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

Development Application for _____
Name of Applicant

Address of site 13 Kariboo Close, Mona Vale

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk ***Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report***

I, Ben White *on behalf of* White Geotechnical Group Pty Ltd
(Insert Name) (Trading or Company Name)

on this the 15/7/21 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 **13 Kariboo Close, Mona Vale**

Report Date: 15/7/21

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 13 Kariboo Close, Mona Vale

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

Geotechnical Report Details:

Report Title: Geotechnical Report **13 Kariboo Close, Mona Vale**

Report Date: 15/7/21

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **13/7/21**
(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 **13/7/21**

☒ 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 **13 Kariboo Close, Mona Vale**

1. Proposed Development

1.1 Construct a new pool on the NW side of the property by excavating to a maximum depth of ~1.6m.

1.2 Details of the proposed development are shown on 4 drawings prepared by Outside Living, project number 21-30, drawings numbered 1-4, issue B, dated 15/6/21.

2. Site Description

2.1 The site was inspected on the 13th July, 2021, and previously on the 23rd December, 2014.

2.2 This residential property is near level with the road and has a slight NE aspect. It is located on the crest of a NW-SE trending ridgeline. The slope runs across the property at angles averaging <5°. The slope continues at similar angles in both directions.

2.3 At the road frontage, a concrete driveway runs to a stable clad carport attached to the SE side of the house (Photo 1). The two-storey, rendered brick house is supported on brick walls and brick piers (Photo 2). The brick walls show no significant signs of movement and the brick piers appear to stand vertical (Photo 3). A gently sloping lawn extends off the NW side of the house to the common boundaries (Photo 4). A single-storey timber framed and clad granny flat sits in the N corner of the property and is supported on timber posts (Photo 5). The foundations appear to be in good condition.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by the Newport Formation of the Narrabeen Group. It is described as interbedded laminite, shale and quartz to lithic quartz sandstone.

4. Subsurface Investigation

Two Auger Hole (AH) was put down to identify the ground 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 attached. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to be an issue for the testing on this site. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations. See the appended "Important information about your report" for a more comprehensive explanation. The results are as follows:

AUGER HOLE 1 (~RL34.2) **–** AH1 (Photo 6)

Depth (m)	Material Encountered
0.0 to 0.4	**TOPSOIL**, clayey soil, dark brown, fine to medium grained, fine traces of organic matter, soft, damp.
0.4 to 0.8	**CLAY**, mottled red, orange, and grey clay derived from Extremely Low Strength Shale, fine grained, very stiff, dry.

Refusal on rock @ 0.8m. Auger grinding on rock surface. No watertable encountered.

GROUND TEST RESULTS CONTINUE ON THE NEXT PAGE

AUGER HOLE 2 (~RL34.2) **–** AH1 (Photo 7)

0.0 to 0.1 **TOPSOIL** dark brown, loamy with some fine organic matter.

0.1 to 0.3 **Fill** Brown to yellow brown, disturbed soil and clay.

0.3 to 0.7 **Silty Loam** Grey brown, powdery dry.

End of hole @ 0.7m in silty loam. No water table 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** (~RL34.3)	**DCP 2** (~RL34.1)	**DCP3** (~RL34.3)	**DCP4** (~RL34.3)
0.0 to 0.3	16	3	10	16
0.3 to 0.6	11	12	15	13
0.6 to 0.9	7	48	36	16
0.9 to 1.2	#	#	#	22
1.2 to 1.5				#
	Refusal on rock @ 0.9m	Refusal on Rock @ 0.85m	End of Test @ 0.9m	End of Test @ 1.2m

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

DCP Notes:

DCP1 – Refusal on rock @ 0.9m, DCP bouncing, orange and red sandy clay on dry tip.
DCP2 – Refusal on rock @ 0.85m, DCP bouncing, red and white impact dust on dry tip.
DCP3 – End of test @ 0.9m, still going down very slowly, mottled pink to orange weathered rock fragments on dry tip.
DCP4 – End of test @ 1.2m, still going down slowly, mottled yellow to orange clay/ weathered rock fragments on dry tip.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of clayey soils over Firm to Hard Clays. The clays merge

into the underlying weathered rock at depths of between 0.6m to 0.9m below the current surface. The weathered zone is interpreted to be Extremely Low to Very Low Strength Shale. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of the proposed excavations.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. It is expected that there will be minimal to no sheet wash during prolonged rainfallas the site is near the crest of the hill.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below or beside the property. The proposed excavation collapsing before permanent support is in place is a potential hazard (**Hazard One**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The excavation (up to a depth of ~1.6m) collapsing onto the work site before retaining structures are in place.
LIKELIHOOD	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})
RISK TO LIFE	5.3×10^{-5}/annum
COMMENTS	UNACCEPTABLE' level of risk to life and property. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** 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 ~1.6m is required to construct the proposed pool. The excavation is expected to be through clayey soil and Firm to Hard clays with Extremely Low to Very Low Strength Rock expected at depths of between 0.6m to 0.9m below the current surface. It is envisaged that excavations through sandy soil, clay and Extremely Low to Very Low Strength Rock can be carried out with an excavator and bucket.

12. Vibrations

No excessive vibrations will be generated by excavation through soil, clay, or Extremely Low to Very Low Strength Shale. 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 excavation for the proposed pool will reach a maximum depth of ~1.6m. The setbacks are as follows:

- ~2.0m from the W common boundary
- ~2.5m from the deck of the granny flat
- ~5.0m from the subject house
- Flush with the deck of the house

Only the deck of the house will be within the zone of influence of the proposed excavation. In this instance, the zone of influence is the area above a theoretical 45° line through clay and Extremely Low to Very Low Strength Shale towards the surrounding structures and boundaries. This line reduces to 30° through the fill and soil.

The deck will need to be propped with the props supported beyond the zone of influence of the proposed excavation. Alternatively, the supporting posts and piers of the deck can be underpinned to below the zone of influence of the cut prior to the excavation commencing. See the site plan attached for the minimum extent of the required underpinning.

The remaining sides of the cut are expected to stand at near-vertical angles for short periods of time until the pool structure is installed provided the cut batters are kept from becoming saturated. If the cut batters through soil and clay remain unsupported for more than a few days, they are also to be supported with typical pool shoring 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 through fill, soil, and clay 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 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
Soil and Residual Clays	20	0.40	0.55
Extremely Low to Low Strength Rock	24	0.25	0.35

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

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

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

15. Foundations

The proposed pool is expected to be seated on the Extremely Low to Very Low Strength Rock. This is a suitable foundation material.

A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low to Very Low Strength Rock. It should be noted that this material is a soft rock that can appear as a stiff clay when cut up by excavation equipment.

As the bearing capacity of clay and Shale reduces when it is wet, we recommend the footings be dug, inspected, and poured in quick succession (ideally the same day if possible). If the footings get wet, they will have to be drained and the soft layer of wet clay or shale on the footing surface will have to be removed before concrete is poured. If a rapid turnaround from footing excavation to the concrete pour is not possible, a sealing layer of concrete may be added to the footing surface after it has been cleaned.

NOTE: If the contractor is unsure of the footing material required, it is more cost-effective to get the geotechnical consultant on site at the start of the footing excavation to advise on footing depth and material. This mostly prevents unnecessary over-excavation in clay-like shaly-rock but can be valuable in all types of geology.

16. Geotechnical Review

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

17. 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 owners and 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 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

Photo 6

Photo 7

Photo 8 (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.

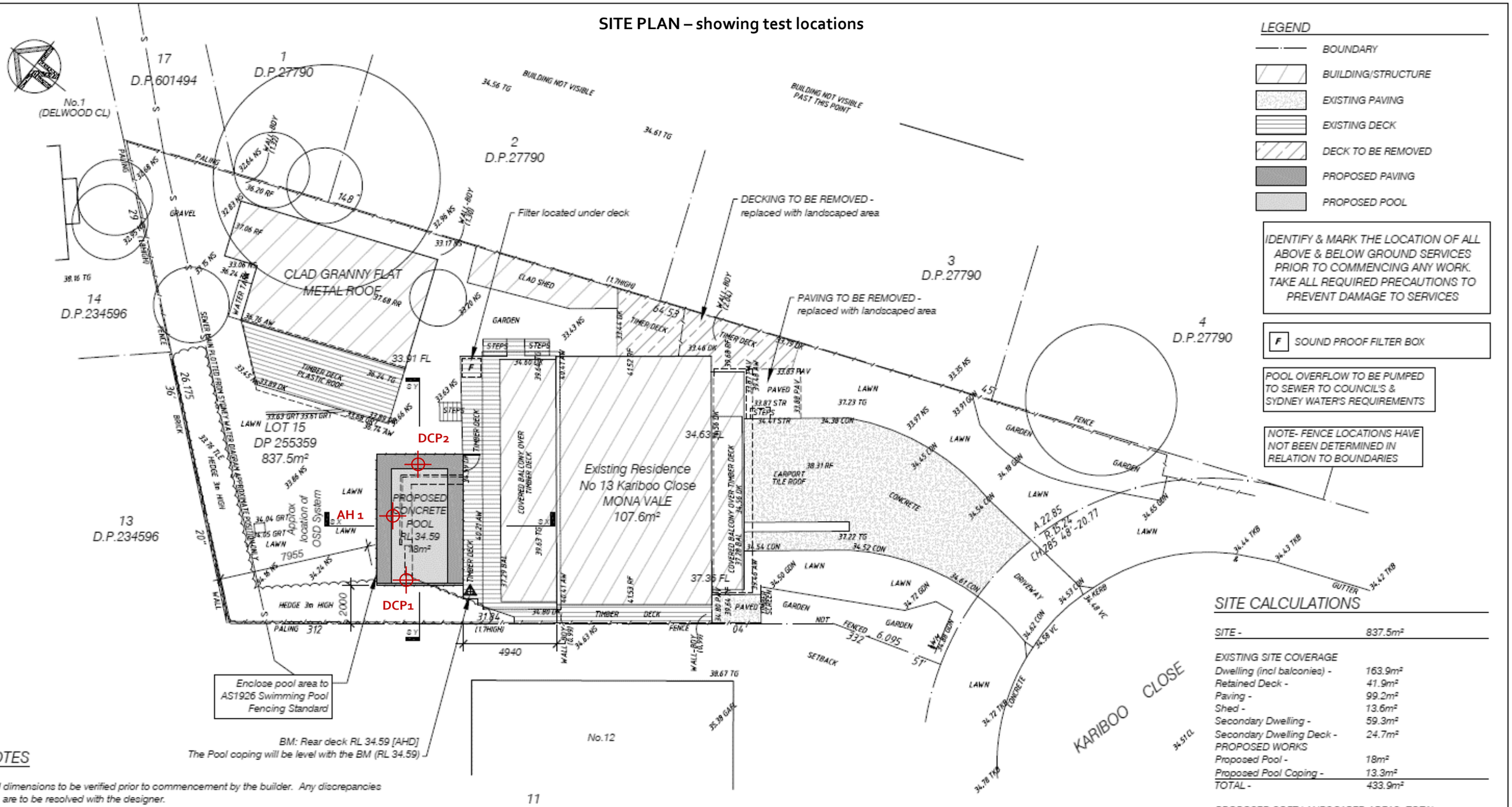
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



LEGEND

- BOUNDARY
- BUILDING/STRUCTURE
- EXISTING PAVING
- EXISTING DECK
- DECK TO BE REMOVED
- PROPOSED PAVING
- PROPOSED POOL

IDENTIFY & MARK THE LOCATION OF ALL ABOVE & BELOW GROUND SERVICES PRIOR TO COMMENCING ANY WORK. TAKE ALL REQUIRED PRECAUTIONS TO PREVENT DAMAGE TO SERVICES

F SOUND PROOF FILTER BOX

POOL OVERFLOW TO BE PUMPED TO SEWER TO COUNCIL'S & SYDNEY WATER'S REQUIREMENTS

NOTE- FENCE LOCATIONS HAVE NOT BEEN DETERMINED IN RELATION TO BOUNDARIES

SITE CALCULATIONS

SITE -	837.5m²
EXISTING SITE COVERAGE	
Dwelling (incl balconies) -	163.9m²
Retained Deck -	41.9m²
Paving -	99.2m²
Shed -	13.6m²
Secondary Dwelling -	59.3m²
Secondary Dwelling Deck -	24.7m²
PROPOSED WORKS	
Proposed Pool -	18m²
Proposed Pool Coping -	13.3m²
TOTAL -	433.9m²

PROPOSED SOFT LANDSCAPED AREAS -TOTAL
Required - 60% of the site area 502.5m²
Proposed - 407.8m² (48.7%)

For single dwellings on land zoned R2 Low Density Residential or R3 Medium Density Residential, or E4 Environmental Living, up to 6% of the total site area may be provided as impervious landscape treatments providing these areas are for outdoor recreational purposes only (e.g. roofed or unroofed pergolas, paved private open space, patios, pathways and uncovered decks no higher than 1 metre above ground level (existing)).

NOTES

1. All dimensions to be verified prior to commencement by the builder. Any discrepancies are to be resolved with the designer.
2. All structural work to engineer's detail.
3. Levels shown are indicative (unless provided by a registered surveyor)
4. All services are to be located and verified prior to commencement of building work.
6. Materials and workmanship to comply with the provisions of the National Construction Code, relevant Australian Standards and the requirements of the Local Government Authority.
7. The structure is to be maintained in a stable condition during construction.

SCALE 1:200 @A3

0 2 4 6 8 10 20

DRAWN BY
Unit 20
12 Phillip Mall
West Pymble 2073
Phone 9440 5451 Facsimile 9402 6499
ABN 97 077 163 663
Fellow of Australian Institute of Landscape Designers and Managers

NOTES TO THE PLAN
THIS PLAN IS TO BE READ AS PART OF A COMPLETE SET OF DRAWINGS RELATING TO THE PROPOSED DEVELOPMENT
THIS PLAN RELATES TO A SPECIFIC DEVELOPMENT INFORMATION RELATING TO THE DEVELOPMENT NEEDS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION
ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

CLIENT
K AND P SPENCE
SITE
13 KARIBOO CLOSE
MONA VALE

DRAWING
SITE PLAN
PROJECT
PROPOSED SWIMMING POOL

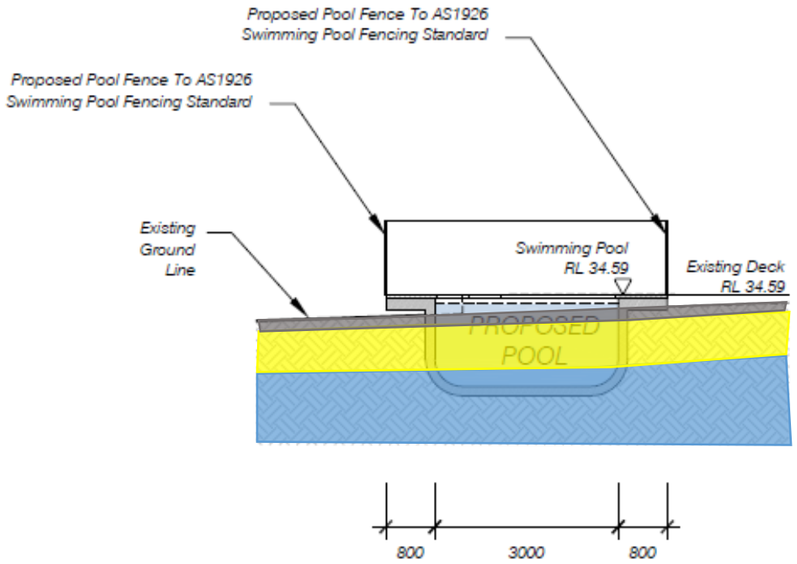
Date of Issue
A 10-06-21
B 15-06-21

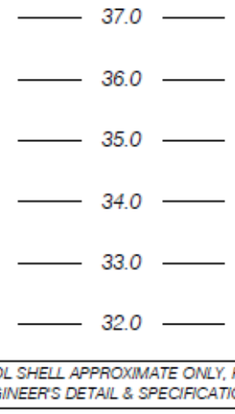
JOB No 21-30
ISSUE B
DWG No 2

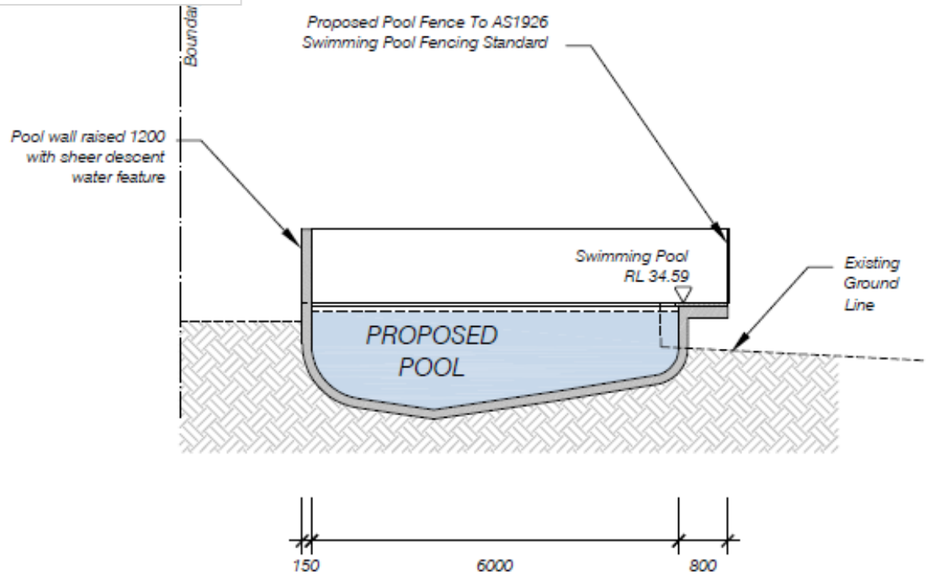
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Expected Ground Materials

- Fill
- Topsoil
- Clay – Firm to Hard
- Narrabeen Group Rocks – Extremely Low Strength Shale
  - After being cut up by excavation equipment can resemble a stiff to hard clay.







SECTION X-X

SECTION Y-Y

SCALE 1:100 @A3

0 1 2 3 4 5 10

DRAWN BY
Unit 20
12 Phillip Mall
West Pymble 2073
Phone 9440 5451 Facsimile 9402 6499
ABN 97 077 163 663
Fellow of Australian Institute of Landscape Designers and Managers

NOTES TO THE PLAN

THIS PLAN IS TO BE READ AS PART OF A COMPLETE SET OF DRAWINGS RELATING TO THE PROPOSED DEVELOPMENT

THIS PLAN RELATES TO A SPECIFIC DEVELOPMENT INFORMATION RELATING TO THE DEVELOPMENT NEEDS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

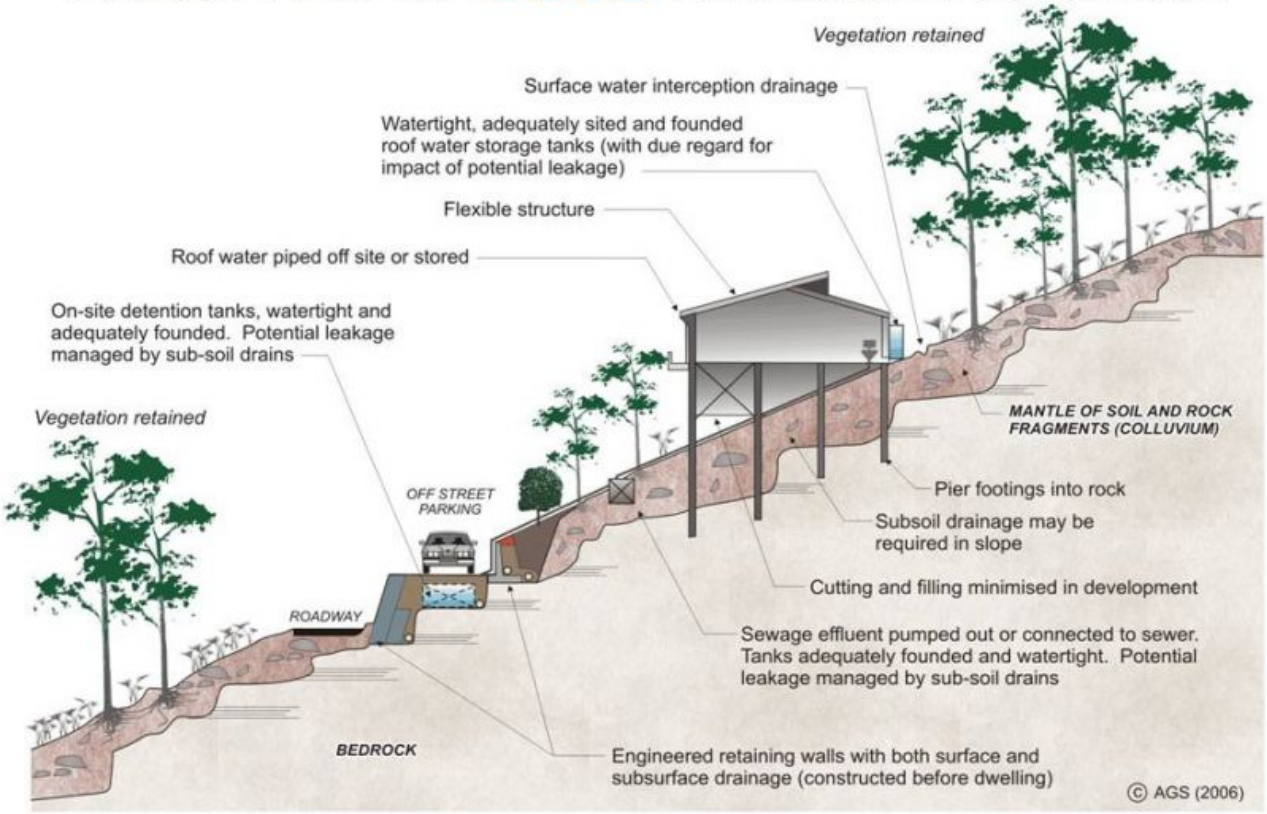
CLIENT
K AND P SPENCE
SITE
13 KARIBOO CLOSE
MONA VALE

DRAWING
SECTIONS
PROJECT
PROPOSED SWIMMING POOL

Date of Issue
A 10-06-21
B 15-06-21

JOB No 21-30
ISSUE B
DWG No 4

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE