

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

Development Application for _____
Name of Applicant

Address of site 102 Wakehurst Parkway, 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 13/9/18 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 102 Wakehurst Parkway, Elanora Heights

Report Date: 13/9/18

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	<u>102 Wakehurst Parkway, Elanora Heights</u>

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 <u>102 Wakehurst Parkway, Elanora Heights</u>
Report Date: <u>13/9/18</u>
Author: <u>BEN WHITE</u>
Author's Company/Organisation: <u>WHITE GEOTECHNICAL GROUP PTY LTD</u>

Please mark appropriate box

- ☒ Comprehensive site mapping conducted 6/9/18
(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 7/9/18
- ☒ 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:

Subdivision and Alterations and Additions at **102 Wakehurst Parkway, Elanora Heights.**

1. Proposed Development

- 1.1** Subdivide the property into two new lots with an indicative house footprint on the proposed vacant lot.
- 1.2** New garage and alterations and additions to the existing house on the proposed property to the S.
- 1.3** Details of the proposed development are shown on 7 drawings prepared by High Design, drawings numbered 1-7 773 18 HD to 7-7 773 18 HD, drawings dated August 2018.

2. Site Description

- 2.1** The site was inspected on the 6th September, 2018.
- 2.2** This residential property is on the high side of the road and has a S aspect. The property encompasses the base and a portion of an E-W trending ridge of an escarpment. From the road frontage the slope rises at average angles of $\sim 7^\circ$ to the uphill side of the lawn area and increases to $\sim 31^\circ$ towards the uphill boundary before a rock face that caps the escarpment rises at near vertical angles. The slope above and below the property continues at decreasing angles.
- 2.3** At the road frontage, a concrete driveway runs to a paved parking area and garage on the S side of the house (Photo 1). Gardens and a lawn area encompass the house frontage (Photo 2). The two storey brick and timber framed and clad house is supported on a concrete slab, brick walls and timber beams (Photo 3). A portion of the W side of the house will be demolished as part of the proposed works. A gently sloping lawn area rises from the uphill side of the house halfway up the property (Photo 4).

Sandstone floaters are scattered on the uphill side of the lawn area (Photo 5). A Storage shed and garden shed lie on the E side of the lawn area (Photo 6). From the uphill extent of the lawn area the property is densely vegetated and a ~6.0m sandstone cliff face marks the top of the escarpment (Photo7). The cliff face is made up of widely jointed massive medium strength sandstone. Some minor undercutting was observed along a bedding plane halfway up one of the large joint blocks but no significant geological defects that could impact the stability of the rock face were observed above the property. The rock face is considered stable in this location (Photo 8). The property continues for another ~40m to the uphill boundary and could not be accessed due to the rock face. No significant signs of movement that could have occurred in recent geological history were observed on the property. No geotechnical hazards that could impact on the subject property were observed on the neighbouring properties as seen from the subject property and the road.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the contact of the Hawkesbury Sandstone and the Newport Formation of the Narrabeen Group underlies the property. The contact is envisaged to be the base of the cliff face with the Narrabeen group rocks located on the slope below. The majority of the proposed works will lie within Narrabeen group rocks. Due to the locality of the transition zone of the two rock types it is expected that bands of sandstone will be encountered within the Narrabeen group formation.

4. Subsurface Investigation

One auger hole was put down to identify the soil materials. Nine Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. 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. The results are as follows:

AUGER HOLE 1 (~RL12.5) – AH1 (Photo 9)

Depth (m)	Material Encountered
0.0 to 0.6	TOPSOIL , dark brown/black, fine to medium grained, organic matter throughout, loose, dry.
0.6 to 0.7	SANDY SOIL , brown and orange, sand/weathered sandstone, sandstone rock fragments, fine to medium grained, loose.

Refusal @ 0.7m in sandy soil, Auger grinding on rock. 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 (~RL7.2)	DCP 2 (~RL7.20)	DCP 3 (~RL7.5)	DCP 4 (~RL9.7)
0.0 to 0.3	1F	3	2F	1F
0.3 to 0.6	4	6	3	6
0.6 to 0.9	4	7	5	5
0.9 to 1.2	4	20	7	5
1.2 to 1.5	4	14	7	7
1.5 to 1.8	17	5	11	12
1.8 to 2.1	37	21	35	5
2.1 to 2.4	29	24	#	24
2.4 to 2.7	#	#		29
2.7 to 3.0				#
	Refusal on Rock @ 2.3m	Refusal on Rock @ 2.3m	Refusal on Rock @ 2.1m	Refusal on Rock @ 2.6m

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

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 5 (~RL10.9)	DCP 6 (~RL12.1)	DCP 7 (~RL15.0)	DCP 8 (~RL15.0)	DCP 9 (~RL17.0)
0.0 to 0.3	5	3	Rock Exposed at Surface	7	3
0.3 to 0.6	#	7		20	17
0.6 to 0.9		9		42	#
0.9 to 1.2		16		#	
1.2 to 1.5		#			
1.5 to 1.8					
	Refusal on Rock @ 0.2m	Refusal on Rock @ 1.3m	Rock Exposed at Surface	Refusal on Rock @ 0.9m	Refusal on Rock @ 0.5m

DCP Notes:

DCP1 – Refusal @ 2.3m, DCP thudding, clean dry tip.

DCP2 – Refusal @ 2.3m, DCP thudding, clean dry tip.

DCP3 – Refusal @ 2.1m, DCP thudding, clean dry tip.

DCP4 – Refusal @ 2.6m, DCP thudding, orange impact dust and rock fragments on dry tip.

DCP5 – Refusal @ 0.2m, DCP thudding, white rock fragments on dry tip.

DCP6 – Refusal @ 1.3m, DCP bouncing, white impact dust on dry tip.

DCP7 – Rock exposed at surface.

DCP8 – Refusal @ 0.9m, DCP still very slowly going down, clean dry tip.

DCP9 – Refusal @ 0.5m, DCP bouncing, white impact dust on dry tip.

5. Geological Observations/Interpretation

The contact between the Newport Formation and the Hawkesbury Sandstone is interpreted to be at the base of the Hawkesbury Sandstone cliff face. Below the contact, in the location of the proposed works, the slope materials are colluvial at the near surface and residual at depth. They consist of a thick sand over silty clays. In the test locations, the clays merge into the weathered zone of the underlying shale at depths of between ~1.8 to ~2.4m below the current surface. The weathered zone is interpreted to be Extremely Low to Very Low Strength Shale. It is to be noted that this material can appear as a mottled stiff clay when it is cut up by excavation equipment. See Type Section attached for a diagrammatical representation of the

expected ground materials. The outcropping sandstone on the uphill side of the property is estimated to be medium strength or better and similar strength rock is expected to underlie the entire surface on the uphill side of the property. 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 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 metres below the base of the proposed excavations.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. Due to the steep slope on the property sheet wash from the slope above is expected to move at relatively high velocities.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed below or beside the property. The large sandstone rock face that rises at the northern end of the block is a potential hazard (**Hazard One**).

SEE OVER THE PAGE FOR CONTINUED RISK ANALYSIS

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The large rock face failing and impacting on the subject house and property (Photo 7 & 8).
LIKELIHOOD	'Rare' (10^{-6})
CONSEQUENCES TO PROPERTY	'Major' (60%)
RISK TO PROPERTY	'Low' (2×10^{-6})
RISK TO LIFE	6.7×10^{-7} /annum
COMMENTS	This level of risk is 'ACCEPTABLE' subject to the recommended inspections being carried out in Section 12 .

(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.

There is fall to the street. 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.

Apart from those for footings, no excavations are required for the proposed additions. The plans for the new dwelling and its driveway are indicative only and will be considered when the DA plans for the development of the upper block are finalised.

12. Maintenance

To be prudent and due to the scale of the cliff face and its position immediately above the developed portion of the block, to ensure ongoing stability into the future we recommend it

be inspected and the stability reassessed by a geotechnical consultant at 10 year intervals. The risk assessment in **Section 8** is subject to these inspections being carried out.

13. Foundations

The proposed house additions can be supported on strip footings or pads taken to medium dense sand to a minimum depth of 0.4m from the existing surface. This ground material is expected at an average depth of ~0.3m below the current surface. A maximum allowable bearing pressure of 150kPa can be assumed for footings on medium dense sand. The footing walls in sand will need to be supported with braced timber or similar to prevent loose sand constantly falling onto the footing surface.

The base of the footing excavations in sand should be compacted as the excavation will loosen the upper sands. This can be carried out with a hand-held plate compactor. Water may be used to assist in compaction in sand but footing materials should be kept damp but not saturated. As a guide to the level of compaction required a density index of >65% is to be achieved.

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.

SEE OVER THE PAGE FOR REQUIRED INSPECTIONS

13. 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.

- All footings are to be inspected, tested for density 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

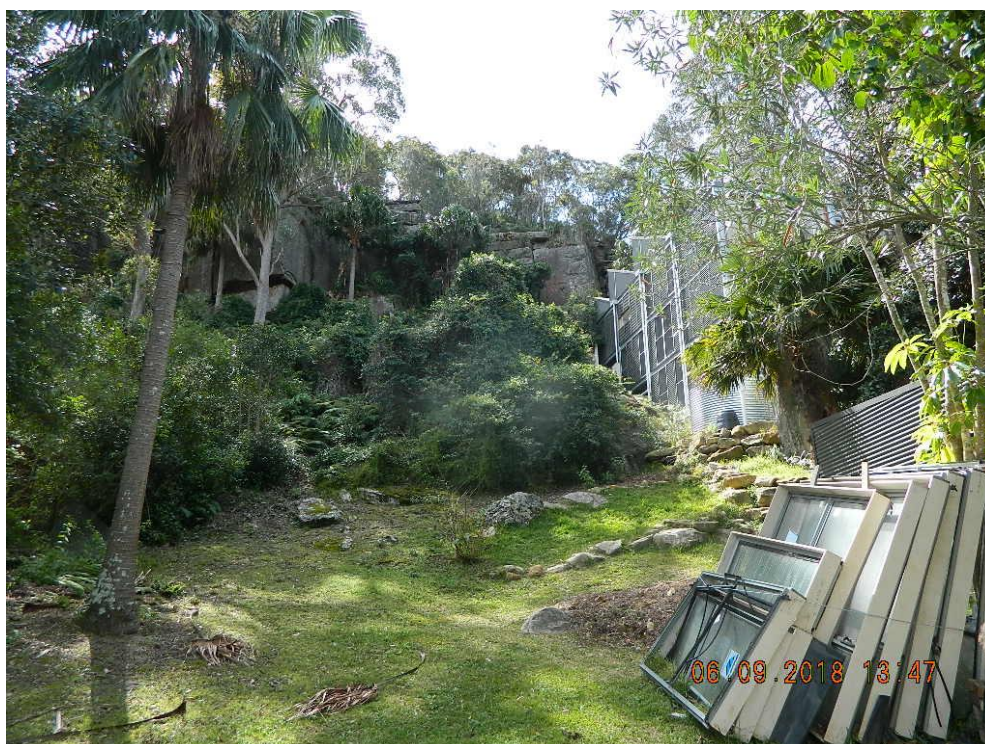


Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9: AH1 – Downhole is from top to bottom

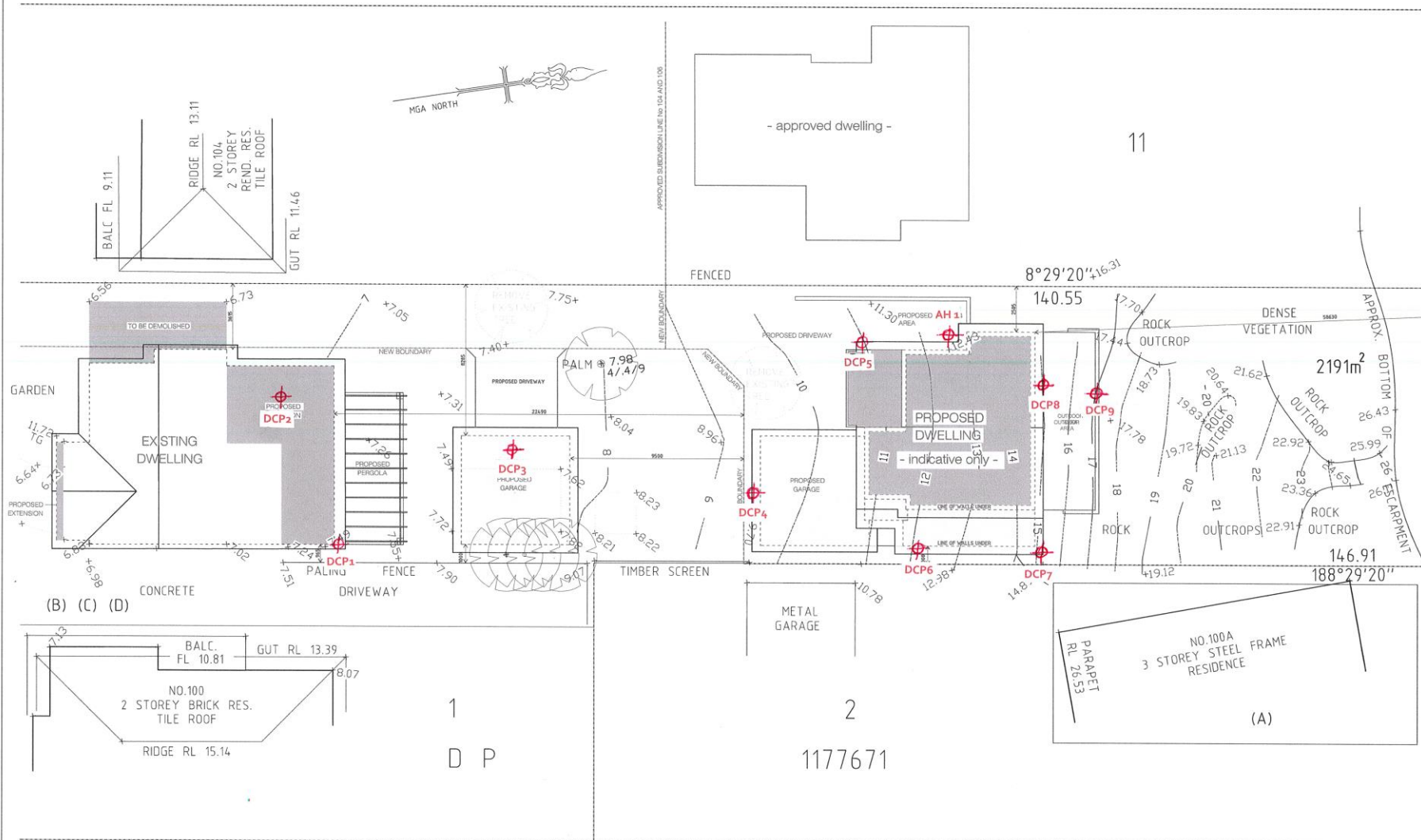
Important Information about Your Report

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



LOT 2 - SITE ANALYSIS PLAN
SCALE 1:100

1. BUILDERS TO CHECK AND CONFIRM ALL NECESSARY OPENINGS ON SITE PRIOR TO CONSTRUCTION. DO NOT SCALE THE DRAWING.
2. ALL OPENINGS MUST RELATE TO SITE DIMENSIONS, UTILITY AND EASEMENTS ARE SUBJECT TO VERIFICATION BY A SITE SURVEY.
3. ALL WORK TO BE IN ACCORDANCE WITH BUILDING CODE OF AUSTRALIA, TO THE SATISFACTION OF LOCAL COUNCIL REQUIREMENTS.
4. ALL WORK TO BE COMPLETED WITHIN THE APPROVED TIME FRAME.
5. ROOF WATER & SUB SOIL DRAINAGE TO BE DISPOSED OF IN THE APPROVED MANNER OR AS DIRECTED BY LOCAL COUNCIL.
6. ALL ELECTRICAL POWER & LIGHT FIXTURES TO BE DETERMINED BY OWNER.
7. MAKE GOOD AND REPAIR ALL EXISTING STRUCTURES DAMAGED BY NEW WORK. REUSE EXISTING MATERIALS WHERE POSSIBLE.
8. ALL NEW DRAINAGE PIPES ARE TO BE CONNECTED TO THE EXISTING STORM WATER SYSTEM.
9. COPYRIGHT OF ALL PLANS BELONGS TO "HIGH DESIGN" - Architectural Design.

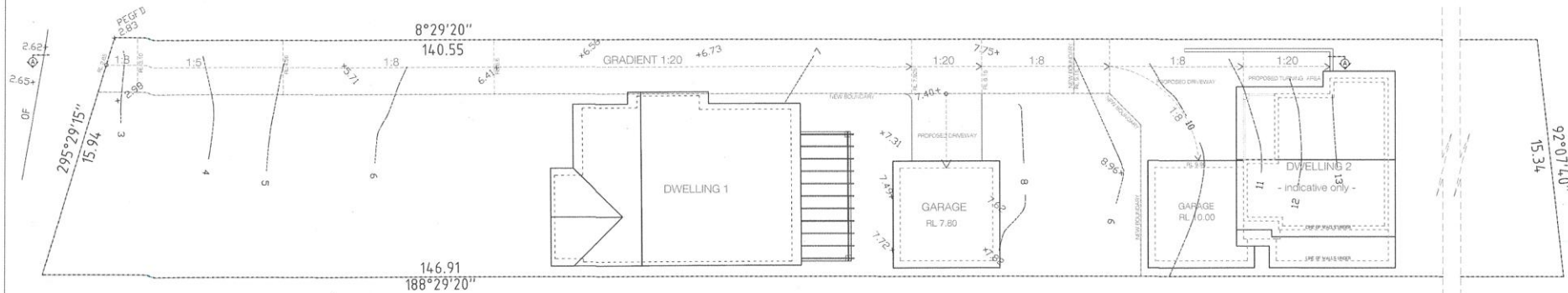
PROJECT ADDRESS:
10 WANDERBURY PARKWAY
ELANDRA HEIGHTS
CLIENT:
3-7 773 18 HD

ARCHITECT: 2018
DESIGN BY:
BLV
DRAWN BY:
3-7 773 18 HD

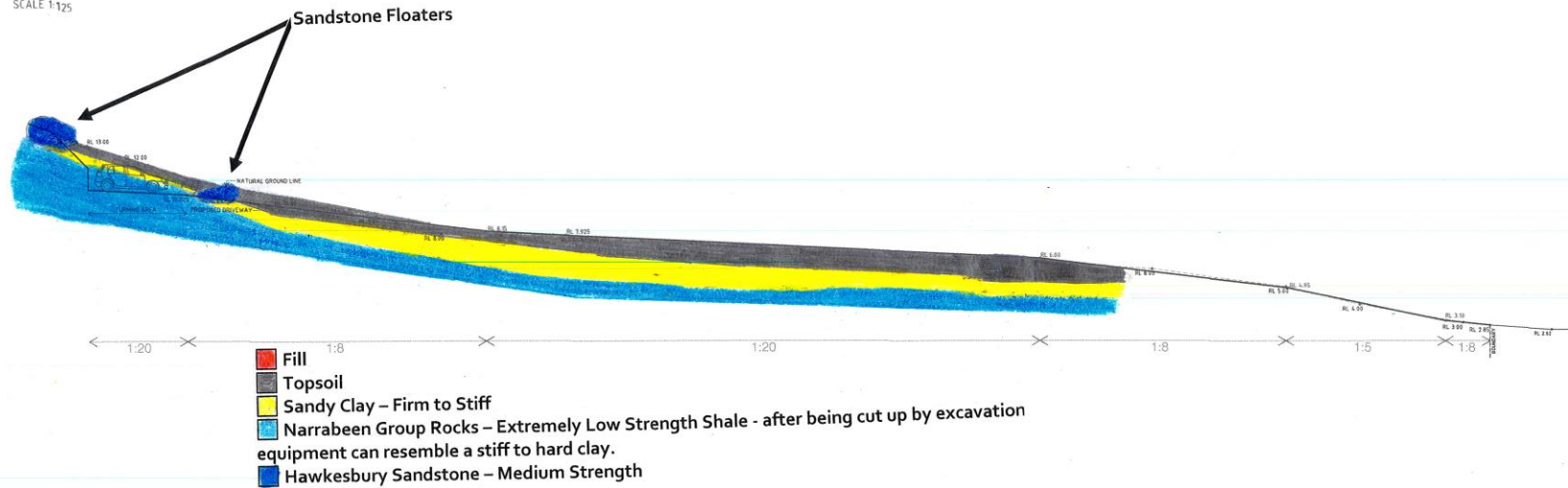


"HIGH DESIGN" - ABN 51 479 054 183
architectural design and drafting service
mobile : 041 3389 036 fax : 9981 65 56
E-mail: info@highdesign.com.au
Web: highdesign.com.au

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



DRIVEWAY LAYOUT PLAN
SCALE 1:125



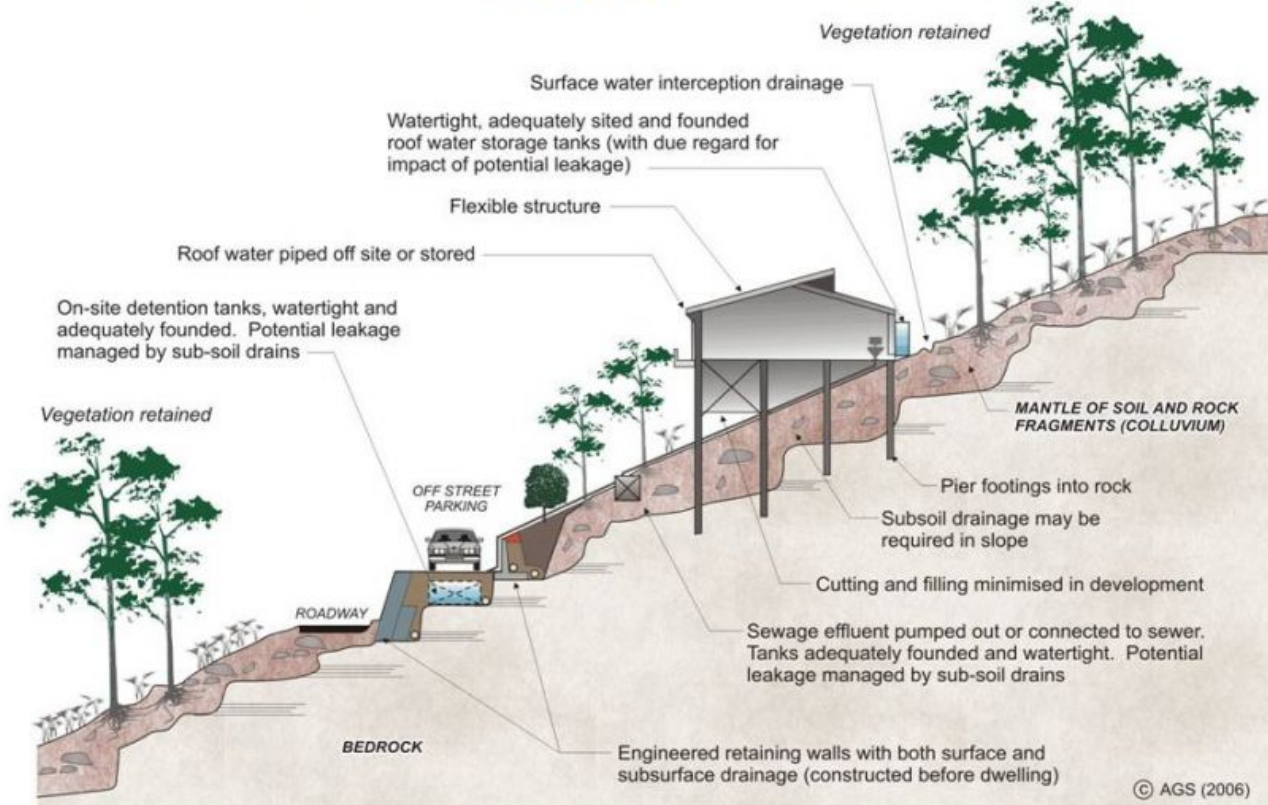
LONGITUDINAL SECTION A-A
SCALE 1:125

1. BUILDER TO CHECK AND CONFIRM ALL SITE LAYOUT DIMENSIONS ON SITE PRIOR TO CONSTRUCTION. DO NOT SCALE THE DRAWING.
2. ALL DIMENSIONS THAT RELATE TO SITE BOUNDARIES, UTILITIES AND LOADINGS ARE SUBJECT TO VERIFICATION BY A SITE SURVEY.
3. ALL WORK TO BE IN ACCORDANCE WITH BUILDING CODE OF AUSTRALIA & TO THE SATISFACTION OF LOCAL COUNCIL REQUIREMENTS.
4. ALL FINISH CONSTRUCTION TO BE IN ACCORDANCE TO FINISH FINISHING CODE.
5. ROOF WATER & SUB SOIL DRAINAGE TO BE DISPOSED UP IN THE APPROVED MANNER OR AS DIRECTED BY LOCAL COUNCIL.
6. ALL ELECTRICAL, WATER & LIGHT OUTLETS TO BE ACCORDING TO OWNERS.
7. HAVE GOOD AND PROPER ALL EXISTING TREES REMOVED BY AN APPROPRIATE TREE REMOVAL COMPANY WHERE POSSIBLE.
8. ALL NEW WORKING AND TO BE SUBMITTED TO THE LOCAL COUNCIL FOR WATER SYSTEM.
9. COPYRIGHT OF ALL PLANS BELONGS TO HIGH DESIGN - Architectural Design

PROJECT ADDRESS: 102 WAKEMAN PARKWAY
SLANDRA HEIGHTS
CLIENT: SLANDRA HEIGHTS
DRAWING No. 6-7 773 18 HD

AUGUST, 2018
DESIGNED BY: B. V.
DRAWN BY: B. V.
"HIGH DESIGN" - ABN 61 476 054 183
architectural design and drafting service
mobile: 041 3989 036
E-mail: info@highdesign.com.au
Web: highdesign.com.au

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE

