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

Development Application for _____
Name of Applicant

Address of site 36 Watkins Road, Avalon

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 20/12/19 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 **36 Watkins Road, Avalon**

Report Date: 19/12/19

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 36 Watkins Road, Avalon

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 **36 Watkins Road, Avalon**

Report Date: 19/12/19

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted **13/12/19** (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 **13/12/19**
- ☒ 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 **36 Watkins Road, Avalon**

1. Proposed Development

1.1 Extend the existing pool deck to the S.

1.2 Demolish and replace the existing timber retaining walls on the uphill side of the pool.

1.3 Various other internal and external alterations.

1.4 Details of the proposed development are shown on 11 drawings prepared by Michelle Walker Architects, Job number 1819, drawings numbered DA 01 to 11, Issue F, dated 17/12/19.

2. Site Description

2.1 The site was inspected on the 13th December, 2019.

2.2 This battle-axe-shaped residential property is on the high side of the road and has a W aspect. The block is located on the moderate to steeply graded upper middle reaches of a hillslope. From the road frontage to the upper boundary, the natural slope rises at an average angle of ~17°. The slope below the property eases to more gentle angles. The slope above the property continues briefly before encountering a ~70m high sea cliff that falls to a narrow rock platform below.

2.3 At the road frontage, a long concrete driveway runs up the slope to a garage on the lower ground floor of the house and to a partially suspended parking area on the downhill side of the house (Photos 1, 2, & 3). The parking area is supported by concrete columns that stand vertical (Photo 4). Filling has been placed on the slope between the lower common boundary and the parking area for a level lawn area. The

fill is supported by a ~1.3m high concrete block retaining wall (Photo 5). The wall displays some cracking through the blocks but no signs of deflection. Thus, the wall is considered stable. Two more fills above are supported by stable treated timber retaining walls ~1.0m high (Photo 6). The part three-storey brick house is supported on brick walls and brick piers (Photo 7). No significant signs of movement were observed in the supporting brick walls and the supporting brick piers stand vertical. Some of the supporting walls and piers were observed to be supported directly off outcropping competent Medium Strength Sandstone. A pool has been cut into the slope on the N side of the house (Photo 8). The water level of the pool indicates no ground movement has occurred in the shell of the pool since its construction. The cut for the pool area has been taken entirely through Medium Strength Sandstone. No significant geological defects were observed in the cut face and it is considered stable. The slope above the pool cut is terraced with two timber retaining walls that will be rebuilt as part of the proposed works (Photo 9). A small stable outbuilding and viewing platform has been constructed in the NE corner of the property (Photo 10). Densely-vegetated undisturbed bushland rises from above the upper boundary to the top of a ~70m high sea cliff (Photo 11). The sea cliff was observed from a distance (Photo 12). It consists of competent, alternating massively and thinly bedded sandstone and shale/laminite. The cliff face displays no significant undercutting or other significant geological defects that could affect its stability. The rock platform has a covering of dislodged sandstone boulders at the cliff base.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by the Newport Formation of the Narrabeen Group. There is a band of sandstone underlying the existing house that extends through the otherwise shale-dominated profile.

4. Subsurface Investigation

As Medium Strength Sandstone was observed to be outcropping across the location of the proposed works, no subsurface investigation was undertaken.

5. Geological Observations/Interpretation

Sandstone bedrock outcrops and steps up the property in the location of the existing house and pool. These thick sandstone units within the Narrabeen Group of rocks are typically present on sites such as this where the rock has resisted weathering over time resulting in headlands and coastal cliff faces. The rock is typically overlain by thin sandy soils and sandy clays. The sandstone underlying the area of the proposed development is estimated to be medium strength. 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 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 below or beside the property. The moderate to steeply graded land surface that falls across the property and continues above is a potential hazard (**Hazard One**). The sea cliff face that falls beyond the upper boundary is a potential hazard (**Hazard Two**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that falls across the property and continues above and below failing and impacting on the property.	The sea cliff face failing and impacting on the proposed works (Photo 12).
LIKELIHOOD	'Unlikely' (10^{-4})	'Rare' (10^{-5})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Major' (40%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Low' (6×10^{-5})
RISK TO LIFE	8.3×10^{-7}/annum	9.96×10^{-6}/annum
COMMENTS	'ACCEPTABLE' level of risk to life & property.	'ACCEPTABLE' level of risk to life & property.

(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

The fall is to Watkins Road below. Roof water from the proposed development is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

Apart from those for footings, no excavations are required.

12. Retaining Walls

The existing timber retaining walls above the pool will be demolished and rebuilt as part of the proposed works (Photo 9). The walls is to be dismantled in an orderly manner and rebuilt following the requirements below.

For cantilever or singly-propped retaining walls, 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 Walls

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0
Fill	20	0.4	0.55

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 wall, do not account for any surcharge loads, and assume retaining walls are fully drained. Ground materials and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

All retaining walls are to have sufficient back-wall drainage and be backfilled immediately behind the wall 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 walls, the likely hydrostatic pressures are to be accounted for in the structural design.

13. Foundations

The proposed deck extension is to be supported on piers supported on the outcropping Medium Strength Sandstone.

The proposed retaining walls above the existing pool will be founded on Medium Strength Sandstone. This is a suitable bearing material for a concrete retaining wall footing or a gravity wall. It is also suitable to support bar grouted into the rock to hold the wall in place.

Where footings are over an exposed sloping rock surface, they may be supported off level pads cut into the rock. A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock the construction process is simplified if with the approval of the structural engineer the joint can be spanned or alternatively the footing can be repositioned so it does not fall over the joint.

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.

REQUIRED INSPECTIONS ARE ON THE NEXT PAGE

14. 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 owner or the regulating authorities if the following inspections have 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

