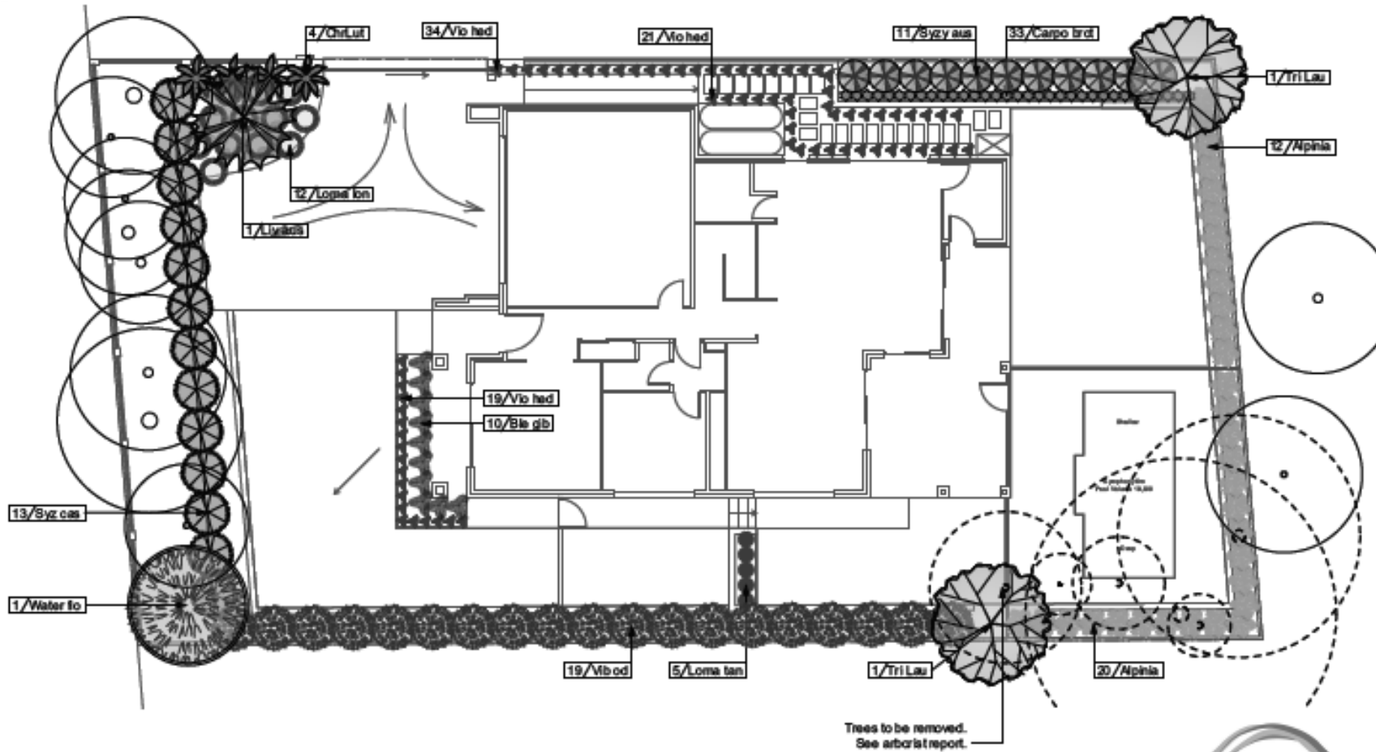
AREA CALCULATION		
	AREA (m2)	PERCENTAGE
Site	700,20	
Landscape total as per DCP	369,30	52,74%



Sedimentation Control Fence
Not to scale.
Source: www.yourhome.gov.au

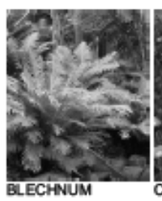
Legend
- MULCH AREA
- TURF AREA
- TIMBER DECKING
- CONCRETE PAVING
- UNIT PAVING
- STAIRS
- PEBBLE
- GRAVEL
- COBBLESTONE
- TIMBER
- WATER
- MASONRY RETAINING WALL
- STONE RETAINING WALL
- TIMBER RETAINING WALL
- BOULDER RETAINING WALL
- SITE OR WORKS BOUNDARY
- +88.88 PROPOSED LEVEL
- +TW 88.88 TOP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

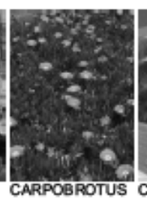
Planting Plan
1:100@A1 1:200@A3. Do not scale off plan



ID	Quantity	Latin Name	Common Name	Scheduled Size	Mature Height	Mature Spread
Alpinia	32	Alpinia zerumbet 'Variegated'	Ginger	200mm	0.9 - 1.5m	0.9 - 1.2m
Ble gib	10	Blechnum gibbum	Silver lady fern	200mm	1 - 1.5m	1 - 2m
Carpo brot	33	Carpobrotus glaucescens	Coastal Moonflower, Pigface, Viro-cell	200mm	0.0 - 0.3m	1.2 - 2.0m
ChrLut	4	Chrysalidocarpus lutescens	Golden Cane Palm	25lt	5 - 10m	3.5 - 6m
Liv aus	1	Livistona australis	Cabbage-tree Palm	25lt	15 - 20m	6 - 10m
Loma lon	12	Lomandra longifolia	Spiny-headed Mat-Rush	150mm	0.75 - 0.9m	0.9 - 1.2m
Loma tan	5	Lomandra longifolia 'Tanika'	Spiny-headed mat rush	150mm	0.45 - 0.6m	0.6 - 0.9m
Syz cas	13	Syzygium 'Cascade'	Lilly Pilly	200mm	1.5 - 3m	1.2 - 2.0m
Syzy aus	11	Syzygium australe 'Resilience'	Lilly Pilly	200mm	5 - 10m	3.5 - 6m
Tri Lau	2	Tristaniopsis laurina 'Luscious'	Kanooka, Water Gum	45lt	12 - 15m	3.5 - 6m
Vib od	19	Viburnum odoratissimum	Viburnum	25lt	3 - 5m	3.5 - 6m
Vio hed	74	Viola hederacea	Native Violet	100mm	0.0 - 0.3m	1.2 - 2.0m
Water flo	1	Waterhousia floribunda	Weeping Lilly Pilly	45lt	5 - 10m	3.5 - 6m


ALPINIA


BLECHNUM


CARPOBROTUS


CHRYSALIDOCARPUS


LIVISTONA


LOMANDRA LONGIFOLIA


LOMANDRA TANIKA


SYZYGIUM


SYZYGIUM 'CASCADE'


TRISTANIOPSIS


VIBURNUM


VIOLA


WATERHOUSIA

Notes:
>Do not scale off plan.
>Contractor to check all measurements on site before starting or commencing work.
>If discrepancies arise, contact the Landscape Architect.
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>POOL TO BE INSTALLED TO MEET THE REQUIREMENTS OF AS1926:2021. POOL LEVEL SHOWN IS INDICATIVE ONLY AND TO BE CONFIRMED ONSITE BY BUILDER TO ENSURE COMPLIANCE WITH AS1926:2021

B	230521	Issue B
A	230521	DRAFT Issue for review.

ISSUE	DATE	REVISION

PROJECT: 57 Mona Vale Road, Mona Vale — PROJECT #: 21097
CLIENT: Foster — DATE: See above — DWG #: Sht-101
DWG: Master Landscape Plan — SCALE @ A1: See Plan — DRAWN: SA — CHKD: JK — REVISION:

JAMIE KING
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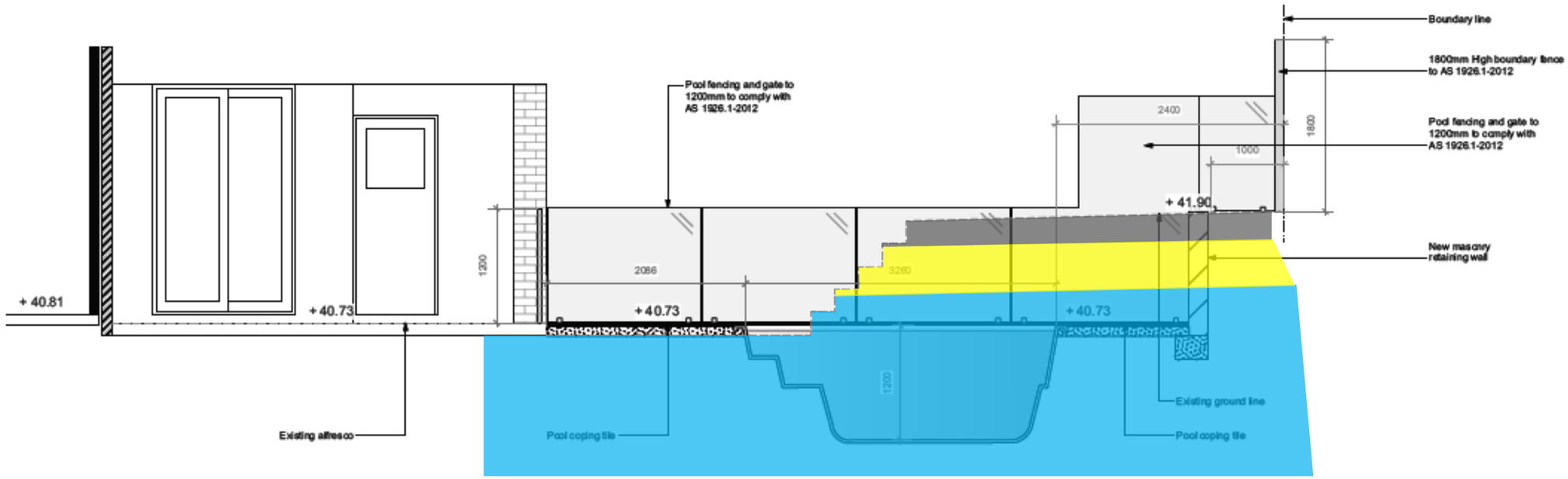
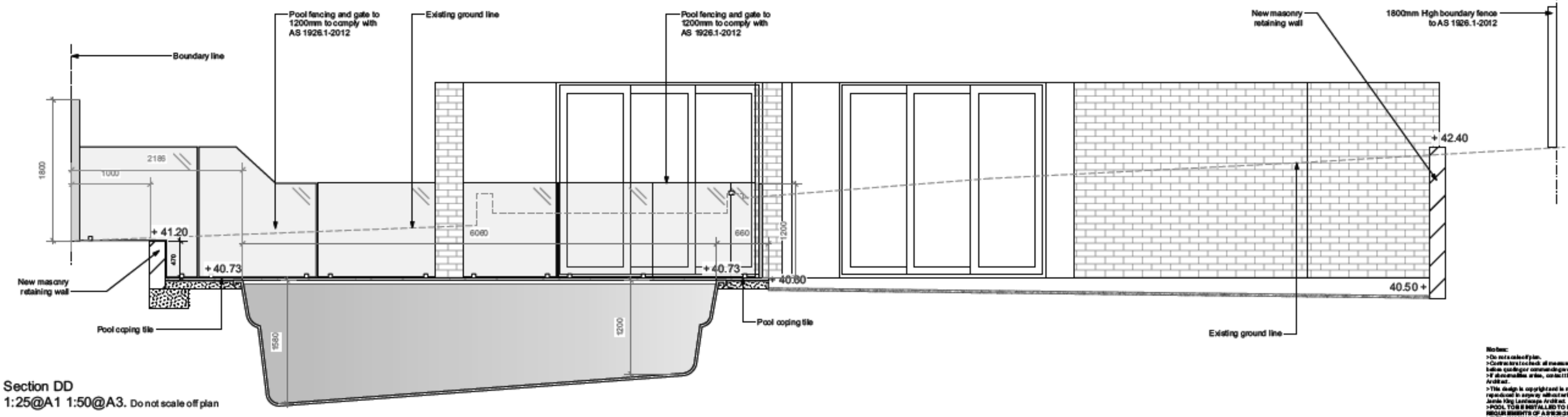
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Section CC
1:25@A1 1:50@A3. Do not scale off plan

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



Section DD
1:25@A1 1:50@A3. Do not scale off plan

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ISSUE	DATE	REVISION
B	230521	Issue B
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JAMIE KING
LANDSCAPE ARCHITECT
DESIGN • APPROVE • MANAGE

PROJECT	57 Mona Vale Road, Mona Vale		PROJECT # 21097
CLIENT	Foster	DATE @ A1 See above	DWG # Sht-105
DWG	Sections	SCALE @ A1 See Plan	
		DRAWN SA	
		CHKD JK	REVISION

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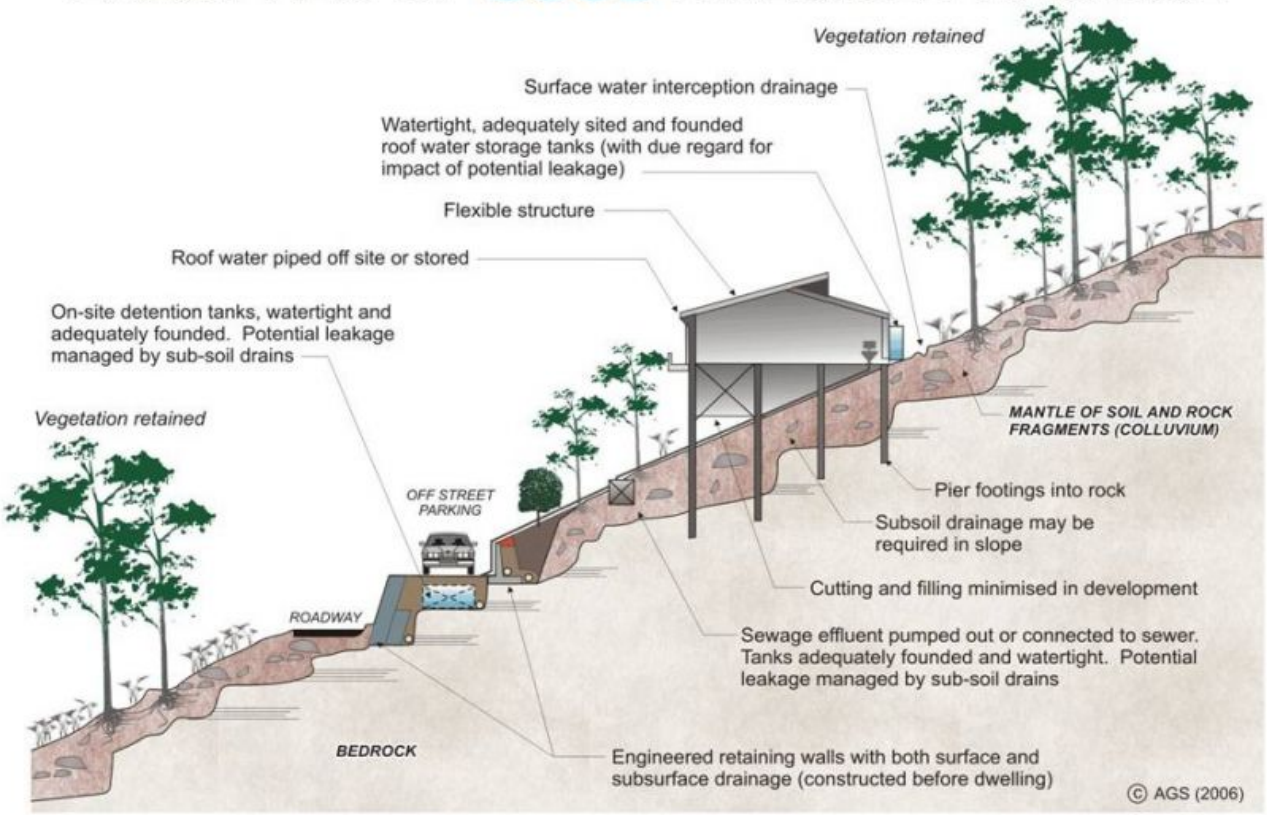
EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE