

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

Development Application for _____
Name of Applicant

Address of site 87 Wimbledon Avenue, North Narrabeen

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 9/12/21 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 87 Wimbledon Avenue, North Narrabeen
Report Date: 10/12/21


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	<u>87 Wimbledon Avenue, North Narrabeen</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>87 Wimbledon Avenue, North Narrabeen</u>
Report Date: <u>10/12/21</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 7/12/21
(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 7/12/21
- ☒ 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 at **87 Wimbledon Avenue, North Narrabeen**

1. Proposed Development

- 1.1** Demolish the existing shed and install a new pool on the W side of the house by excavating to a maximum depth of ~2.1m.
- 1.2** Details of the proposed development are shown on 7 drawings provided by Site Design Studios, drawing number 1392, pages numbered L-01 to L-07, dated 19/11/21.

2. Site Description

- 2.1** The site was inspected on the 7th December, 2021.
- 2.2** This residential property is level with the road. The block is located on the near level terrain that fronts the N shore of Narrabeen Lagoon.
- 2.3** At the road frontage, an unpaved and concrete driveway runs to a garage beside the house (Photo 1). Between the road frontage and the house is a near level lawn area. The two storey brick house is supported by brick walls and brick piers (Photos 1 & 2). The supporting walls and piers stand vertical and show no significant signs of movement (Photo 3). A fibre cement shed and near level lawn is located on the W side of the house (Photos 2 & 4). Fill provides a level platform for the lawn. The fill is supported by a stable sandstone block seawall up to ~1.3m high. 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 Manmade Fill (mf) and Alluvial Stream and Estuarine Sediment (Qha). The Alluvial Stream and Estuarine

Sediment are described as silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places and common shell layers.

4. Subsurface Investigation

Four hand auger holes (AH) were put down to identify the soil materials. Two Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the sands underlying the site. 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 (~RL2.1) – AH1 (Photo 5)

Depth (m)	Material Encountered
0.0 to 0.3	FILL , silty sand, brown, dry, fine to medium grained.
0.3 to 1.4	SAND , with shell fragments, light brown/yellow, Very Loose to Loose, moist to wet, fine to medium grained.
1.4 to 1.6	SANDY PEAT , with shell fragments, black and dark grey, wet.
1.6 to 2.0	SAND , with shell fragments, grey, Loose to Medium Dense, wet, fine to medium grained.

End of Hole @ 2.0m in Loose to Medium Dense sand. Watertable encountered at ~1.6m.

AUGER HOLE 2 (~RL2.1) – AH2

Depth (m)	Material Encountered
0.0 to 0.3	FILL , silty sand, brown, dry, fine to medium grained.
0.3 to 1.4	SAND , with shell fragments, light brown/yellow, moist to wet, fine to medium grained.
1.4 to 1.6	SANDY PEAT , with shell fragments, black and dark grey, wet.
1.6 to 1.9	SAND , with shell fragments, grey, wet, fine to medium grained.

End of Hole @ 1.9m in sand. Watertable encountered at ~1.6m.

AUGER HOLE 3 (~RL2.0) – AH3

Depth (m)	Material Encountered
0.0 to 0.5	FILL , silty sand, brown, dry, fine to medium grained.
0.5 to 1.4	SAND , with shell fragments, light brown/yellow, moist to wet, fine to medium grained.
1.4 to 1.5	SANDY PEAT , with shell fragments, black and dark grey, wet.
1.5 to 2.1	SAND , with shell fragments, grey, wet, fine to medium grained.

End of Hole @ 2.1m in sand. Watertable encountered at ~1.5m.

AUGER HOLE 4 (~RL2.0) – AH4

Depth (m)	Material Encountered
0.0 to 0.6	FILL , silty sand, brown, dry, fine to medium grained.
0.6 to 1.3	SAND , with shell fragments, light brown/yellow, Loose to Medium Dense, moist to wet, fine to medium grained.
1.3 to 1.9	SAND , with shell fragments, grey, Loose to Medium Dense, wet, fine to medium grained.

End of Hole @ 1.9m in Loose to Medium Dense sand. Watertable encountered at ~1.5m.

DCP TEST RESULTS ON NEXT PAGE

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 (~RL2.1)	DCP 2 (~RL2.0)
0.0 to 0.3	4	4
0.3 to 0.6	2	5
0.6 to 0.9	1	4
0.9 to 1.2	3	4
1.2 to 1.5	2	4
1.5 to 1.8	5	5
1.8 to 2.1	13	16
2.1 to 2.4	12	11
2.4 to 2.7	6	7
2.7 to 3.0	9	5
3.0 to 3.3	7	6
3.3 to 3.6	5	5
3.6 to 3.9	7	8
3.9 to 4.2	7	9
4.2 to 4.5	#	6
4.5 to 4.8		16
4.8 to 5.1		17
5.1 to 5.4		#
	End of Test @ 4.2m	End of Test @ 5.1m

#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 @ 4.2m, DCP still going down, dark brown sand on wet tip.

DCP2 – End of test @ 5.1m, DCP still going down, dark brown sand on wet tip.

5. Geological Observations/Interpretation

The site is underlain by fill and alluvial sediment that extends to the extent of the testing at 5.1m. Fill extends to depths from between ~0.3m to ~0.6m which overlies sands of variable density that range from Very Loose to Medium Dense to a depth of ~1.4m. These overlie a thin ~0.1 to ~0.2m layer of sandy peat. The sandy peat overlies sands of variable density that range from Loose to Medium Dense to the extent of the testing at 5.1m. See the Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

The watertable was encountered at depths from between ~1.5m to ~1.6m (~RL0.5) below the current surface. This is to be noted by the pool builders as it will have an impact on excavation stability and the excavation walls will need to be supported until the pool structure is in place as per the recommendations in **Section 13**. It should be noted the watertable fluctuates with the tide and climatic changes.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. Normal sheet wash that is generated on the property will be quickly be absorbed into the sandy soil where surfaces are unsealed.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below or beside the property. The proposed excavation for the pool is a potential hazard until retaining structures are in place (**Hazard One**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The proposed excavation for the pool collapsing onto the work site and impacting the neighbouring properties before retaining structures are in place.
LIKELIHOOD	'Likely' (10^{-2})
CONSEQUENCES TO PROPERTY	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})
RISK TO LIFE	3.7×10^{-5} /annum
COMMENTS	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.

(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 stormwater runoff will be created by the proposed development.

11. Excavations

An excavation to a maximum depth of ~2.1m is required to install the proposed pool. The excavation is expected to be through fill, sand and sandy peat. It is envisaged that excavations through fill, sand and peat can be carried out with an excavator and bucket.

12. Vibrations

Possible vibrations generated during excavations through fill, sand and peat will be below the threshold limit for building damage.

13. Excavation Support Requirements

An excavation to a maximum depth of ~2.1m is required to install the proposed pool. The excavation is set back sufficiently from the subject house. The excavation is set back ~1.3m from the S common boundary. The S common boundary will be within the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 30° line through fill/sand/peat from the base of the excavation towards the surrounding structures and boundaries. Additionally, the watertable was encountered at depths from ~1.5m to ~1.6m below the current surface. This has implications for the excavation stability that need to be considered in the design and construction.

The S boundary fence is to be braced prior to the excavation commencing.

The cut batters are to be temporarily supported until the pool structure is in place. The ground support is to be designed and approved by a structural engineer. Seepage is expected through the profile from a depth of ~1.5m and is likely the water will cause undercutting and slumping through the batter. An example of suitable ground support is a sandbag retaining wall that is installed as the excavation is progressed and remains in place while the pool is formed and poured. The sandbags allow seepage flow but prevent sediment movement and subsequent batter collapse. It should be noted that this is one of many possible shoring solutions.

A sump and pump will be required during construction to keep the base of the pool excavation dry. Pumps should only be used when they are required for construction and should not be left operating consistently at other times to minimise temporary draw down effects on the watertable.

The materials and labour to construct the pool is to be organised so on completion of the excavations it 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 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, Sand and Peat	20	0.40	0.60

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. Ground materials 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 Very Loose to Medium Dense sand. Although the underlying ground material at the base of the pool has an adequate bearing pressure to support the pool we recommend screw piles be installed to prevent possible 'pop-out' that can occur when the pool is empty and floats on the water table and subsequently pops out of

the ground. The Structural Engineer is to calculate the required pressure for the screw piles to resist buoyancy.

Note that we do not certify screw pile foundations. Screw pile design varies between contractors and we are not privy to the details of individual design or how the screw pile contractor converts torque to bearing pressure. As such, the screw pile contractor is totally responsible for ensuring the screw piles can support the loads on the piles and that these are within acceptable settlement limits.

If another method of “hold down” is used and the pool can be supported on the sand at the base of the excavation, it should be compacted as the excavation will loosen the upper sands. This can be carried out with a hand-held plate compactor. As a guide to the level of compaction required, a density index of >65% is to be achieved, correlating to a dense sand. The geotechnical consultant is to inspect and test the compacted base of the pool excavation to ensure the required density has been achieved.

If the cost of these measures to prevent ‘pop out’ are considered too much and the owners wish to support the pool on the base of the excavation only, we point out the pool will always need to be kept full of water to prevent the possibility of it floating on the water table during wet periods. We recommend the pool be anchored. If it is not and the pool does pop out of the ground, we accept no liability whatsoever.

As the area around the pool will become saturated during pool use, it is recommended any paving around the pool be supported on a raft slab taken below the fill into the sand of the natural profile. This will reduce the risk of settlement around the pool that can result from ongoing saturation of the soil. A maximum allowable bearing pressure of 100kPa can be assumed for the sand of the natural profile.

Raft slab footing walls are to be shored with timber to prevent collapse. 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.

16. Inspection

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 (excluding screw pile foundations) 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: AH1 – Downhole is from bottom to top.

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.

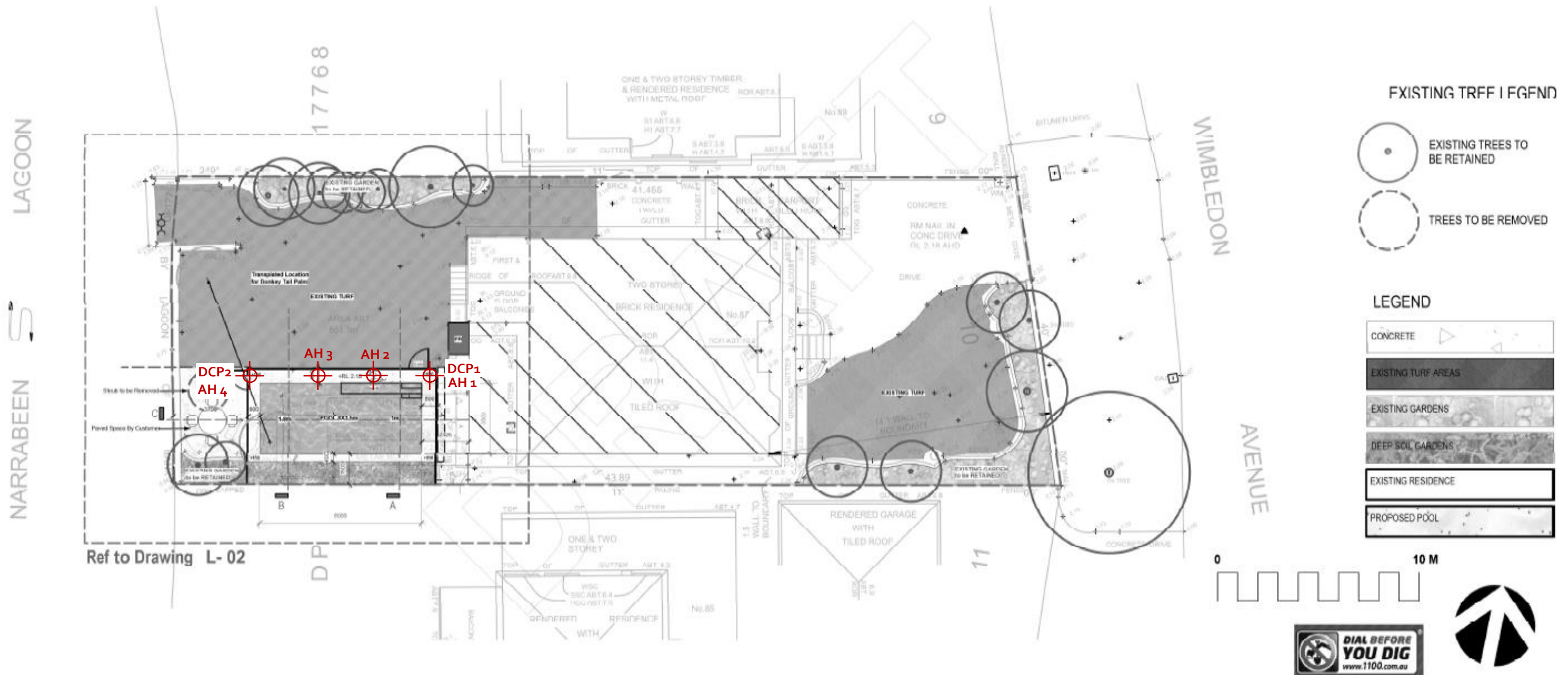
With this in mind, the following points are to be noted:

- 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

Drawing List

Sheet No.	Sheet Name	Sheet Size	Rev. No.	Rev. Date	Project No.
L-01	SITE PLAN	A3	A	19/11/21	1392
L-02	SITE /SEDIMENT/WASTE/STORMWATER PLAN	A3	A	19/11/21	1392
L-03	SITE CALCULATION PLAN	A3	A	19/11/21	1392
L-04	POOL PLAN	A3	A	19/11/21	1392
L-05	REAR YARD LANDSCAPE PLAN	A3	A	19/11/21	1392
L-06	SECTION A & B	A3	A	19/11/21	1392
L-07	SECTION C	A3	A	19/11/21	1392

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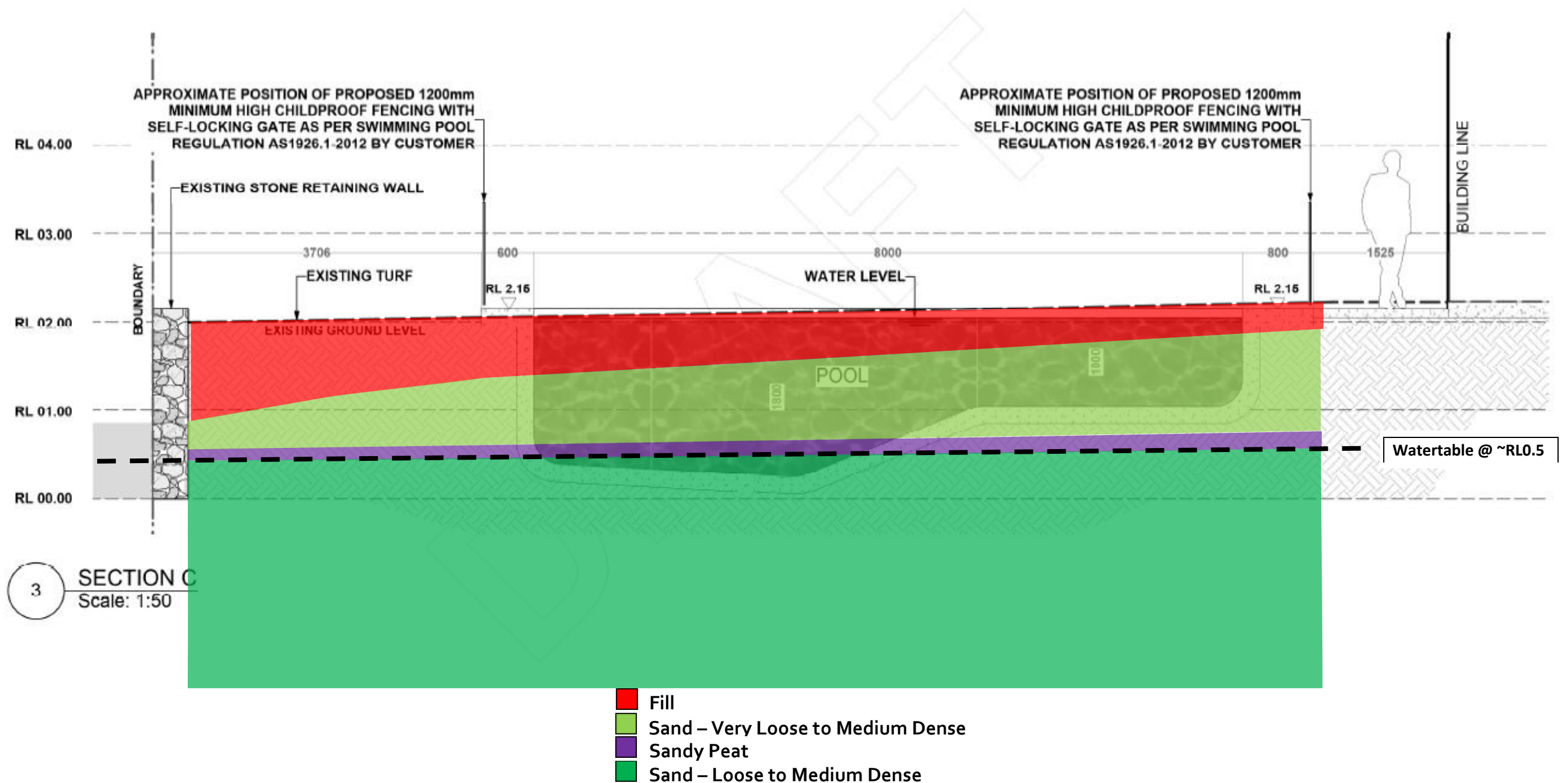
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SYDNEY NORTH STUDIO
PO Box 265
SEAFORTH NSW 2092
0417685846
p 1300 22 44 55
info@sdstudios.com.au
www.sdstudios.com.au

Project	PROPOSED SWIMMING POOL		
Address	LOT 10, NO.87 WIMBLEDON AVENUE, NORTH NARRABEEN	Date	19/11/2021
Drawing Title	SITE PLAN		Scale 1:200@A3

Drawing No. **1392**Page
L-01

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



GENERAL NOTES
 All work to be carried out in accordance with the Building Code of Australia, all Local and State Government Ordinances, relevant Australian Standards, Local Authorities Regulations and all other relevant Authorities concerned.
 All structural work and site drainage to be subject to Engineer's advice or notification where required by Council. This shall include r/c slabs and footings, r/c and steel beams & columns, steel bracing to AS 1170 and AS 4555, anchor rods or bolts, tie down, flags etc., driveway slabs and drainage to Council's satisfaction. All timbers to be in accordance with SAA Timber Structural Code AS1720 and SAA Timber Framing Code AS 1684. All work to be carried out in a professional and workman-like manner according to the plans and specifications.
 PR011:
 Do not scale off the drawings unless otherwise stated and use figured dimensions in preference.
 All dimensions are to be checked and verified on site before the commencement of any work, all dimensions and levels are subject to final survey and survey.
 No responsibility will be accepted by Sitedesign for any variations in design, builder's method of construction or materials used, deviation from specification without permission or in conflict with practices resulting in inferior construction. Locate and protect all services prior to construction.
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SYDNEY NORTH STUDIO
 PO Box 265
 SEAFORTH NSW 2092
 0417685846
 p 1300 22 44 55
 info@sdstudios.com.au
 www.sdstudios.com.au

Project	PROPOSED SWIMMING POOL
Address	LOT 10, NO.87 WIMBLEDON AVENUE, NORTH NARRABEEN
Drawing Title	SECTION C
Issue	19/11/21 FOR REVIEW
Date	19/11/2021
Scale	1:50@A3
Drawing No.	1392

**Page
 L-07**

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE