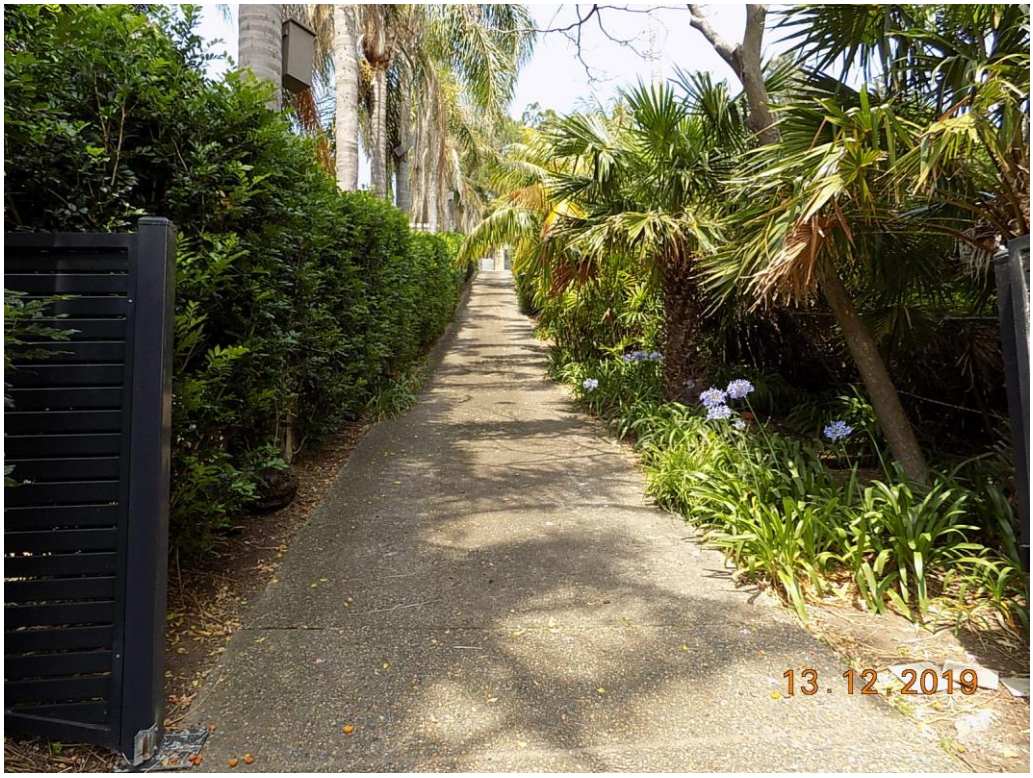


Photo 1

Photo 2

Photo 3

Photo 4

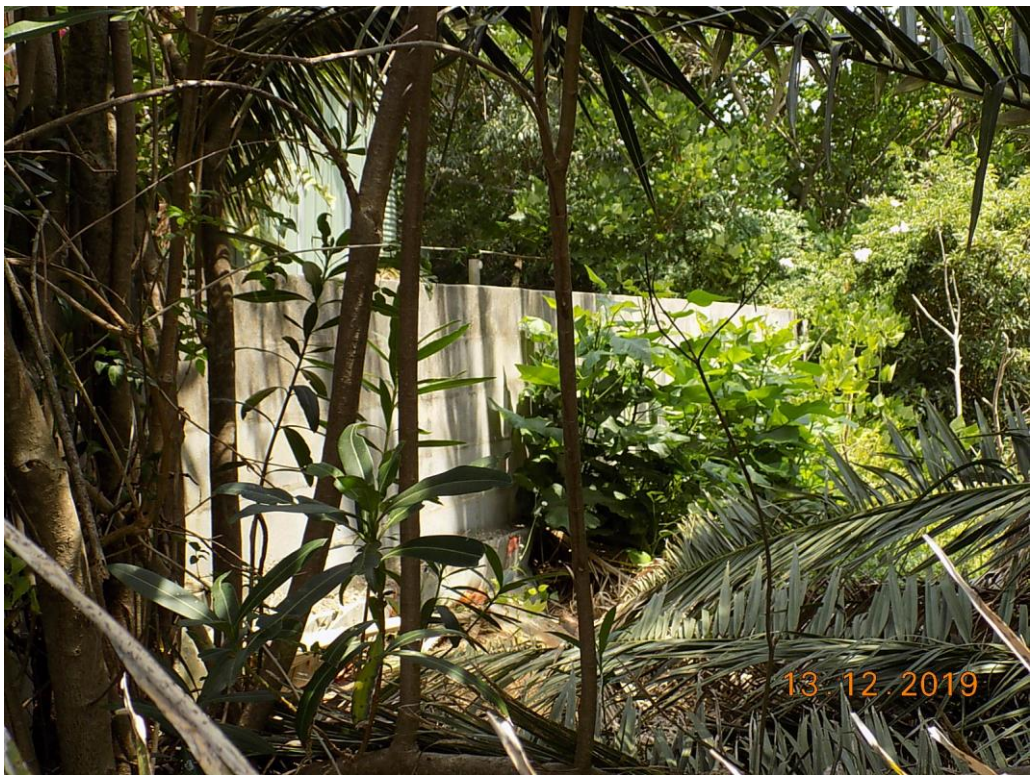


Photo 5

Photo 6

Photo 7

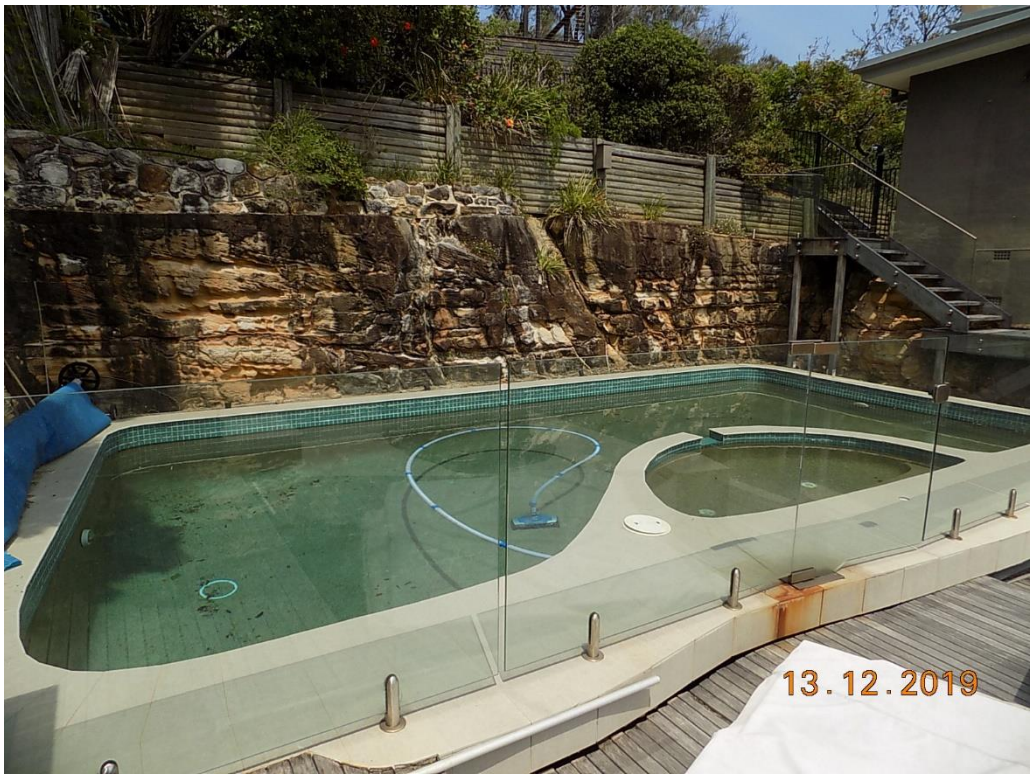


Photo 8

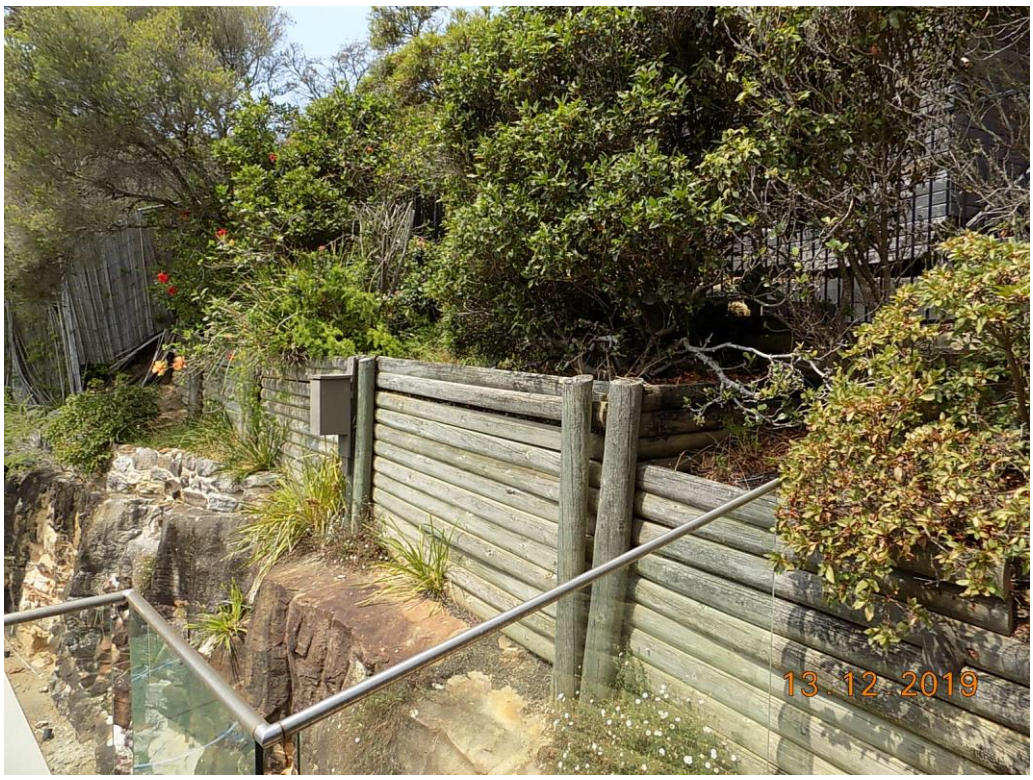


Photo 9

Photo 10

Photo 11

Photo 12

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.

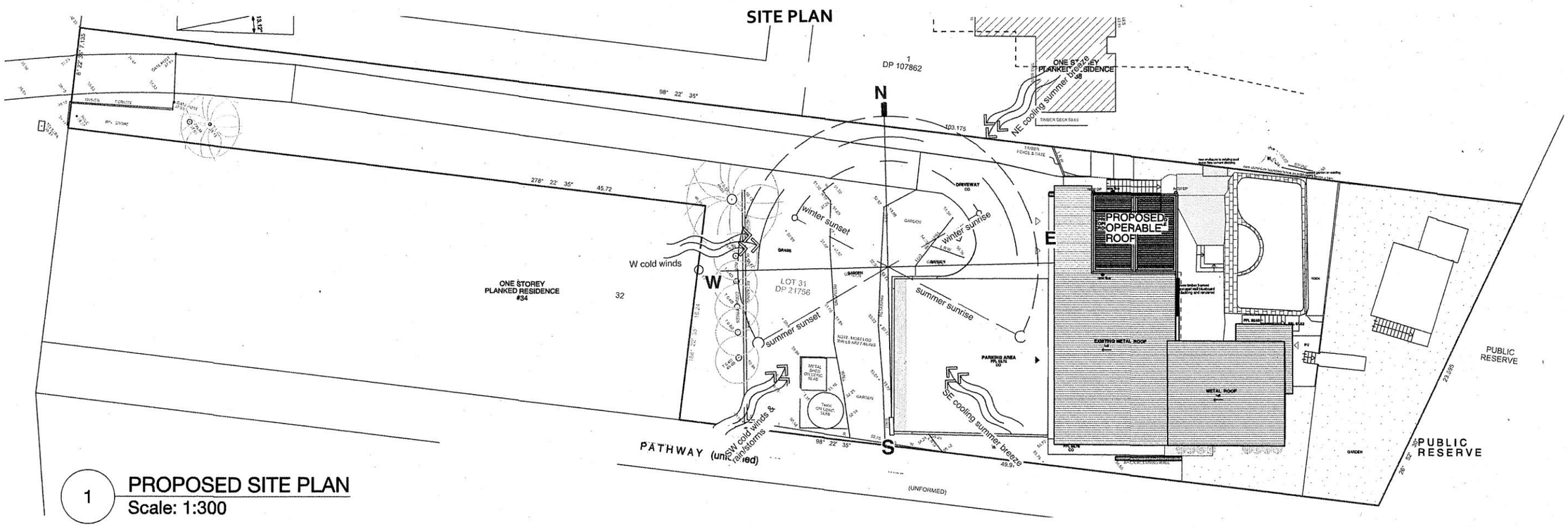
- If this report is used by other professionals during the design or construction process, any questions should be directed to White Geotechnical Group as only we understand the full methodology behind the report's conclusions.

- 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.



1 PROPOSED SITE PLAN
Scale: 1:300

FOR DEVELOPMENT APPLICATION ONLY

MICHELLE WALKER ARCHITECTS
address 67a wanganella st balgowlah nsw 2093
mobile 0421 068 110
email michelle@mwarchitects.net.au
web www.mwarchitects.net.au
reg nominated architect # 6530

Member Australian Institute of Architects

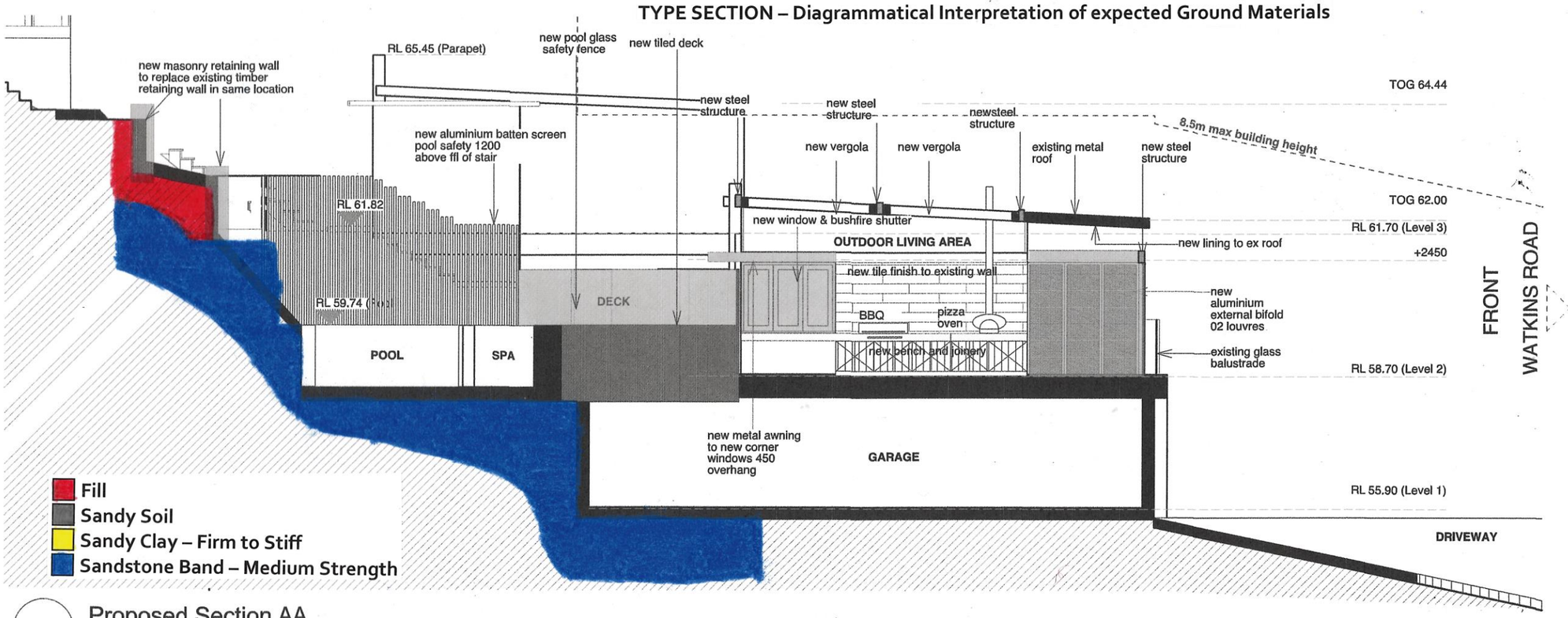
issue	amendment	date
A	MEASURED DRAWINGS	15/8/18
B	INITIAL SKETCH DESIGNS	13/11/18
C	PREFERRED SKETCH DESIGNS	26/08/19
D	PRELIMINARY COSTING	7/11/19
E	DRAFT DA ISSUE TO CONSULTANTS	6/12/19
F	DEVELOPMENT APPLICATION	17/12/19

true north

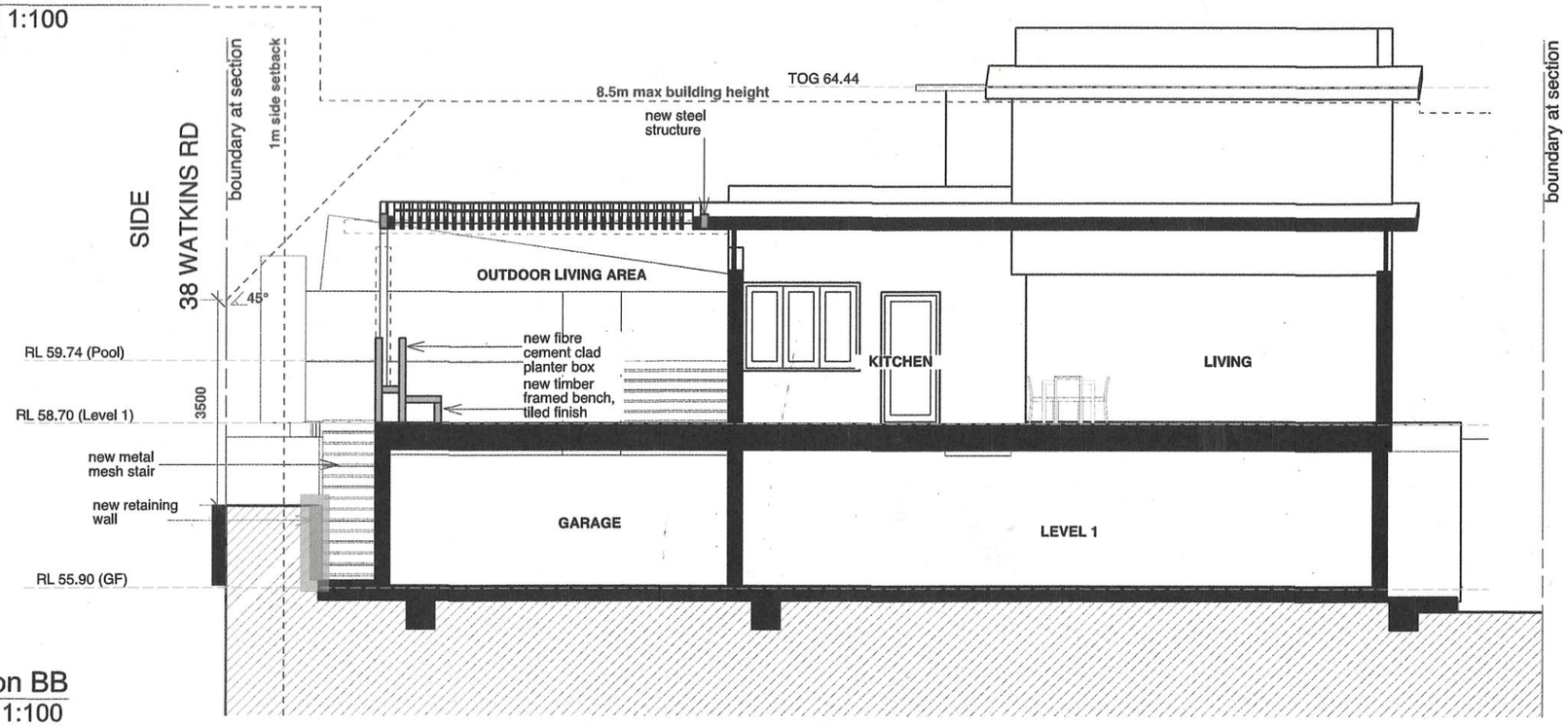
LISA & BRETT LEWTHWAITE (client)
36 WATKINS ROAD, AVALON BEACH 2107, LOT 31 DP 21756 (address)
ALTERATIONS AND ADDITIONS (AREA: 1528sqm) (project)
SITE ANALYSIS/PROPOSED SITE PLAN (title)

job no 1819
drawn by MB
checked by MW
scale @ a3 1:300
drawing no DA 04
issue F

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



1 Proposed Section AA
Scale: 1:100



2 Section BB
Scale: 1:100

FOR DEVELOPMENT APPLICATION ONLY

MICHELLE WALKER ARCHITECTS
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web | www.mwarchitects.net.au
reg | nominated architect # 6530

Member Australian Institute of Architects

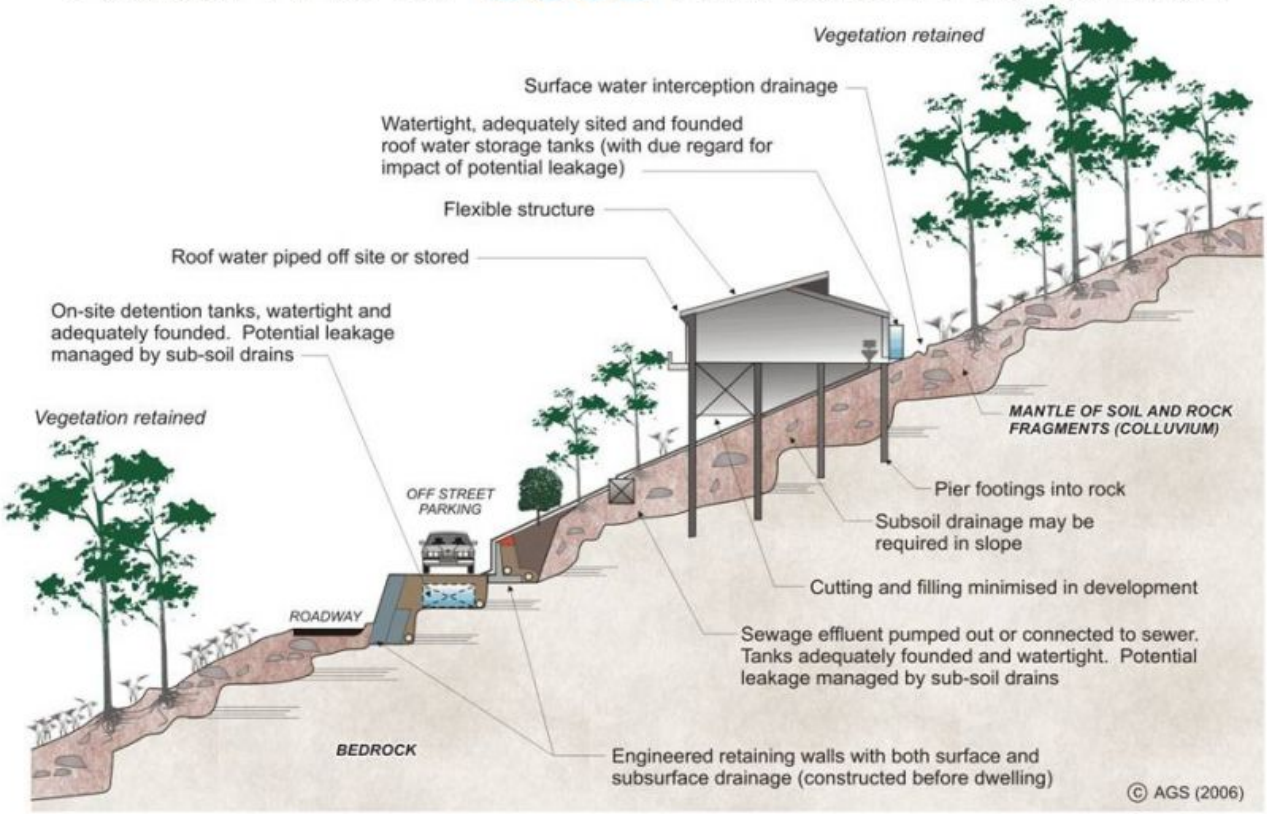
issue	amendment	date
A	MEASURED DRAWINGS	15/9/18
B	INITIAL SKETCH DESIGNS	13/11/18
C	PREFERRED SKETCH DESIGNS	28/08/19
D	PRELIMINARY COSTING	7/11/19
E	DRAFT DA ISSUE TO CONSULTANTS	6/12/19
F	DEVELOPMENT APPLICATION	17/12/19

true north

LISA & BRETT LEWTHWAITE | client
36 WATKINS ROAD, AVALON BEACH 2107, LOT 31 DP 21756 | address
ALTERATIONS AND ADDITIONS (AREA: 1528sqm) | project
PROPOSED SECTIONS | title

job no 1819
drawn by MB
checked by MW
scale @ a3 1:100
drawing no DA 08
issue F

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE