

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

Development Application for \_\_\_\_\_  
Name of Applicant

Address of site 20 Baz Retreat, Warriewood

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 2/11/20 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 20 Baz Retreat, Warriewood  
Report Date: 29/10/20  
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**

<b>Development Application for</b> _____	Name of Applicant
<b>Address of site</b> <u>20 Baz Retreat, Warriewood</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>20 Baz Retreat, Warriewood</u>
Report Date: <u>29/10/20</u>
Author: <u>BEN WHITE</u>
<b>Author's Company/Organisation:</b> <u>WHITE GEOTECHNICAL GROUP PTY LTD</u>

**Please mark appropriate box**

- Comprehensive site mapping conducted 28/10/20  
(date)
- Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- Subsurface investigation required
  - No Justification \_\_\_\_\_
  - Yes Date conducted 28/10/20
- 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 Pool at 20 Baz Retreat, Warriewood**

### **1. Proposed Development**

- 1.1** Install a new pool in the E corner of the property by excavating to a maximum depth of ~2.3m.
- 1.2** Details of the proposed development are shown on 4 drawings prepared by Right Angle Design and Drafting, Job number RADD20019, drawings numbered P1 to P4, dated May 2020.

### **2. Site Description**

- 2.1** The site was inspected on the 28<sup>th</sup> October, 2020.
- 2.2** This residential property was a vacant lot at the time of the inspection. It is on the high side of the road and has a SW aspect. It is located on the gently graded lower reaches of a hillslope. The natural slope rises across the property at an average angle of ~5°. The slopes above and below the property continue at similar angles.
- 2.3** A gently sloping lawn rises across the entire property (Photos 1 & 2). A fill on the neighbouring property above is supported by a stable concrete block retaining wall reaching ~1.0m high (Photo 3).

### **3. Geology**

The Sydney 1:100 000 Geological sheet indicates the site is underlain by the Narrabeen Group of Rocks with the contact point of Alluvial Stream and Estuarine Sediment (Qha) in close proximity downslope of the property. However, manmade fill was encountered to the extent of the ground tests.

## 4. Subsurface Investigation

One Auger Hole (AH) was put down to identify the soil materials. Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative densities of the materials through the profile. 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 expected to have occurred in DCP2. 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:

### AUGER HOLE 1 (~RL11.3) – AH1 (Photo 4)

Depth (m)	Material Encountered
0.0 to 0.3	<b>FILL</b> , disturbed silty soil, brown, dense to very dense, dry, fine to medium grained with fine trace organic matter, rock fragments, and trace clay.

End of test @ 0.3m in very dense fill. No watertable encountered.

**DCP RESULTS ON NEXT PAGE**

<b>DCP TEST RESULTS – Dynamic Cone Penetrometer</b>				
Equipment: 9kg hammer, 510mm drop, conical tip.			Standard: AS1289.6.3.2 - 1997	
<b>Depth(m) Blows/0.3m</b>	<b>DCP 1 (~RL11.4)</b>	<b>DCP 2 (~RL11.3)</b>	<b>DCP 3 (~RL10.2)</b>	<b>DCP 4 (~RL10.0)</b>
0.0 to 0.3	17	30	40	20
0.3 to 0.6	53	29	37	60
0.6 to 0.9	28	#	45	#
0.9 to 1.2	36		#	
1.2 to 1.5	29			
1.5 to 1.8	31			
1.8 to 2.1	30			
2.1 to 2.4	41			
2.4 to 2.7	#			
	End of Test @ 2.4m	Refusal @ 0.5m	End of Test @ 0.9m	End of Test @ 0.5m

#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 @ 2.4m, DCP still very slowly going down, brown clay on dry tip, brown clay in collar above tip.

DCP2 – Refusal @ 0.5m, DCP bouncing, white impact dust on dry tip.

DCP3 – End of test @ 0.9m, DCP still very slowly going down, clean dry tip.

DCP4 – End of test @ 0.5m, DCP still very slowly going down, clean dry tip.

## **5. Geological Observations/Interpretation**

The entire property is underlain by very well-compacted engineered fill that was encountered to the extent of the testing. To summarise the test results, Dense to Very Dense Fill occupied the top ~0.9m of the profile before regressing to Dense Fill to the extent of the tests. Rock was not encountered to the extent of the tests at 2.4m. See the 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. 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 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 above, below, or beside the property. The proposed excavation collapsing onto the work site before permanent support is in place is a potential hazard (**Hazard One**). The proposed excavation undercutting the footings of the retaining wall above is a potential hazard (**Hazard Two**).

### Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The unsupported cut batter of the excavation collapsing onto the work site before permanent support is in place.	The proposed excavation undercutting the footings of the retaining wall above and causing movement (Photo 3).
LIKELIHOOD	'Possible' ( $10^{-3}$ )	'Possible' ( $10^{-3}$ )
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)
RISK TO PROPERTY	'Moderate' ( $2 \times 10^{-4}$ )	'Moderate' ( $2 \times 10^{-4}$ )
RISK TO LIFE	$1.4 \times 10^{-5}$ /annum	$8.3 \times 10^{-5}$ /annum
COMMENTS	This level of risk to life and property is <b>'UNACCEPTABLE'</b> . To move the risk levels to acceptable levels, the recommendations in <b>Section 13</b> are to be followed.	This level of risk to life and property is <b>'UNACCEPTABLE'</b> . To move the risk levels to acceptable levels, the recommendations in <b>Section 13</b> 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**

No significant additional stormwater runoff will be created by the proposed development.

## **11. Excavations**

An excavation to a maximum depth of ~2.3m is required to install the proposed pool. It is expected the excavation will be taken entirely through dense to very dense manmade fill. Excavations through fill can be carried out with an excavator and bucket.

## **12. Vibrations**

No excessive vibrations will be generated by excavation through fill. Any vibrations generated by a domestic machine and bucket up to 16 ton will be below the threshold limit for infrastructure or building damage.

## **13. Excavation Support Requirements**

The proposed excavation will be ~2.3m deep and will be taken entirely through fill. It will be set back ~1.1m from the SE common boundary and a maximum of ~1.3m from the retaining wall that lines the upper common boundary. Thus, the retaining wall above and the SE common boundary will be within the zone of influence of the proposed excavation.

Where the retaining wall above falls within the zone of influence of the excavation, exploration pits in this location will need to be put down by the builder to determine the foundation depth and material. The pits are to be inspected by the geotechnical consultant.

If the wall is found to be supported below the base of the proposed excavation, the excavation may commence. If it is not supported below the base of the proposed excavation, the wall will need to be underpinned prior to the excavation commencing.

Underpinning is to follow the underpinning sequence 'hit one miss two'. Under no circumstances is the bulk excavation to be taken to the edge of the wall and then underpinned. Underpins are to be constructed from drives that should be proportioned according to footing type and size. Allowances are to be made for drainage through the underpinning to prevent a build-up of hydrostatic pressure.

To ensure the integrity of the SE neighbouring property, we recommend the SE side of the excavation be temporarily supported with typical pool shoring such as sacrificial form ply, until the pool structure is in place.

The remaining cut batters for the pool may stand at near-vertical angles for a very short period of time until the pool structure is installed provided the cut batters are kept from becoming saturated. If the cut batters remain unsupported for more than a day before the shell is constructed, they are to be supported with typical pool shoring as above, until the pool structure is in place.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. Unsupported cut batters 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. The materials and labour to construct the 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. Retaining Structure

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 <sup>3</sup> )	'Active' K <sub>a</sub>	'At Rest' K <sub>0</sub>
Compacted Engineered Fill	20	0.35	0.45

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

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

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

## 15. Foundations

The proposed pool is expected to be seated in the dense engineered fill. This is a suitable foundation material. A maximum allowable bearing pressure of 200kPa can be assumed for footings on dense engineered fill.

As the bearing capacity of engineered fill 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 fill 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.

## 16. 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 regulating authorities or the owner if the following inspections have not been carried out during the construction process.

- The geotechnical consultant is to inspect any test pits dug by the builder to verify foundation depth and material of the existing footings for the retaining wall.
- 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: AH1 – Downhole is from left to right

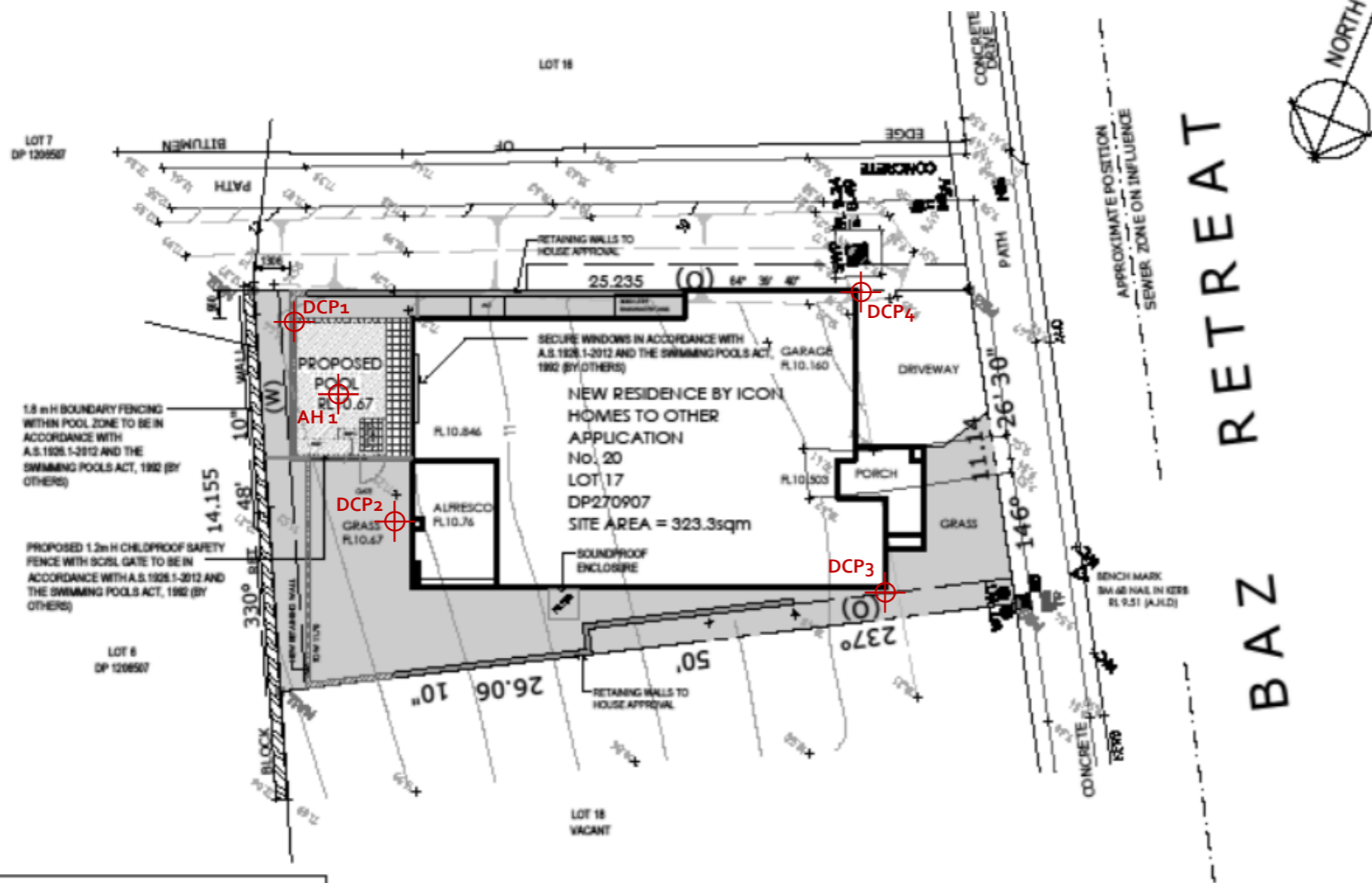
## Important Information about Your Report

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



LANDSCAPE NOTES:

Check boundaries, levels, dimensions and locate services on site prior to starting work.  
 Clear site of any builders rubbish and set up erosion and sediment control as per councils requirements.  
 Protect any trees to be retained to council requirements.  
 Grade site to achieve proposed final grades. Cultivate sub grade to a depth of 300mm.  
 Stockpile soil if suitable for reuse or provide landscape soil that meets Australian Standards to replace site top soil.  
 Install plant material as per plan. Keep planting areas moist, stake plants as required and 'water in'. Fertilise exotic plants with Osmocote 'Plus' 8-9 month slow release fertiliser and native plants with Osmocote zero Phosphorus 5-6 month slow release. Apply as per manufacturer's instructions.  
 Gardens are to be mulched to a 75mm depth using Native Le Litter Mulch or wood chip that meets Australian Standards.  
 Keep mulch clear of all plant stems.  
 Level turf areas and spread lawn food as per manufacturers instructions. Lay turf, water well and roll with turf roller. Keep moist at all times.  
 Fill gaps and depressions with sand and allow 4 weeks before cutting.  
 Paving to be laid on compacted surface of 50mm sand bed on 100mm compacted fine crushed rock. Ensure ground below is also compacted. Check paving and setout prior to laying.  
 Retaining walls and concrete driveways / paths to engineers details.

LANDSCAPE CALCULATION

SITE AREA = 323.3 sq m

HARD SURFACE

HOUSE	= 142.6m <sup>2</sup>
PORCH	= 13.8m <sup>2</sup>
DRIVEWAY	= 23.3m <sup>2</sup>
ALFRESCO	= 13.4m <sup>2</sup>
PROPOSED POOL	= 21.4m <sup>2</sup>
<b>TOTAL HARD SURFACE</b>	<b>= 214.5m<sup>2</sup></b>
OR 66% OF THE SITE	

VARIATIONS

6% OF SITE = 19.4m<sup>2</sup>

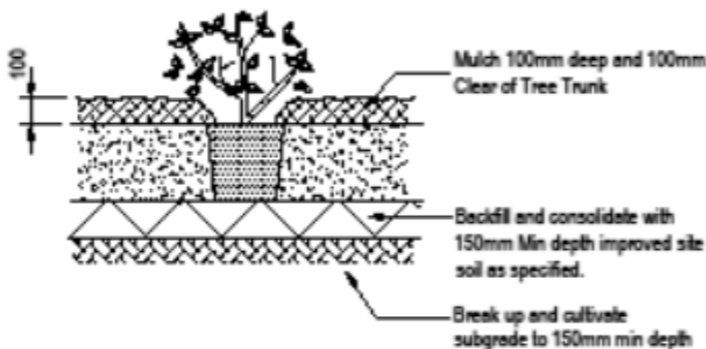
PROPOSED LANDSCAPED = 128.2m<sup>2</sup>  
 OR 40% OF THE SITE.

REQUIRED LANDSCAPED = 161.65m<sup>2</sup>/50%

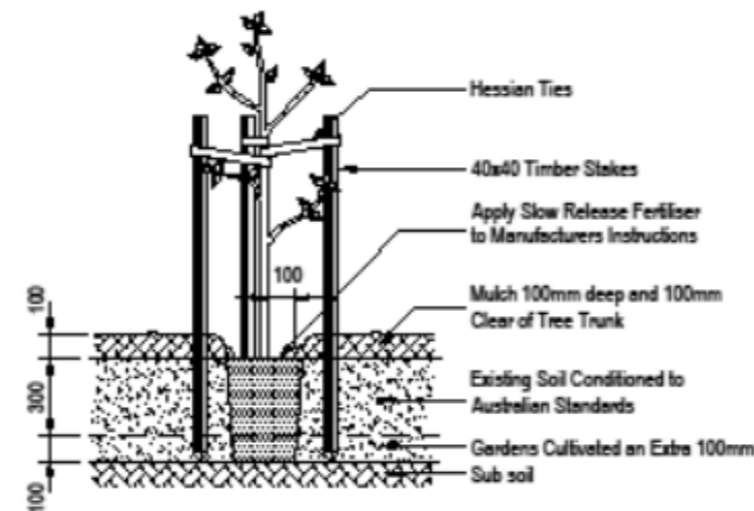
LANDSCAPE PLAN

(O): EASEMENT FOR ACCESS, CONSTRUCTION & MAINTENANCE 0.9 WIDE  
 (W): EASEMENT FOR ACCESS, MAINTENANCE & SUPPORT 0.9 WIDE (DP1206507)

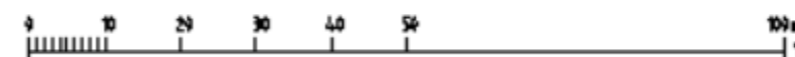
■ DENOTES AREAS INCLUDED IN LANDSCAPE CALCULATION



TYPICAL SHRUB PLANTING DETAIL



TYPICAL PLANTING DETAIL



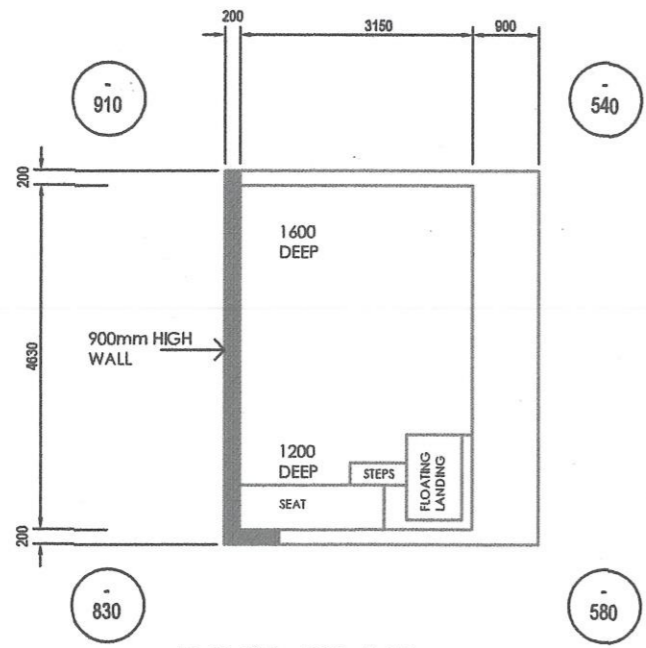
**RIGHT ANGLE DESIGN & DRAFTING PTY LTD**  
 NORTH COAST HORTICULTURE UNIT 8  
 ABNCC DIPLOMA STRUCTURAL ENGINEERING  
 NCC ARCHITECTURAL DRAFTING  
 P.O. Box 104 BARRY HILL 2393  
 PH: 029440572  
 EMAIL: info@rightanglept.com.au  
 MOB: 92138 740 98

PROPOSED POOL & ASSOCIATED WORKS  
 LAUREN WESTBROOKE  
 LOT 17 DP270907  
 No. 20 BAZ RETREAT  
 WARRIEWOOD 2102

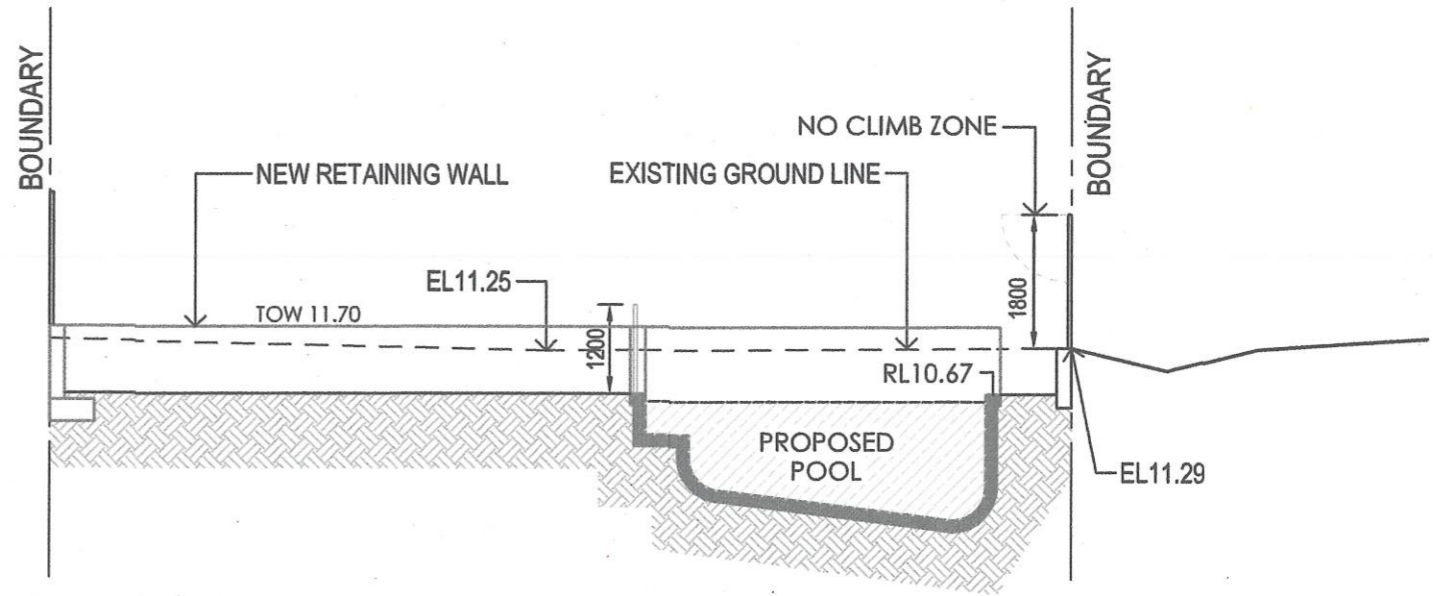
DWG NAME  
 LANDSCAPE PLAN

DATE	SCALE AT A3	JOB NUMBER	DWG NUMBER
MAY 2020	1:200	RADD20019	P4

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



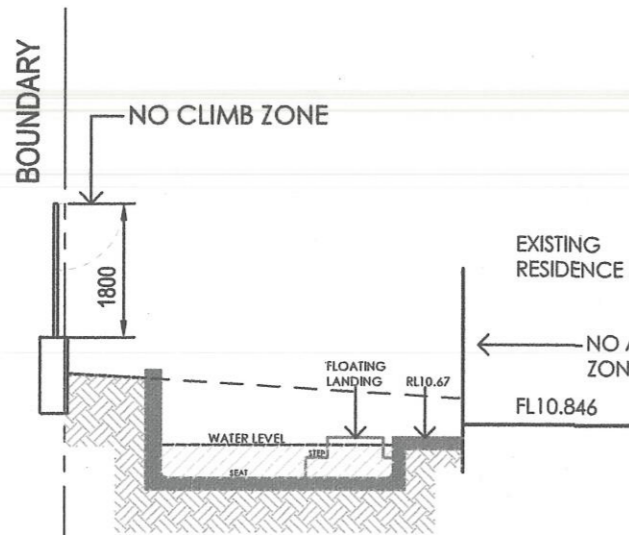
POOL PLAN



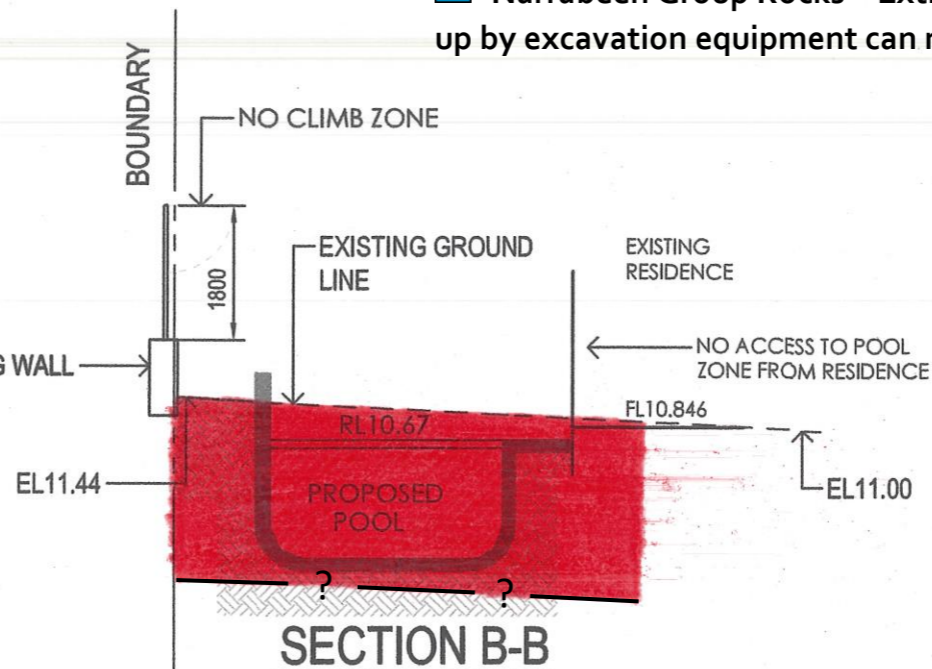
SECTION A-A

+ 100 DENOTES TOP OF POOL RELATIVE TO NATURAL GROUND LEVEL

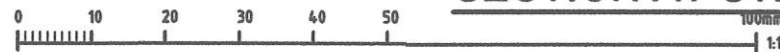
- Well-Compacted Engineered Fill
- Topsoil
- Silty Clay
- Narrabeen Group Rocks – Extremely Low Strength Shale - after being cut up by excavation equipment can resemble a stiff to hard clay.



SECTION AT STEPS



SECTION B-B



**RIGHT ANGLE DESIGN & DRAFTING PTY LTD**

ROBYN GOOD  
HORTICULTURE CERT III  
ASSOC. DIPLOMA STRUCTURAL ENGINEERING  
NZCD ARCHITECTURAL DRAFTING

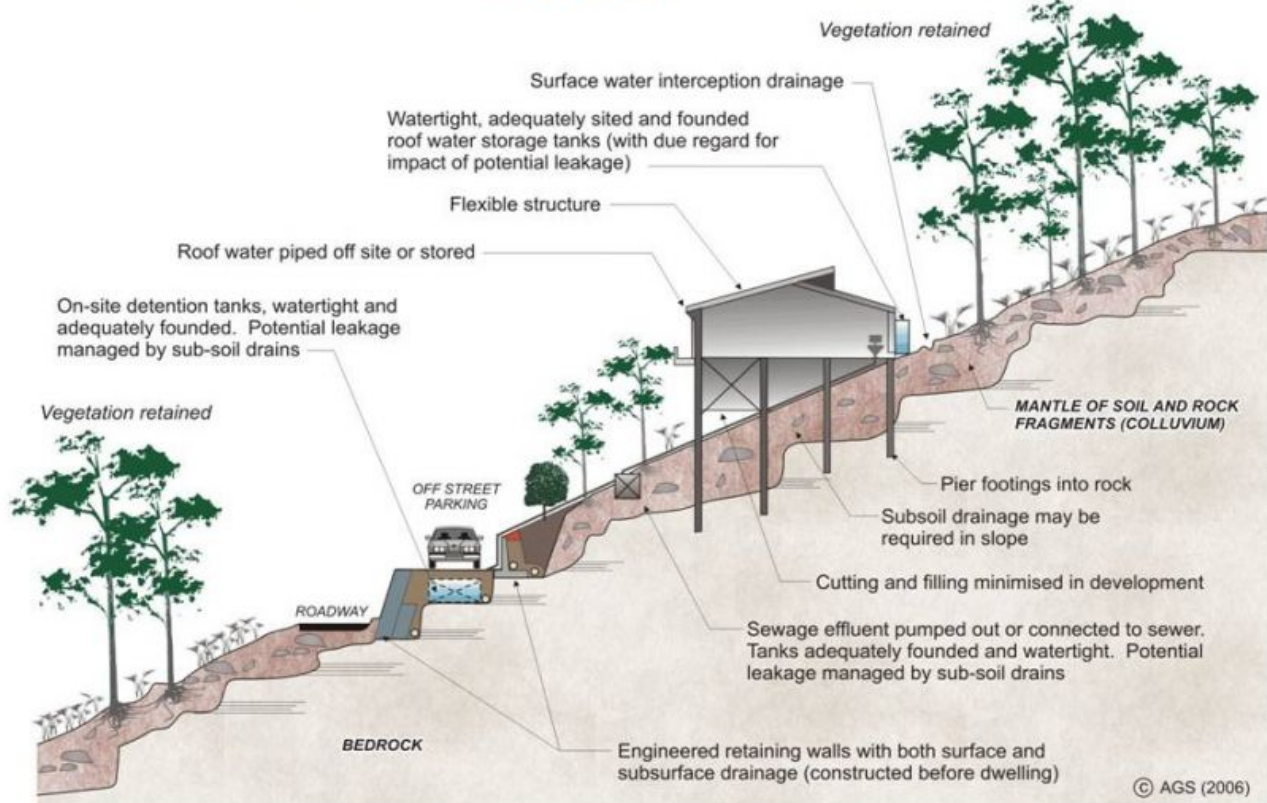
P.O. Box 1049 SURRY HILLS 2010  
PH: 6390-0072  
EMAIL: info@rightangledesign.com.au  
ABN: 70 150 745 556

REVISIONS:

PROPOSED POOL & ASSOCIATED WORKS  
LAUREN WESTBROOKE  
LOT 17 DP270907  
No. 20 BAZ RETREAT  
WARRIEWOOD 2102

DWG NAME			
POOL PLAN AND SECTIONS			
DATE	SCALE AT A3	JOB NUMBER	DWG NUMBER
MAY 2020	1:100	RADD20019	P3

# EXAMPLES OF **GOOD** HILLSIDE PRACTICE



# EXAMPLES OF **POOR** HILLSIDE PRACTICE

