

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

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

Address of site 14 Capua Place, 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 10/9/19 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 14 Capua Place, Avalon

Report Date: 10/9/19

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	<u>14 Capua Place, Avalon</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>14 Capua Place, Avalon</u>
Report Date: <u>10/9/19</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 9/8/19  
(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 9/8/19
- ☒ 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 and New Garage at 14 Capua Place, Avalon**

#### **1. Proposed Development**

- 1.1** Construct a new secondary dwelling under the existing house.
- 1.2** Construct a new deck on the downhill side of the secondary dwelling.
- 1.3** Construct a new garage on the W side of the property.
- 1.4** Various other internal and external alterations.
- 1.5** Details of the proposed development are shown on 5 drawings prepared by Ross Brown, drawing numbered 2A is dated 24/8/19, drawing numbered 4A is dated 27/8/19, drawings numbered 3A and 5A are dated 28/8/19, and drawing numbered 1A is dated 30/8/19.

#### **2. Site Description**

- 2.1** The site was inspected on the 9<sup>th</sup> August, 2019.
- 2.2** This residential property is on the high side of Capua Place and has a S aspect. The block is also accessed by a Right of Carriageway (ROW) off Riviera Avenue. The block is located on the steeply graded middle reaches of a hillslope. The natural surface rises at a ~9m high cliff face at the road frontage to Capua Place before easing to average angles of ~22° across the remainder of the property. The slope above and below the property continues at similar angles.
- 2.3** A ~9m high cliff face rises from the road frontage to Capua Place (Photo 1). No significant undercutting or other geological defects were observed in the cliff face. Some filling has been placed to terraced the slope between the cliff and the downhill side of the house. The terraces are supported by a series of stable stack rock retaining walls (Photos 2 & 3). On the W side of the house, the slope has been terraced with

two stable stack rock retaining walls (Photo 4). These walls support a fill for a gravel parking area. The part two-storey timber framed and clad house is supported on steel posts and brick piers (Photo 5). The supporting posts and piers stand vertical. A gravel driveway runs under the house to a car parking area. The cut for the parking area is partially supported by a stack rock retaining wall and is partially unsupported (Photo 6). A new retaining wall will be constructed in this location as part of the proposed works. A brick and gravel ROW runs along the uphill side of the house (Photo 7). The ROW is accessed from Riviera Avenue. Competent Medium Strength Sandstone outcrops and steps up the slope that rises above the ROW and continues to the upper boundary (Photo 8).

### **3. Geology**

The Sydney 1:100 000 Geological sheet indicates the contact of the Hawkesbury Sandstone and the Newport Formation of the Narrabeen Group lies on approximately the lower boundary of the property. The geological boundaries on the map should be considered approximate and the actual contact can vary from the map on site.

### **4. Subsurface Investigation**

Three Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. 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:

### **DCP RESULTS ON THE 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 (~RL68.5)	DCP 2 (~RL71.6)	DCP 3 (~RL68.7)
0.0 to 0.3	6	38	3
0.3 to 0.6	13	12	10
0.6 to 0.9	10	#	17
0.9 to 1.2	33		14
1.2 to 1.5	40		#
1.5 to 1.8	#		
	End of Test @ 1.4m	Refusal on Rock @ 0.4m	Refusal on Rock @ 1.0m

#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 @ 1.4m, DCP still very slowly going down, tip not recovered.

DCP2 – Refusal on rock @ 0.4m, DCP bouncing off rock surface, white and maroon sandstone fragments on dry tip.

DCP3 – Refusal on rock @ 1.0m, DCP bouncing off rock surface, white impact dust on dry tip.

## 5. Geological Observations/Interpretation

The surface features of the block are controlled by the outcropping and underlying sandstone bedrock that steps up the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger, and the benches narrower. Where the slope eases, the opposite is true. The rock is overlain by natural sandy soils over firm to stiff sandy clays that fill the bench-step formation. Filling has been placed across the downhill side of the property for landscaped areas. In the test locations, the depth to Medium Strength Sandstone ranged between 0.4 to 1.0m below the current surface, being deeper where filling is present and due to the stepped nature of the underlying rock.

The subsurface materials were exposed in an exposed cut under the house (Photo 6). The exposed profile consisted of a thin manmade fill over stiff to hard clays. The clays merge into the underlying weathered rock at an average depth of ~0.8m below the current surface. The

weathered zone in this location is interpreted to be Very Low Strength Shale. As Medium Strength Sandstone was encountered in the other tests and was observed to be outcropping above and below this location, this is interpreted as a thin band of shale that extends through the otherwise sandstone-dominated profile. 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 normal sheet wash will move onto the site from above the property during heavy down pours. This will move down the slope at a relatively high velocity due to the steep slope.

## 8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below, or beside the property. The sandstone cliff face that rises from the road frontage is a potential hazard (**Hazard One**).

### Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The sandstone cliff face on the property failing and impacting on the proposed works (Photo 1).
LIKELIHOOD	'Rare' ( $10^{-5}$ )
CONSEQUENCES TO PROPERTY	'Major' (40%)
RISK TO PROPERTY	'Low' ( $6 \times 10^{-5}$ )
RISK TO LIFE	$9.96 \times 10^{-6}$ /annum
COMMENTS	This level of risk is 'ACCEPTABLE'.

(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

There is fall to Capua Place 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

A new retaining wall will be constructed under the house to support the existing excavation. 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 <sup>3</sup> )	'Active' K <sub>a</sub>	'At Rest' K <sub>0</sub>
Fill, Sandy Soil, and Residual Clays	20	0.40	0.55
Rock Up to Low Strength Rock - Jointed	24	0.25	0.35
Medium Strength Rock	24	0.00	0.10

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 so slope surcharge loads will need to be added. Rock strength 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 secondary dwelling and garage are to be supported on piers taken to the underlying Medium Strength Sandstone. These are expected to be ~1.0m deep. 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.



## 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

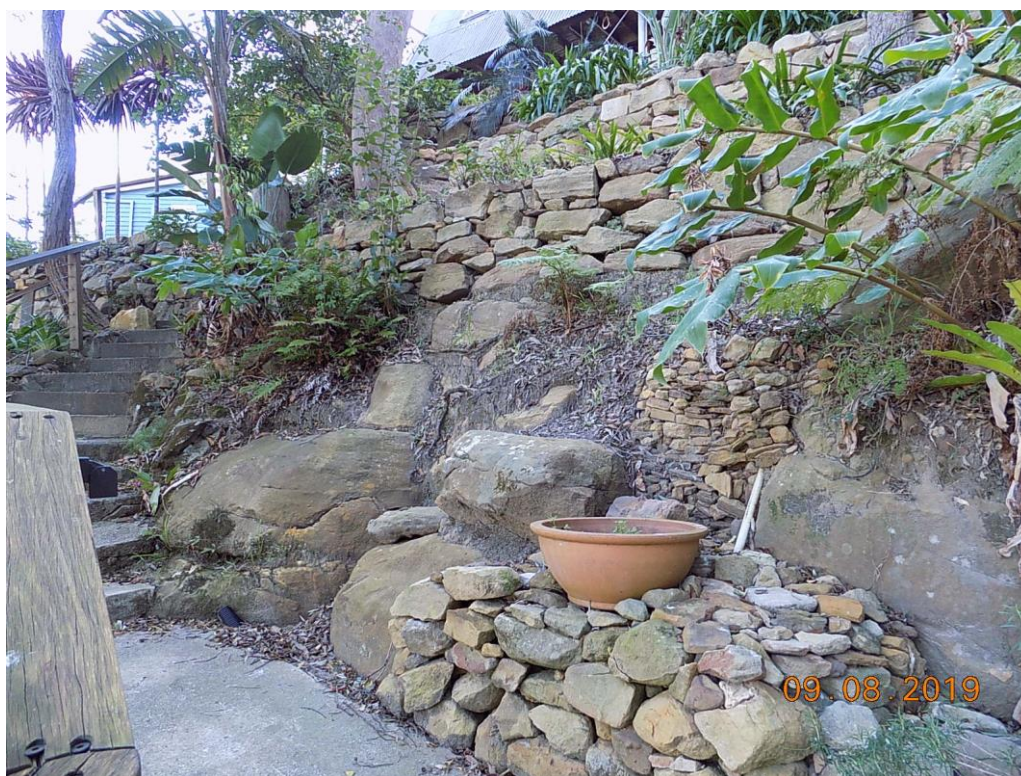


Photo 2





Photo 3



Photo 4





Photo 5



Photo 6





Photo 7



Photo 8

## 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:

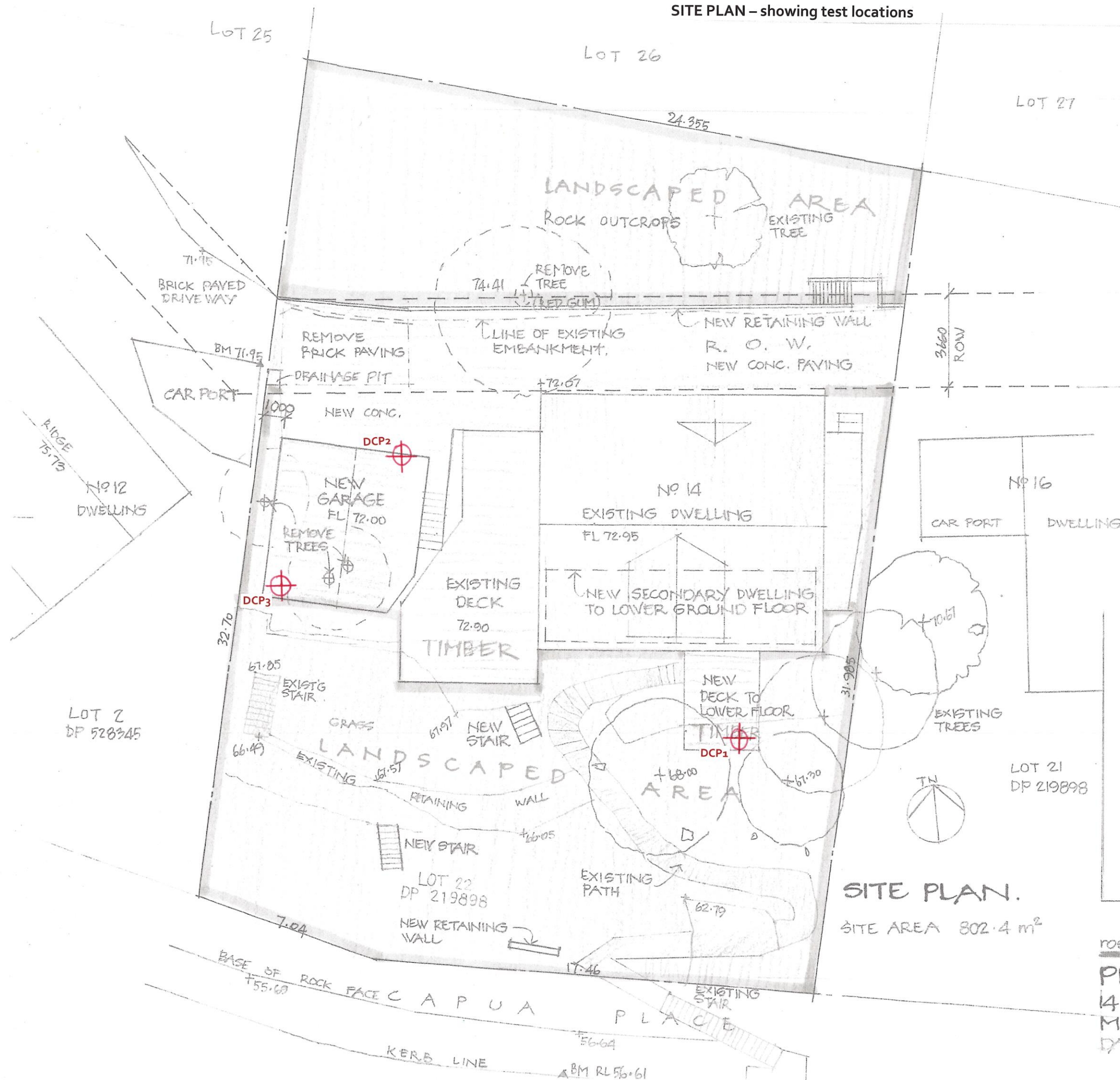
- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly 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.



LOT 25

LOT 26

LOT 27



**Proposed Landscaped area : 61%**

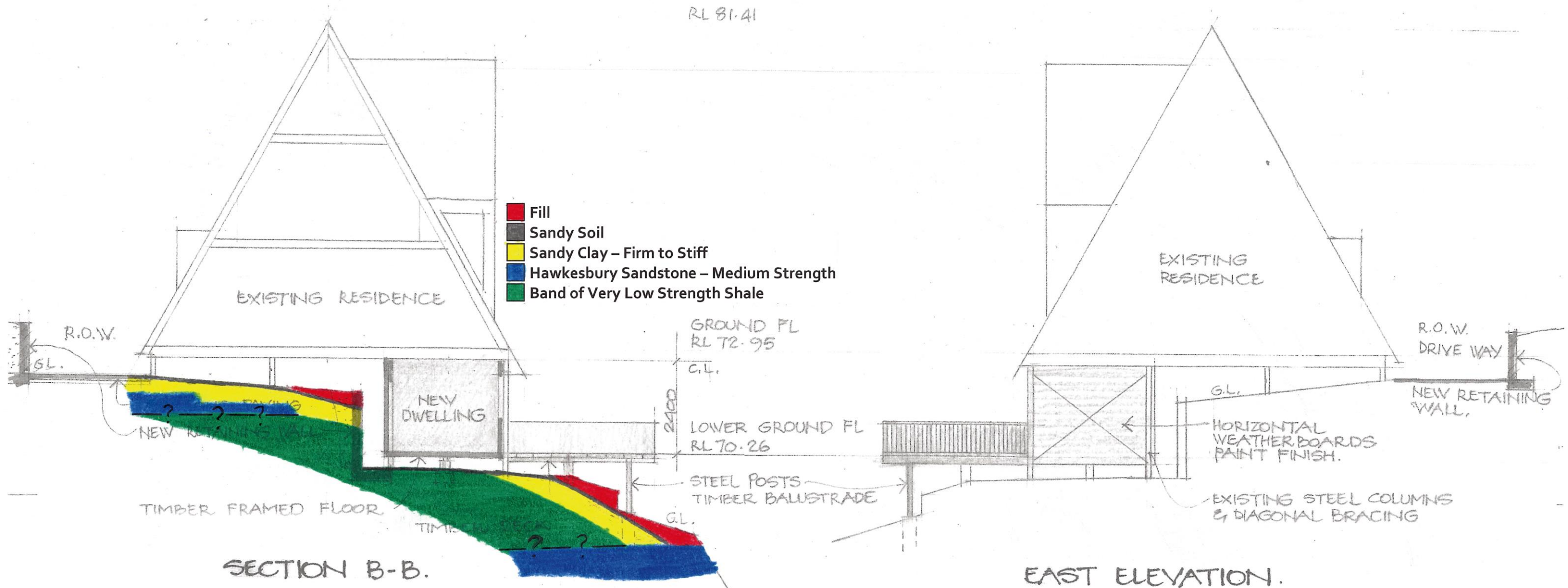
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PROPOSED ADDITIONS AT  
14 CAPUA PL AYALON FOR  
MR. M & MRS Y. PEARSE  
DATE 30. 8. 19

DWG 1A



# TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Window/glazed door no.	Maximum height (mm)	Maximum width (mm)	Type	Shading Device (Dimension within 10%)	Overshadowing
<b>South facing</b>					
W01	1000	2500	aluminium, single, clear	eave 400 mm, 100 mm above head of window or glazed door	not overshadowed
W02	1000	2600	aluminium, single, clear	eave 400 mm, 100 mm above head of window or glazed door	not overshadowed
W03	900	850	aluminium, single, clear	eave 400 mm, 100 mm above head of window or glazed door	not overshadowed
W04	1900	2600	aluminium, single, clear	eave 400 mm, 100 mm above head of window or glazed door	not overshadowed

Construction	Additional insulation required (R-Value)	Other specifications
floor - suspended floor above open subfloor, 31.8 square metres, framed	0.8 (or 1.5 including construction) (down)	
floor - above habitable rooms or mezzanine, 31.8 square metres, framed	nil	
external wall - framed (weatherboard, fibre cement, metal clad)	3.00 (or 3.40 including construction)	
ceiling and roof - flat ceiling / flat roof, framed	ceiling: 5 (up), roof: foil backed blanket (75 mm)	framed; medium (solar absorptance 0.475-0.70)

- Note** • Insulation specified in this Certificate must be installed in accordance with Part 3.12.1.1 of the Building Code of Australia.
- Note** • In some climate zones, insulation should be installed with due consideration of condensation and associated interaction with adjoining building materials.

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**PROPOSED ADDITIONS AT**

14 CAPUA PL. AVALON FOR  
MR. M & MRS Y. PEARSE

DATE 28.8.19

DWG 5A



# EXAMPLES OF **GOOD** HILLSIDE PRACTICE



# EXAMPLES OF **POOR** HILLSIDE PRACTICE

