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

Development Application for _____
Name of Applicant

Address of site 36 Weeroona Avenue, Elanora Heights

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 11/11/20 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 **36 Weeroona Avenue, Elanora Heights**

Report Date: 11/11/20

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 36 Weeroona Avenue, Elanora Heights

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 **36 Weeroona Avenue, Elanora Heights**

Report Date: 11/11/20

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted **6/11/20** (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 **6/11/20**
- ☒ 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:

New Secondary Dwelling at **36 Weeroona Avenue, Elanora Heights**

1. Proposed Development

1.1 Construct a new secondary dwelling with alfresco on the uphill side of the property by excavating to a maximum depth of ~1.1m.

1.2 Details of the proposed development are shown on 4 drawings prepared by RK Design, Project Number 20-71, sheets numbered 0 to 3, Issue A, dated 22/9/20.

2. Site Description

2.1 The site was inspected on the 6th of November, 2020.

2.2 This residential property is on the low side of the road and has a N aspect. It is located on the gentle to moderately graded middle reaches of a hillslope. The natural slope falls from the uphill boundary of the property at an angle ~12° before easing to angles of <5°. The slope above the property increases in grade. The slope below the property eases. It encompasses the grounds of Elanora Heights Primary School and is near level.

2.3 At the road frontage a concrete driveway runs to down the slope to a gravel parking area (Photos 1 & 2). Beside the driveway is a moderately sloping lawn (Photo 3). The fill for the parking area is supported by a low sandstone block retaining wall (Photo 4). A brick/timber clad shed, timber deck and pool in good condition are located downhill of the parking area (Photos 5). The two storey rendered and steel clad house is supported by rendered walls and a concrete slab (Photos 5 to 7). The external supporting walls display no significant signs of movement. The cut for the house is supported by a low sandstone flagging retaining wall. A portion of the cut has

exposed Medium Strength Hawkesbury Sandstone bedrock (Photo 8). 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 Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

One auger hole was put down to identify the soil materials. 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. 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 due to the possibility that the actual ground conditions vary from our interpretation there should be allowances in the excavation and foundation budget to account for this. We refer to the appended "Important Information about Your Report" to further clarify. The results are as follows:

AUGER HOLE 1 (~RL54.5) **–** AH1 (photo 9)

Depth (m)	Material Encountered
0.0 to 0.2	**TOPSOIL**, sandy soil, dark brown, damp, fine to medium grained with fine trace organic matter.
0.2 to 0.5	**SAND**, grey and light brown/white, damp, medium grained.
0.5 to 0.6	**SANDY CLAY**, light orange/brown, firm, damp.

Refusal @ 0.6m in firm 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** (~RL57.1)	**DCP 2** (~RL56.1)	**DCP 3** (~RL54.5)	**DCP 4** (~RL55.7)
0.0 to 0.3	4	4	4	4
0.3 to 0.6	4	4	6	5
0.6 to 0.9	10	23	20	15
0.9 to 1.2	23	40	31	7
1.2 to 1.5	40	#	#	#
1.5 to 1.8	#			
	End of Test @ 1.4m	End of Test @ 1.1m	Refusal @ 1.1m	Refusal @ 1.0m

#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 @ 1.4m, DCP still very slowing going down, brown sand on wet tip.
DCP2 – End of Test @ 1.1m, DCP still very slowing going down, brown sandy soil on damp tip.
DCP3 – Refusal on rock @ 1.1m, DCP bouncing off rock surface, brown sand on wet tip.
DCP4 – Refusal on rock @ 1.0m, DCP bouncing off rock surface, brown sandy soil on wet tip.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger and the benches narrower. Where the slope eases, the opposite is true. The rock is overlain by a sandy topsoil, sand and sandy clays that fill the bench step formation. Fill has been placed over the soil profile in the location of the parking area to reduce the slope and form a near level platform. In the test locations, the depth to rock ranged from between 1.0m to 1.4m below the current surface. The sandstone underlying the property is estimated to be Medium Strength or better. 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 proposed works.

7. Surface Water

No evidence of 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 for Weeroona Avenue above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed below or beside the property. The gentle to moderately graded slope that falls across the property and continues above is a potential hazard (**Hazard One**). The proposed excavation undercutting the existing driveway is a potential hazard (**Hazard Two**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The gentle to moderately graded slope that falls across the property and continues above failing and impacting on the property.	The proposed excavation for the secondary dwelling undercutting the existing driveway.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (20%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/annum	8.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.

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

9. Suitability of the Proposed Development for the Site

The proposed development is suitable for the site. No geotechnical hazards will be created by the completion of the proposed development provided it is carried out in accordance with the requirements of this report and good engineering and building practice.

10. Stormwater

It is recommended a drainage easement be obtained from the downhill neighbouring property and all stormwater or drainage runoff from the proposed development be piped to the street below. If this option is not feasible, a spreader/dispersion trench is suitable as a last resort, provided flows are kept close to natural runoff for the site. All stormwater is to be piped through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to maximum depth of ~1.1m will be required to construct the proposed secondary dwelling. The excavation is expected to be through topsoil, sand and sandy clay. It is envisaged that excavations through soil, sand and clay can be carried out with an excavator and bucket.

12. Vibrations

It is expected the proposed excavation 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 ~1.1m will be required to construct the proposed secondary dwelling. The excavation will come flush with the existing driveway. If the driveway is not used during the excavation works and for the short period until retaining walls are in place the low cut batters through soil, sand and clay will stand at near-vertical angles until the retaining walls are installed, provided the cut batters are kept from becoming saturated. The portion of the driveway immediately above the excavation is to be taped off/barricaded against vehicle entry during this time.

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 excavation 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
Soil and Sand	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, so slope and vehicle surcharge loads from the driveway above will need to be accounted for in the design. They also 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 can be supported on spread footings or shallow piers taken into the firm to stiff clays of the natural profile where some movement in accordance with a 'Class S' site can be tolerated. Clay founded footings in this location should be taken to a minimum depth of ~0.5m below the current 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.

As the bearing capacity of 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 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.

For better quality footings or where little movement can be tolerated piers can be taken to Medium Strength Sandstone. This ground material is expected at depths from between ~1.0m to ~1.4m below the current surface. A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if with the approval of the structural engineer the joint can be spanned or alternatively the footing can be repositioned so it does not fall over the joint.

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

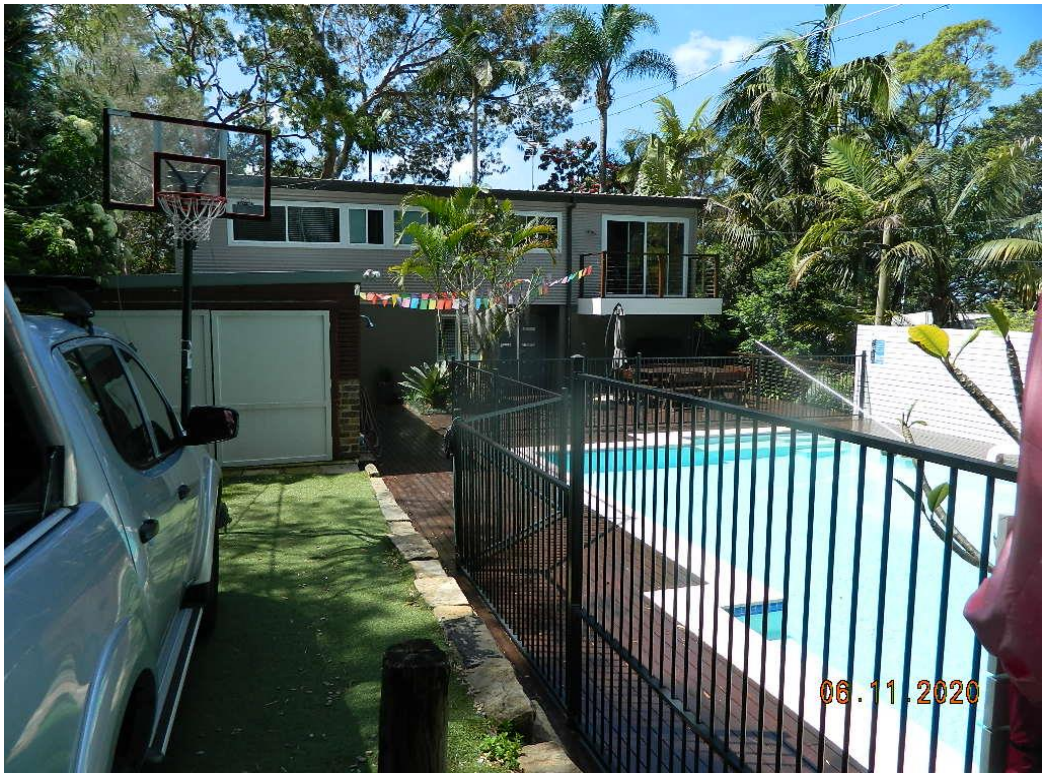


Photo 5

Photo 6

Photo 7

Photo 8

Photo 9: 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.

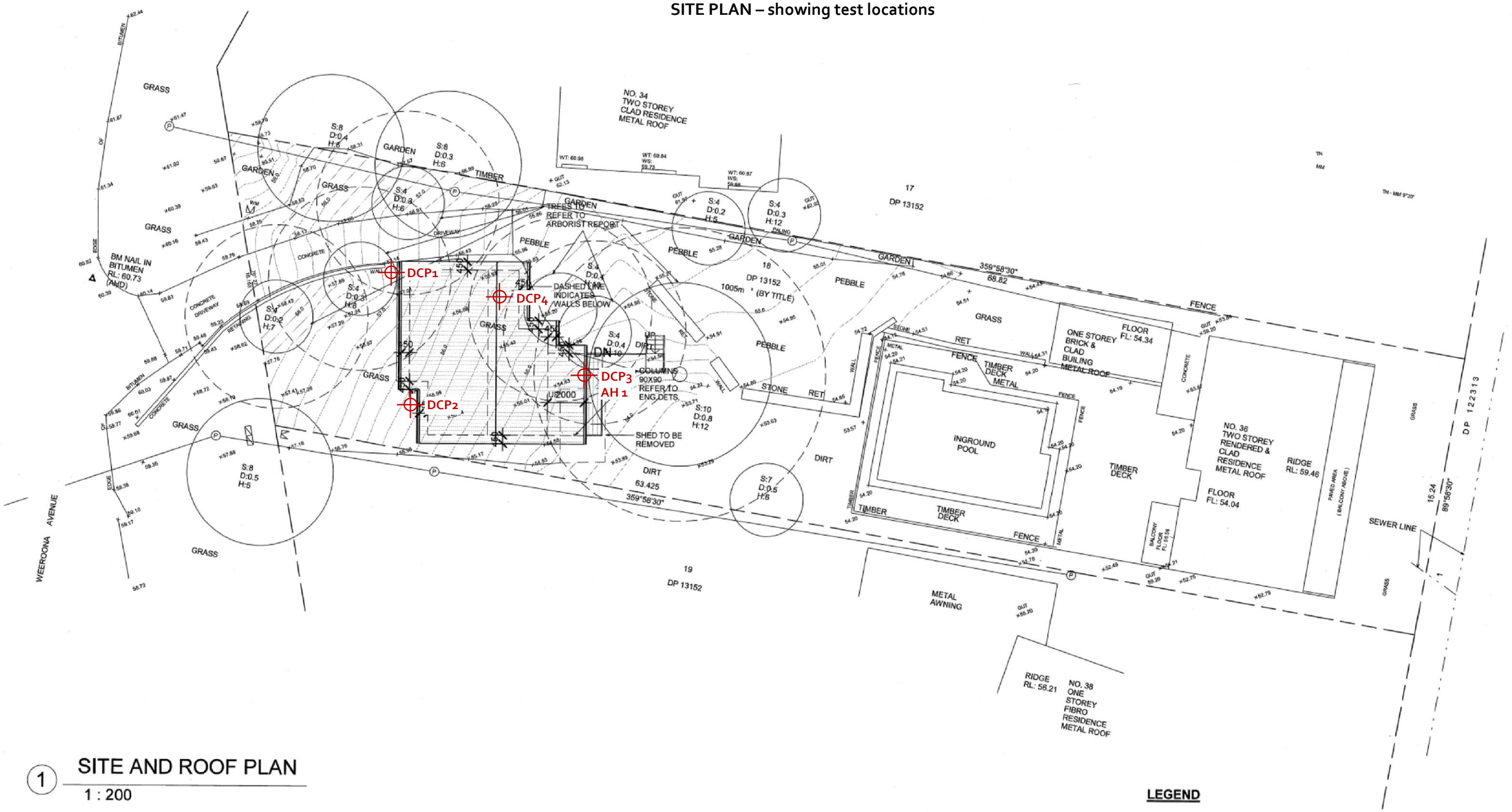
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

SITE PLAN – showing test locations



1 SITE AND ROOF PLAN

1 : 200

IMPORTANT NOTE
THESE DRAWINGS HAVE BEEN ISSUED FOR DEVELOPMENT APPLICATION PURPOSES ONLY. THEY ARE NOT ISSUED FOR CONSTRUCTION OR CONSTRUCTION CERTIFICATE OR FOR THE PURPOSES OF PRICING BY ANY CONTRACTOR

LEGEND

FLOOR WASTE fw⊕

SMOKE ALARM (S)

(HARD WIRED PHOTO-ELECTRIC SMOKE ALARMS TO BE INSTALLED IN ACCORDANCE WITH NCC PART 3.7.5 & AS 3786)

DIAL BEFORE YOU DIG www.1100.com.au

GENERAL NOTES
. All dimensions are to be confirmed on site by the builder/subcontractor, any incongruencies must be reported to the Designer before commencement of any work.
. No Survey has been made on the boundaries, all bearings, distances and areas have been taken from the contour survey plan. A Survey must be carried out to confirm the exact boundary locations.
. No construction work shall commence until a site survey confirming the site boundaries has been completed. The contractor is to ensure that the boundary setbacks are confirmed and used, the boundary setbacks take precedence over all other dimensions. The Survey work must be performed by a registered Surveyor.
. In the event of encountering any discrepancies on these drawings, specification or subsequent instructions issued, the Builder/Subcontractor shall contact the designer before proceeding further with any work.
. All construction, control joints and expansion joints in the wall, floors, other locations shall be in strict accordance with the Structural Engineering details. No joints or breaks other than specified, are allowed without written permission from the Engineer.
. Measurements for the fabrication of secondary components such as, windows, doors, internal frames, structural steel components and the like, are not to be taken from these documents. Measurements must be taken on site to suit the work as constructed.
. All structural components shall be in strict accordance to details and specifications as prepared by a structural engineer.
. All existing structures need to be examined for structural adequacy, and it is the Contractor's responsibility to ensure that a certificate of structural adequacy is available prior to the start of any work.

drawn	date	issue	amendment
EC	22/09/20	A	ISSUE FOR DA

project
PROPOSED CONSTRUCTION OF A GRANNY FLAT AT 36 WEEROONA AVENUE ELANORA HEIGHTS 2101 NSW LOT 18 DP 13152

bdaa ACCREDITED BUILDING DESIGNER

6/7 Parkes Street, Parramatta NSW 2150
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admin@rkdesigns.com.au
02 9633 4797
abn. 393 300 330 53
spaces designed for life

client
NIK AND MARIA FRANK
Bungalow Homes

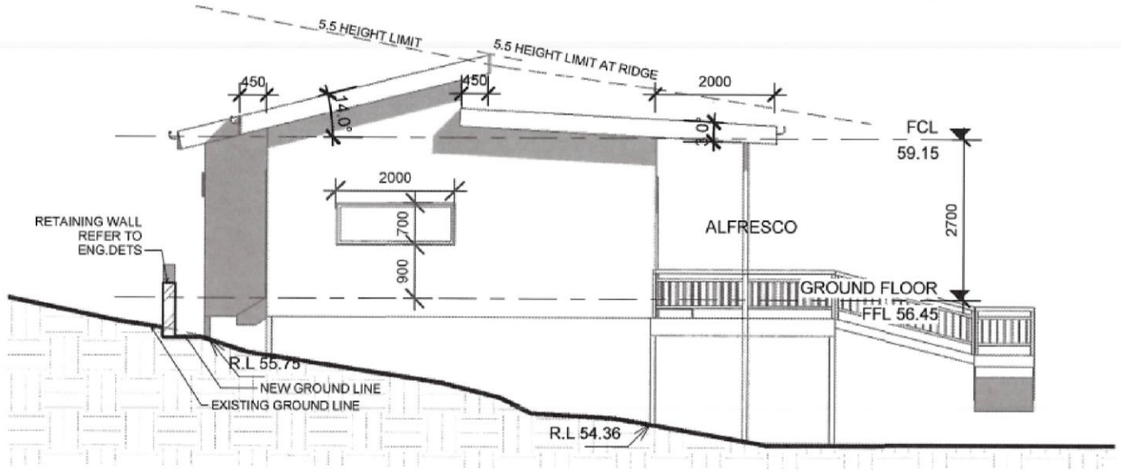
true north

drawing
SITE AND ROOF PLAN

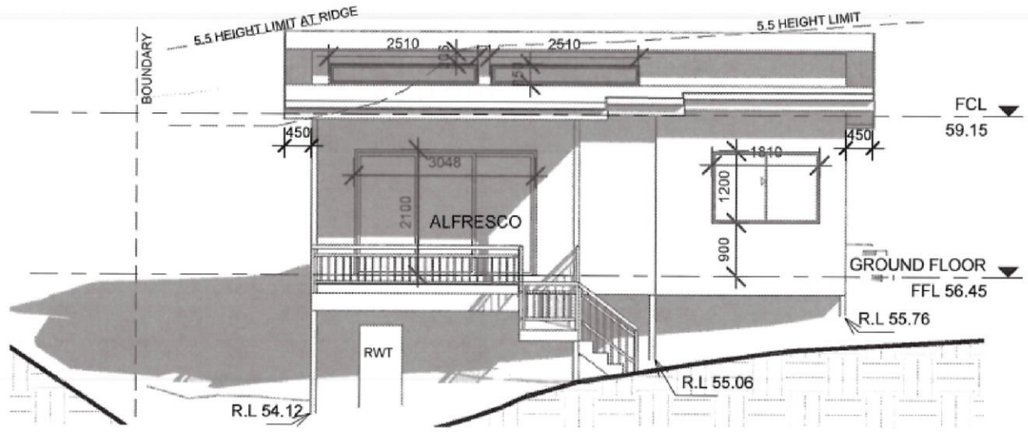
project no	date	sheet no.	scale @ A3	issue	drawn
20-71	22/09/20	1	1 : 200	A	RK

RK DESIGNS

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



1 EAST ELEVATION
1 : 100



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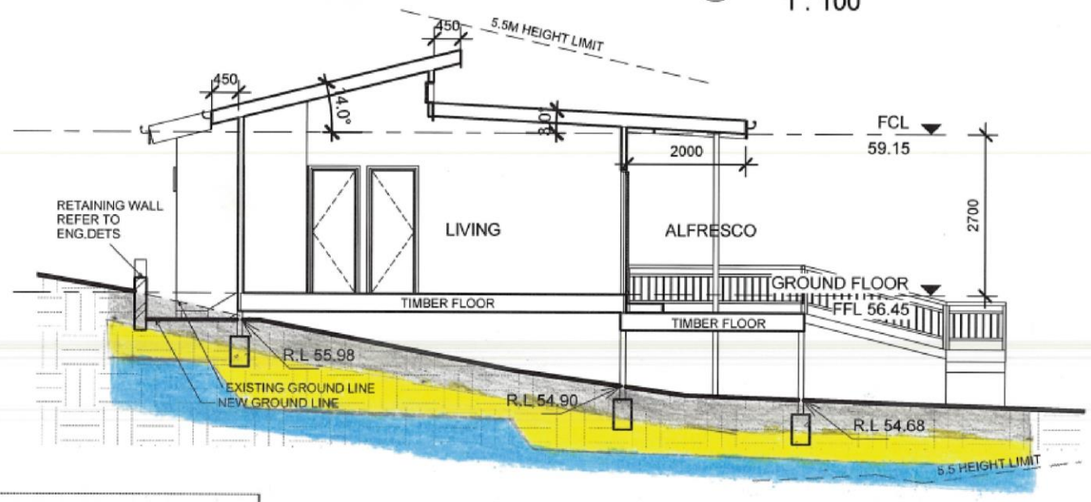
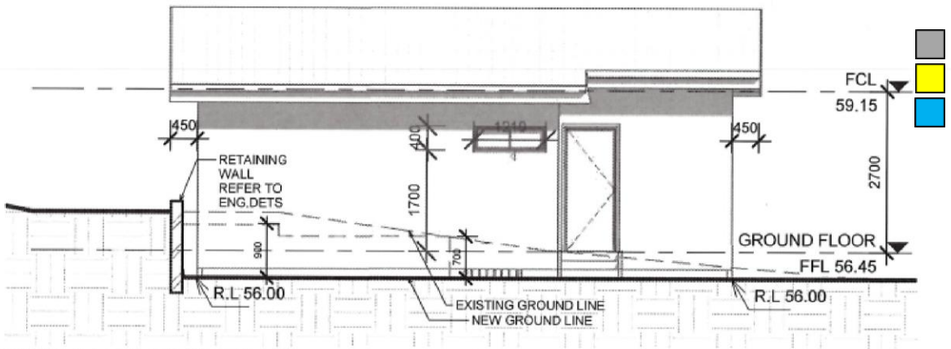
1 : 100

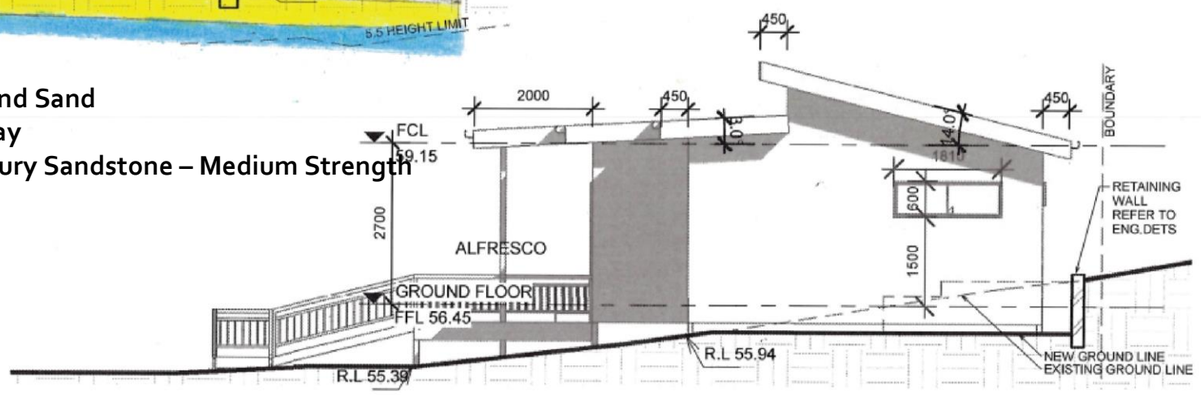


3 SECTION A - A
1 : 100

Topsoil and Sand
Sandy Clay
Hawkesbury Sandstone – Medium Strength



4 SOUTH ELEVATION
1 : 100



5 WEST ELEVATION
1 : 100

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GENERAL NOTES
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. All structural components shall be in strict accordance to details and specifications as prepared by a structural engineer.
. All existing structures need to be examined for structural adequacy, and it is the Contractor's responsibility to ensure that a certificate of structural adequacy is available prior to the start of any work.

drawn	date	issue	amendment
EC	22/09/20	A	ISSUE FOR DA

project
PROPOSED CONSTRUCTION OF A GRANNY FLAT AT 36 WEEROONA AVENUE ELANORA HEIGHTS 2101 NSW
LOT 18 DP 13152

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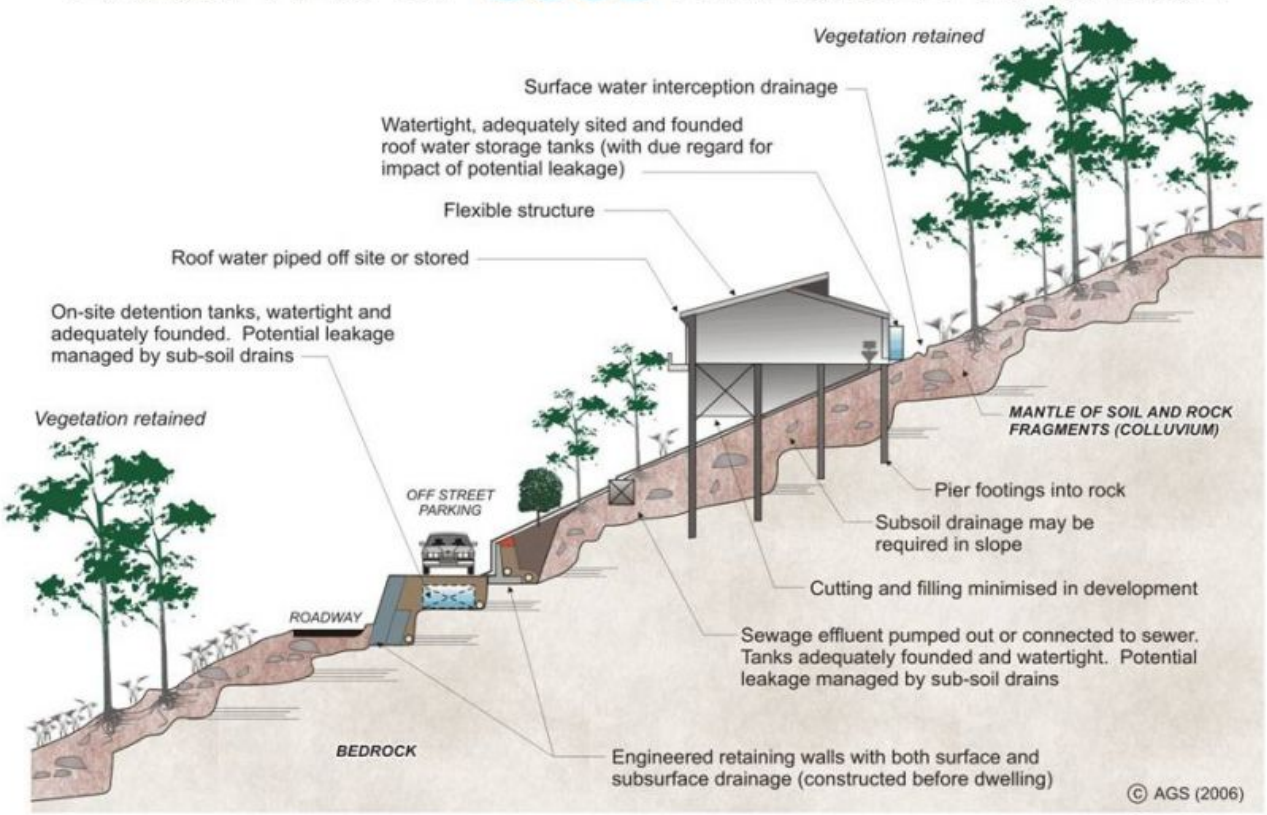
true north

drawing
ELEVATIONS AND SECTION

project no	date	sheet no.	scale @ A3	issue	drawn
20-71	22/09/20	3	1 : 100	A	RK

RK DESIGNS

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE