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

Development Application for _____
Name of Applicant

Address of site 5 Irrubel Road, Newport

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 17/03/20 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 **5 Irrubel Road, Newport**

Report Date: 17/03/20

Author: BEN WHITE

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

Documentation which relate to or are relied upon in report preparation:

Australian Geomechanics Society Landslide Risk Management March 2007.

White Geotechnical Group company archives.

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature _____

Name Ben White

Chartered Professional Status MScGEOLAusIMM CP GEOL

Membership No. 222757

Company White Geotechnical Group Pty Ltd

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1(a) - Checklist of Requirements for Geotechnical Risk Management Report for Development Application

Development Application for _____
Name of Applicant

Address of site 5 Irrubel Road, Newport

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 5 Irrubel Road, Newport

Report Date: 17/03/20

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted 6/3/20 (date)
- ☒ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ☒ Subsurface investigation required
  - ☐ No Justification _____
  - ☒ Yes Date conducted 6/3/20
- ☒ 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:

Alterations and Additions at **5 Irrubel Rd, Newport.**

1. Proposed Development

1.1 Demolish and replace the carport roof.

1.2 Internal and external modifications to the house.

1.3 Construct a pool by excavating to a maximum depth of ~1.7m.

1.4 Construct a secondary dwelling by excavating to a maximum depth of ~0.6m.

1.5 Details of the proposed development are shown on 12 drawings prepared by J.D. Evans and Company, drawings numbered 2010-1 to 2010-12, dated 18th November 2019.

2. Site Description

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

2.2 This residential property is on the low side of the road and has a S aspect. The natural slope falls across the property at an average angle of ~9°. The slopes above and below the property continue at similar angles.

2.3 At the road frontage a concrete driveway leads to the existing carport (Photos 1 & 2). The part two storey rendered brick and timber clad house is supported by brick piers and brick walls (Photos 3 & 4). The supporting piers and walls stand vertical and show no signs of significant movement (Photo 5).

Fill provides a level platform for a tiled pavement and grass lawn that extend from the downhill side of the house (Photo 6). The fill is supported by stable brick retaining walls up to ~1.2m high (Photo 7). An existing metal shed that is in good condition will be demolished as part of the works (Photo 8). A gently sloping lawn extends from

below the retaining walls to the downhill boundary of the property (Photo 9). A timber shed is located near the downhill boundary (Photo 10). No signs of slope instability were observed on the property. The adjoining neighbouring properties were observed to be in good order as seen from the street and subject property.

3. Geology

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

4. Subsurface Investigation

One Auger hole was put down to identify the soil materials. Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The locations of the tests are shown on the site plan. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to be an issue for the testing on this site and the results are as follows:

AUGER HOLE 1 (~RL24.7) – AH1 (photo 11)

Depth (m)	Material Encountered
0.0 to 0.3	**TOPSOIL**, brown, fine to medium grained, moist, fine trace organic matter.
0.3 to 1.1	**FILL**, yellow, brown and orange, moist.
1.1 to 1.4	**CLAYEY SOIL**, brown and orange, moist.
1.4 to 1.8	**CLAY**, orange and brown, firm to stiff, moist.

End of Hole @ 1.8m in Clay. No watertable encountered.

DCP TEST RESULTS – Dynamic Cone Penetrometer				
Equipment: 9kg hammer, 510mm drop, conical tip.			Standard: AS1289.6.3.2 -1997	
Depth(m) Blows/0.3m	**DCP 1** (~RL28.2)	**DCP 2** (~RL24.1)	**DCP 3** (~RL24.7)	**DCP 4** (~RL21.9)
0.0 to 0.3	5	2F	3	5
0.3 to 0.6	9	3	4	7
0.6 to 0.9	9	3F	5	12
0.9 to 1.2	14	7	17	25
1.2 to 1.5	30	13	6	37
1.5 to 1.8	#	19	7	#
1.8 to 2.1		25	18	
2.1 to 2.4		#	24	
2.1 to 2.7			14	
2.7 to 3.0			#	
	Refusal @ 1.4m	Refusal @ 2.0m	Refusal @ 2.6m	End of Test @ 1.5m

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

DCP Notes:

DCP1 – Refusal @ 1.4m, DCP bouncing, white dust on dry tip, orange clay on collar.
DCP2 – Refusal @ 2.0m, DCP bouncing, orange clay on muddy tip.
DCP3 – Refusal @ 2.6m, DCP bouncing, brown soil and orange clay on muddy tip.
DCP4 – End of Test @ 1.5m, DCP still slowly going down, orange and red 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 Topsoil, Fill and Clayey Soil up to 1.4m deep over Firm to Very Stiff Clay. The clays merge into the weathered zone of the under lying rocks at depths of between 1.4m to 2.6m below the current surface. The weathered zone of the underlying rock is interpreted as Extremely Low to Low Strength Rock. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks in the rock.

Due to the slope and elevation of the block, the water table in the location is expected to be many metres below the base of the proposed excavations.

7. Surface Water

No evidence of significant surface flows were observed on the property during the inspection. Normal sheet wash from the slope above will be intercepted by the street drainage system for Irrubel Road above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The gentle to moderately graded slope that falls across the property and continues above and below is a potential hazard (**Hazard One**). The proposed excavation for the pool collapsing onto the worksite and impacting the neighbouring properties is a potential hazard (**Hazard Two**). The proposed excavation for the secondary dwelling is a potential hazard until retaining walls are in place (**Hazard Three**).

RISK ANALYSIS SUMMARY IS ON THE NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The gentle to moderate slope that falls across the property and continues above and below failing and impacting on the property.	The proposed excavation for the pool collapsing onto the worksite and impacting the neighbouring properties during the excavation process.	The proposed excavation for the secondary dwelling collapsing onto the work site before the retaining structure is in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (15%)	'Minor' (5%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'Low' (5×10^{-6})
RISK TO LIFE	8.3×10^{-7}/annum	8.3×10^{-6}/annum	8.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move the risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.	This level of risk to property is 'ACCEPTABLE', provided the recommendations in **Section 13** are followed.

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

9. Suitability of the Proposed Development for the Site

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

10. Stormwater

It is noted on the plans that the stormwater from the proposed works is to be connected to the existing system.

11. Excavations

An excavation to a maximum depth of ~1.7m is required to construct the proposed pool. The excavation is interpreted to be through fill and soil to a depth of ~1.4m over clay. An excavation to a maximum depth of ~0.6m is required to construct the proposed secondary dwelling. The excavation for the secondary dwelling is interpreted to be through soil and clay. Excavations through fill, soil and clay can be carried out with an excavator and bucket.

12. Vibrations

It is expected the proposed excavations will be carried out with an excavator and bucket and the vibrations produced will be below the threshold limit for building or infrastructure damage.

13. Excavation Support Requirements

Bulk Excavation for Pool

An excavation to a maximum depth of ~1.7m is required for the proposed pool.

The excavation is set back ~1.1m from the W common boundary, but the majority of the excavation will be though fill that is elevated above the neighbouring property along the boundary, therefore the W boundary will be outside the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 45° line from the base of the excavation towards the surrounding structures and boundaries.

The excavation will 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 remain unsupported for more than a few days before the pool construction

commences, they are to be temporarily supported with typical pool shoring, such as sacrificial form ply.

Bulk Excavation for Secondary Dwelling

An excavation to a maximum depth of ~0.6m is required for the secondary dwelling. The excavation is set back ~1.0m from the E common boundary.

The cut batters through soil and clay will stand at near-vertical angles for short periods of time until the retaining walls are installed, provided the cut batters are kept from becoming saturated.

Advice Applying to All Excavations

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. All unsupported cut batters are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The materials and labour to construct the retaining walls and pool structure are to be organised so on completion of the excavation they can be constructed as soon as possible. The excavations are to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast. If the retaining walls are not constructed within a few days of the excavation being completed temporary shoring will be required.

All excavation spoil is to be removed from site or be supported by engineered retaining walls.

14. Retaining Structures

For cantilever or singly propped retaining structures it is suggested the design be based on a triangular distribution of lateral pressures using the parameters shown in Table 1.

TABLE 1 IS ON THE NEXT PAGE

Table 1 – Likely Earth Pressures for Retaining Structures

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m³)	'Active' K_a	'At Rest' K_0
Fill and Soil	20	0.40	0.55
Residual Clays	20	0.35	0.45
Extremely Low to Low Strength Rock	22	0.25	0.38

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 full hydrostatic pressures are to be accounted for in the retaining structure design.

15. Foundations

The proposed new carport roof can be supported on the piers for the existing carport roof, provided foundation loads do not exceed a maximum allowable bearing pressure of 200 kPa. The proposed secondary dwelling can be supported on spread footings or shallow piers taken into the clays of the natural profile. This ground material is expected at a depth of ~0.4m below the current surface. The proposed pool is expected to be seated in the clays of the

natural profile. This is a suitable foundation material. Depending on the depth of the pool, it is possible the downhill edge will require shallow piers (bucket piers) to get embedment into the natural clays. A maximum allowable bearing pressure of 200kPa can be assumed for footings on natural clay.

For better quality footings or where little movement can be tolerated piers can be taken to Extremely Low to Low Strength Rock. This ground material is expected at a depth of ~1.5m below the current surface of the proposed secondary dwelling and at a maximum depth of ~2.6m below the current surface on the downhill edge of the proposed pool, where the fill is deepest. A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low to Low Strength Rock.

As the bearing capacity of clay and weathered rock 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 weathered rock 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 professional on site at the start of the footing excavation to advise on footing depth and material. This mostly prevents unnecessary over excavation in clay like shaly rock but can be valuable in all types of geology.

REQUIRED INSPECTIONS ARE ON THE NEXT PAGE

16. Inspections

The client and builder are to familiarise themselves with the following required inspection as well as council geotechnical policy. We cannot provide geotechnical certification for the Occupation Certificate if the following inspection has not been carried out during the construction process.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment is still onsite and before steel reinforcing is placed or concrete is poured.

White Geotechnical Group Pty Ltd.

Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11: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.

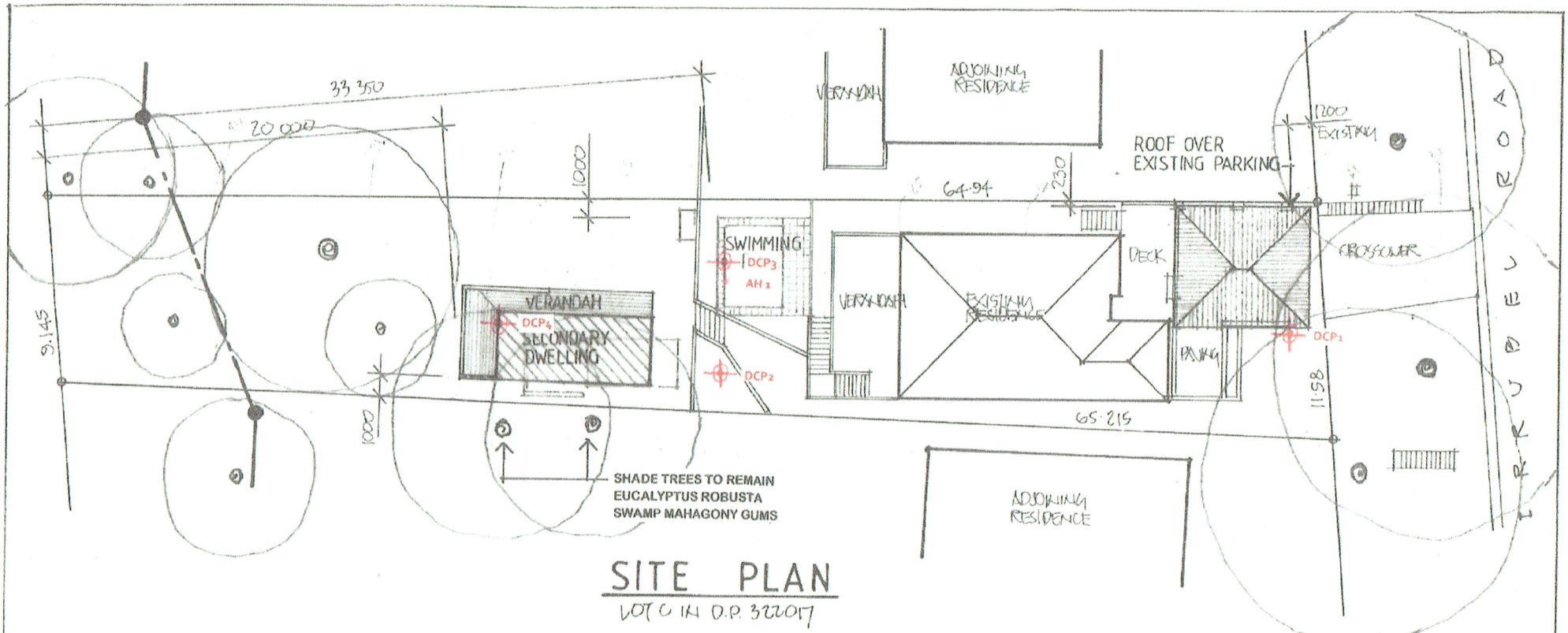
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

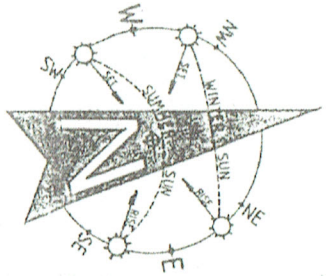
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar 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



SITE PLAN

LOT C IN D.P. 322017



NOTES:

1. THE BUILDER IS TO CHECK AND CONFIRM ALL NECESSARY DIMENSIONS AND LEVELS ON SITE PRIOR TO ORDERING MATERIALS AND COMMENCING CONSTRUCTION. DO NOT SCALE OFF THE DRAWING.
2. SHOULD ANY DEVELOPMENT OR CONSTRUCTION OCCUR ON OR NEAR BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE BY THE REGISTERED LAND SURVEYORS.

DEVELOPMENT CALCULATIONS

SITE AREA	669.60 SQUARE METRES	
DESCRIPTION	EXISTING SQM	PROPOSED SQM
FLOOR	154.52	154.52
ROOF	105.48	105.48
CARPORT	36.00	40.20
DECK	18.00	18.00
VERANDAH & STAIRS	33.50	33.50
DRIVEWAY	8.96	4.76
SWIMMING POOL & COPING	—	22.08
SECONDARY DWELLING	—	25.65
SD VERANDAH	—	16.78
TOTAL HARD SURFACE	201.94 (30.16%)	266.46 (39.79%)

1 Builder to check and confirm all necessary dimensions on site prior to construction. Do not scale the drawing.
2 All dimensions that relate to site boundaries 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 & other authorities.
4 All timber construction to be in accordance with the "TIMBER FRAMING" code.
5 Any detailing in addition to what is supplied shall be resolved between the owner and the builder to the owner's approval, except for any structural details or design which is to be supplied by a Structural Engineer.
6 Roof water & soil-soil drainage to be disposed of in the approved manner or as directed by local council inspectors.
7 All electrical power & light outlets to be determined by owner.
8 Make good and repair all existing finishes damaged by new work. Reuse existing materials where possible.

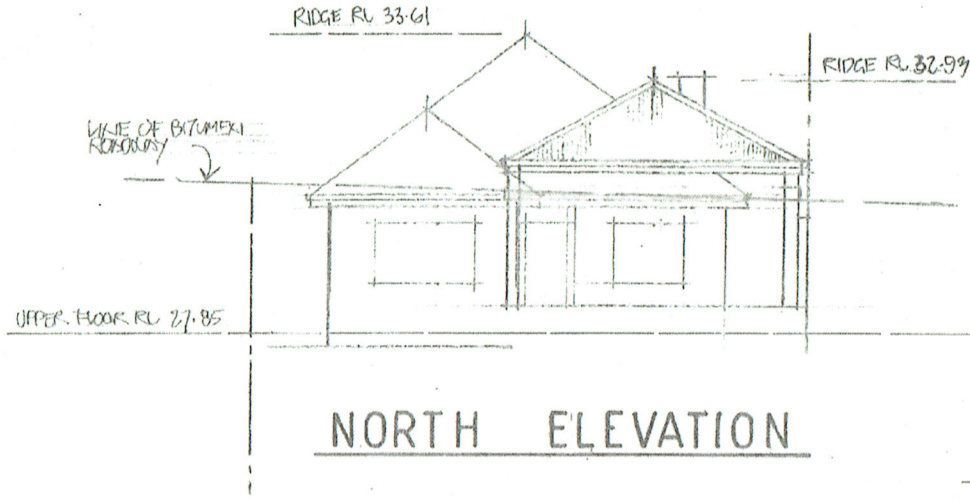
No.	AMENDMENT	DATE

J.D. EVANS and COMPANY
DESIGN AND BUILDING CONSULTANTS
UNIT 7, 6 JUBILEE AVENUE, WARRIEWOOD 2102
PHONE 9999 4566 MOBILE 0418 976 596
www.jdeco.com.au email info@jdeco.com.au

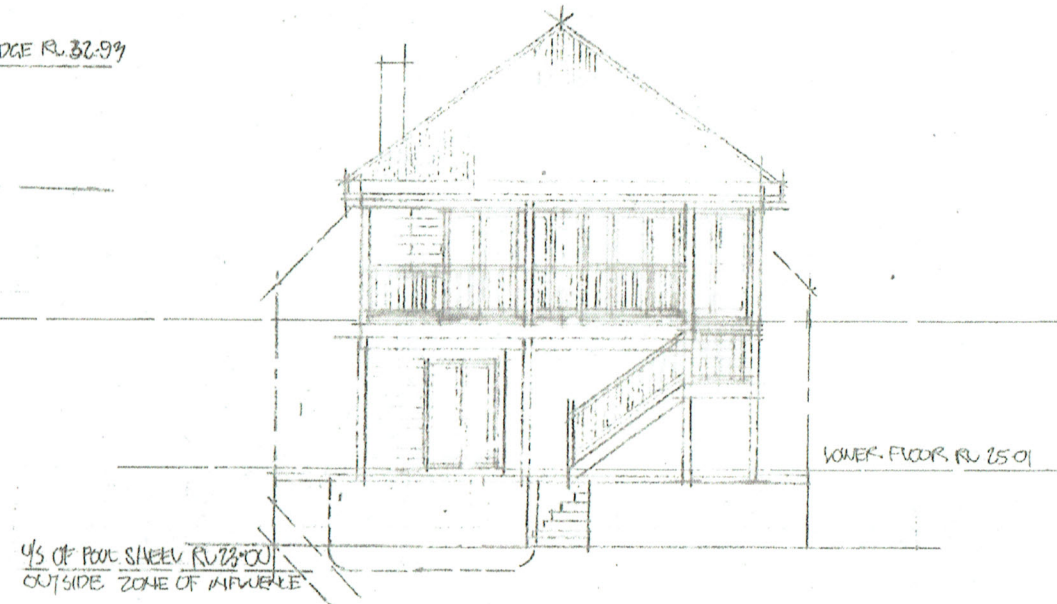
PROJECT
PROPOSED ALTERATIONS/ADDITIONS, SWIMMING POOL & SECONDARY DWELLING
5 IRRUBEL ROAD N. S. W. 2106
CLIENT
PIET POELMANN

DATE 18/11/2019 SCALE 1:200
DRAWN JDE. CHECKED
DRAWING No. 2010-1 ISSUE

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



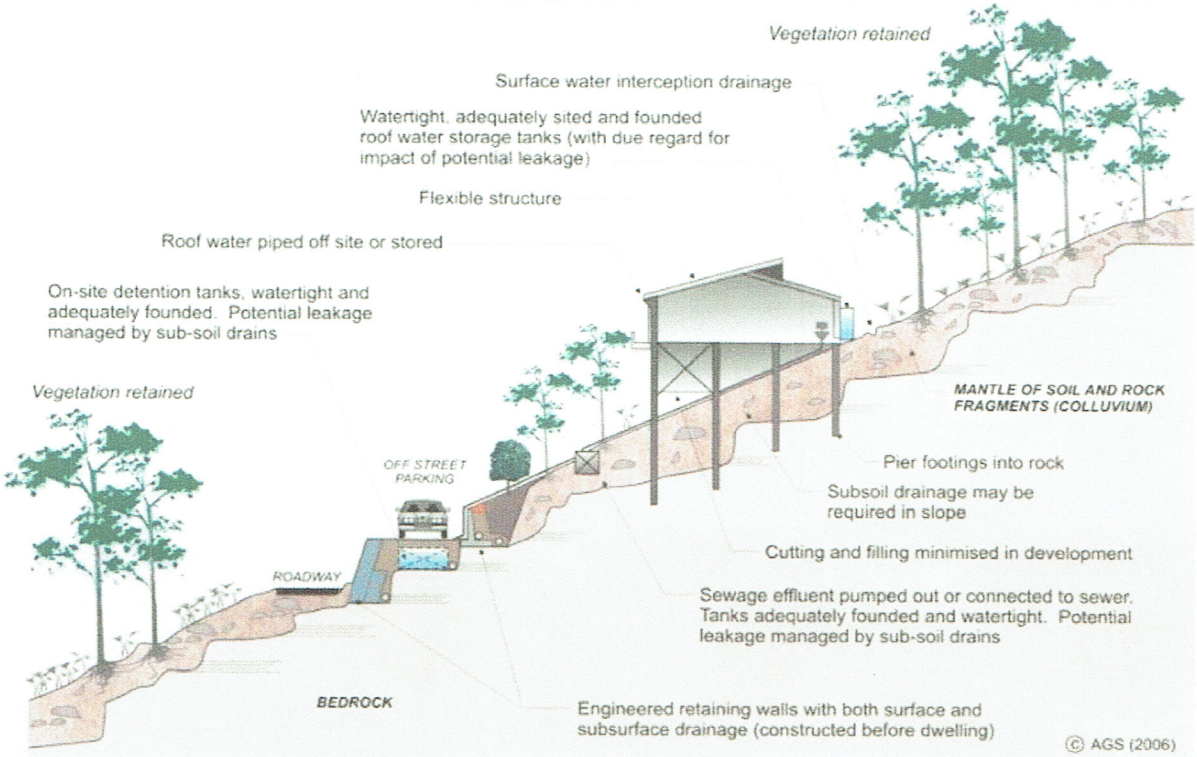
NORTH ELEVATION



SOUTH ELEVATION

WEST ELEVATION

EXAMPLES OF GOOD HILLSIDE PRACTICE



EXAMPLES OF POOR HILLSIDE PRACTICE