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

Development Application for _____
Name of Applicant

Address of site 325 Whale Beach Road, Palm Beach

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 4/12/19 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 **325 Whale Beach Road, Palm Beach**

Report Date: 4/12/19

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 325 Whale Beach Road, Palm Beach

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 **325 Whale Beach Road, Palm Beach**

Report Date: 4/12/19

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **2/10/19**
(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 **2/10/19**

☒ 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:

New Pool at **325 Whale Beach Road, Palm Beach**

1. Proposed Development

1.1 Construct a new pool and deck on the downhill side of the property.

1.2 Various other external alterations.

1.3 Details of the proposed development are shown on 2 drawings by Landart, drawings numbered LMP01 and SE01, Revision B, dated 19/11/19.

1.4 The Coastal Engineering Report attached to the end of this report was completed by Horton Coastal Engineering and is referenced "IrJ0304-325 Whale Beach Road Palm Beach", dated 11/11/19

2. Site Description

2.1 The site was inspected on the 2nd October, 2019.

2.2 This waterfront residential property is on the low side of the road and has a NE aspect. The block is located on the moderately graded lower reaches of a hillslope. The natural surface falls across the property at an average angle of ~13°. The slope above the property gradually increases in grade. A ~15m high sea cliff falls to a ~50m wide rock platform below the property at the waterfront.

2.3 At the road frontage, a tile-paved driveway runs down and across the slope to a parking area on the uphill side of the property and to a garage attached to the uphill side of the house (Photo 1). The slope between the road frontage and the house is garden and lawn-covered (Photo 2). The single-storey rendered brick house is supported on brick walls and brick piers (Photo 3). No significant signs of movement were observed in the supporting brick walls and the supporting brick piers stand vertical. A moderately sloping lawn extends off the downhill side of the house to a

well-vegetated garden at the cliff-top (Photos 4 & 5). A ~15m high sea cliff falls from near the lower boundary to a rock platform below (Photo 6). It consists of competent Medium Strength Sandstone. The cliff face displays no significant undercutting or serious geological defects that could affect its stability. The rock platform has a covering of dislodged sandstone boulders at the cliff base. Some of the boulders were observed to be greater than 3m in diameter and effectively armour the cliff base from the erosional forces of storm surf.

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

Three 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 expected to have occurred in DCP1:

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** (~RL27.5)	**DCP 2** (~RL27.7)	**DCP 3** (~RL25.7)
0.0 to 0.3	5	1	4
0.3 to 0.6	1	6	13
0.6 to 0.9	#	9	17
0.9 to 1.2		23	35
1.2 to 1.5		30	#
1.5 to 1.8		#	
	Refusal @ 0.4m	End of Test @ 1.4m	End of Test @ 1.1m

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

DCP Notes:

DCP1 – Refusal @ 0.4m on likely obstruction in profile, DCP bouncing, wet muddy tip.
DCP2 – End of test @ 1.4m, DCP still very slowly going down, maroon shale fragments on dry tip, grey and maroon clay in collar above tip.
DCP3 – End of test @ 1.1m, DCP still very slowly going down, maroon shale on dry tip, maroon clay in collar above tip, and maroon shale streaking up rod.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the location of the proposed works they consist of a thin silty soil over firm to stiff clays. In the test locations, the clays merge into the weathered zone of the underlying shale at an average depth of ~0.9m below the current surface. DCP1 likely refused on an obstruction in the profile. The weathered zone is interpreted as Extremely Low Strength Shale. It is to be noted that this material can appear as a mottled stiff clay when it is cut up by excavation equipment. 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 clay and 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 works.

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. Whale Beach Road above will provide only limited drainage diversion from surface flows as the road is not guttered above the subject property.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderately graded slope that falls across the property and continues above is a potential hazard (**Hazard One**). The sea cliff that falls below the lower boundary is a potential hazard (**Hazard Two**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate slope that falls across the property and continues above failing and impacting on the property.	The long-term stability of the cliff below the property impacting on the property taking into consideration the allowance for erosion/weathering of the cliff as calculated by Horton Coastal Engineering in the next 100 years (Photo 6).
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	This level of risk is 'ACCEPTABLE'.	The base of the cliff is <5m seaward of the property. However, the rock platform continues seaward at the base of the cliff over a distance of ~70m and Horton Coastal Engineering has provided an 18mm/year allowance for erosion of the cliff. Thus, the cliff is not a significant risk to the property for well over 100 years. 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 the waterfront below. All stormwater or drainage runoff from the proposed development is to be piped to the waterfront.

11. Excavations

Apart from those for footings, no excavations are required.

12. Foundations

The proposed pool and deck can be supported on piers taken to and embedded ~0.6m into Extremely Low Strength Shale. This ground material is expected at an average depth of ~0.9m below the current surface so the required depth of the piered foundations is ~1.5m from the downhill side of the pier hole. A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low Strength Shale. It should be noted that this material is a soft rock and a rock auger will cut through it so the builders should not be looking for refusal to end the footings.

It is recommended 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 wet layer of 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.

13. 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 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 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

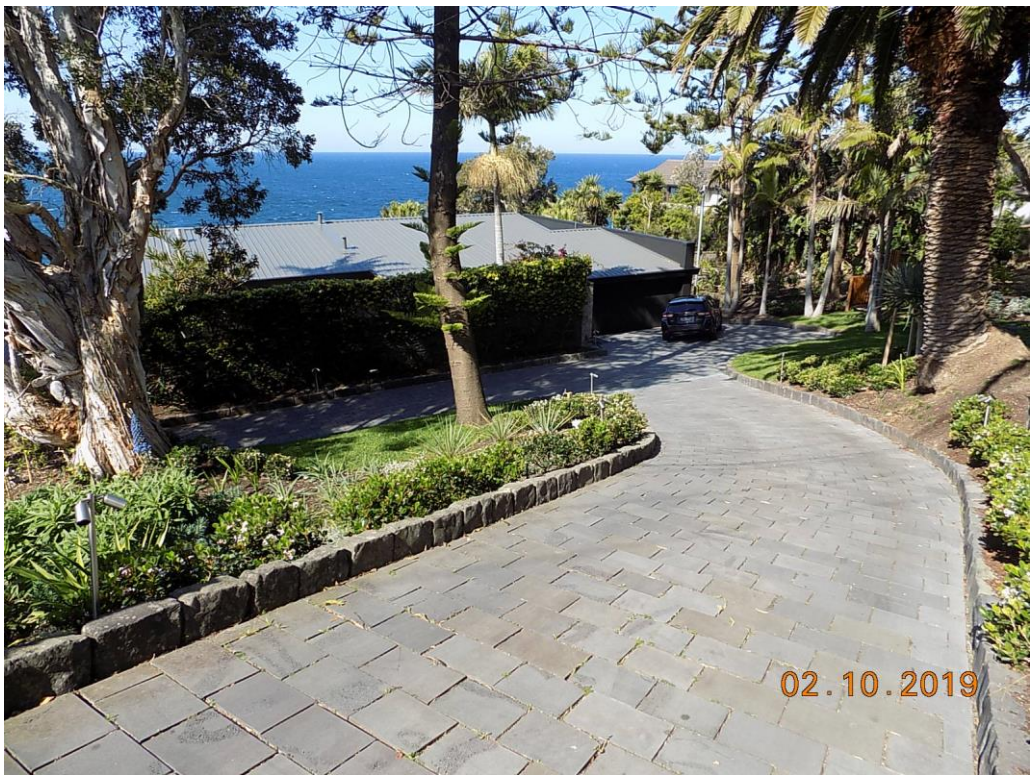


Photo 1

Photo 2

Photo 3

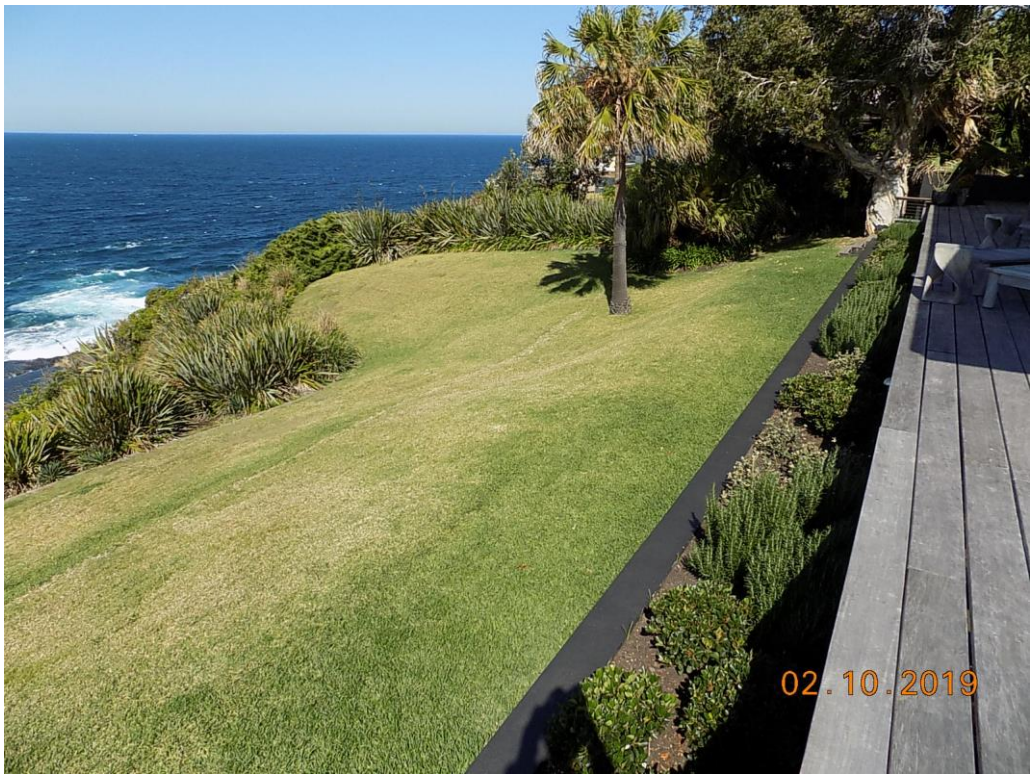


Photo 4

Photo 5

Photo 6

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.

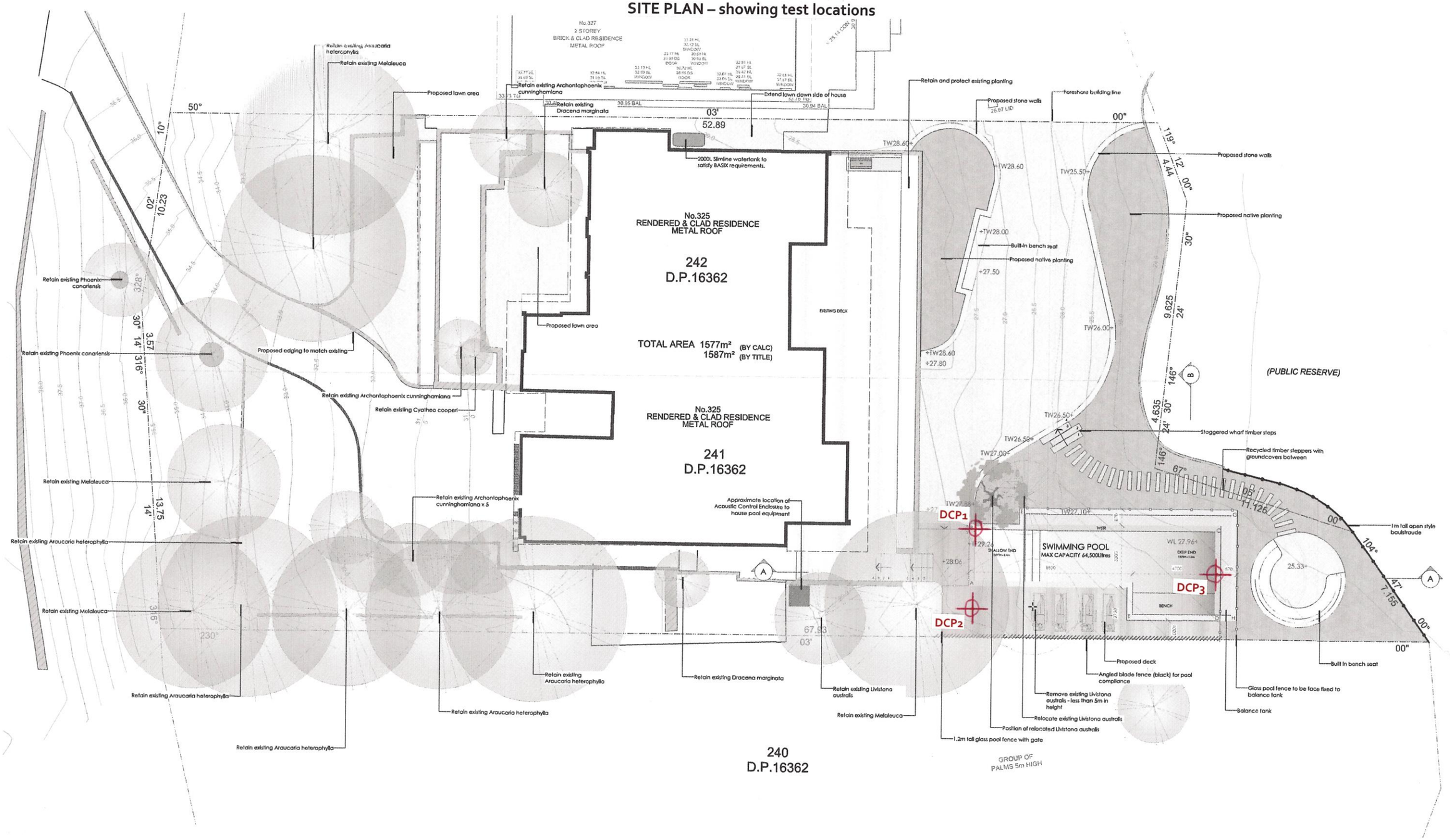
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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

- BENCHMARK ON KERB RL 93.95
- EXISTING SPOT LEVEL / PROPOSED SPOT LEVEL (+ 96.68)
- BOUNDARY LINE (APPROX LOCATION)
- FORESHORE BUILDING LINE (APPROX LOCATION)
- EXISTING WALLING TO BE RETAINED (TW=TOP OF WALL)
- PROPOSED MASONRY WALLING (TW= TOP OF WALL)
- POOL SAFETY FENCING (NOM 1200MM HIGH)
- POST BAULSTRAUDE (NOM 1000MM HIGH)
- PROPOSED TIMBER DECKING
- PROPOSED STEPPING STONES WITH PLANTING
- LAWN AREA
- GARDEN AREA
- EXISTING TREE TO BE RETAINED
- EXISTING TREE TO BE REMOVED
- PROPOSED TREE

GENERAL NOTES

- All civil, structural and hydraulic work associated with this project shall be to consulting engineer's details.
- All levels have been taken from the survey prepared by C.M.S Surveyors on 25 September 18.
- Exact location of site boundaries are to be confirmed on site by client or client's surveyor prior to commencement of work.
- This pool has not been designed for diving. Children should not be allowed in pool enclosure without adequate adult supervision.
- The design of this project is Copyright and shall not be copied or reproduced in any way without the prior written permission of Landart Landscapes Pty. Ltd.

CONSTRUCTION NOTES

Note 1: All materials and workmanship shall be in accordance with the latest relevant australian standard and building code of australia. All plumbing and drainage works shall also be in accordance with the by-laws of Sydney Water.

Note 2: Written dimensions shall take precedence over scaled measurements. all dimensions and levels shall be verified by contractor on site, and initial setout approved by construction manager prior to commencement of work. If in doubt, contact Landscape Architect / Designer.

Note 3: Contractor shall confirm extent of existing vegetation to be removed / transplanted on site, prior to commencement of works.

Note 4: Excavator shall strip approved topsoil from all areas to be excavated and shall store material in an approved location on site. All excavation shall be carried out as necessary, including over-excavation in lawn areas (as required) to ensure min. 200mm depth of topsoil is able to be provided and for garden areas (as required) to ensure that min. 350mm topsoil depth is able to be provided. Topsoil depths refer to depth over subsoil, not over rock or concrete.

Note 5: Contractor shall ensure that damp proof courses on buildings are not breached and that air vents are not blocked or restricted.

Note 6: Retaining walls shall be constructed to heights as necessary to retain existing/proposed ground levels, with final extent of all walling to be as required and to construction manager's on-site approval.

Note 7: Waterproofing and drainage line in gravel filled trench, or other approved drainage layer, shall be installed to rear of all walls where retaining.

Comparative levels

Approx height of pool surrounds relative to existing ground levels at points A - F are as follows:

A: + 0.25
B: + 0.36
C: + 2.81
D: + 2.06
E: + 1.56
F: + 0.35
G: + 2.1
H: + 1.1

0 1 2 5 10

SCALE 1:100

B	19/11/19	For DA submission
A	28/8/19	For external consultants review

Landart.
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Unit 2/68 Tullah St Willoughby NSW 2068
PO Box 705 Crows Nest NSW 1585
T: (02) 9958 0462
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PROJECT NORTH TRUE NORTH

CLIENT: Blampied & Webster Residence

PROJECT: 323-325 Whale Beach Road, Palm Beach
Lots 241 & 242 D.P. 16362

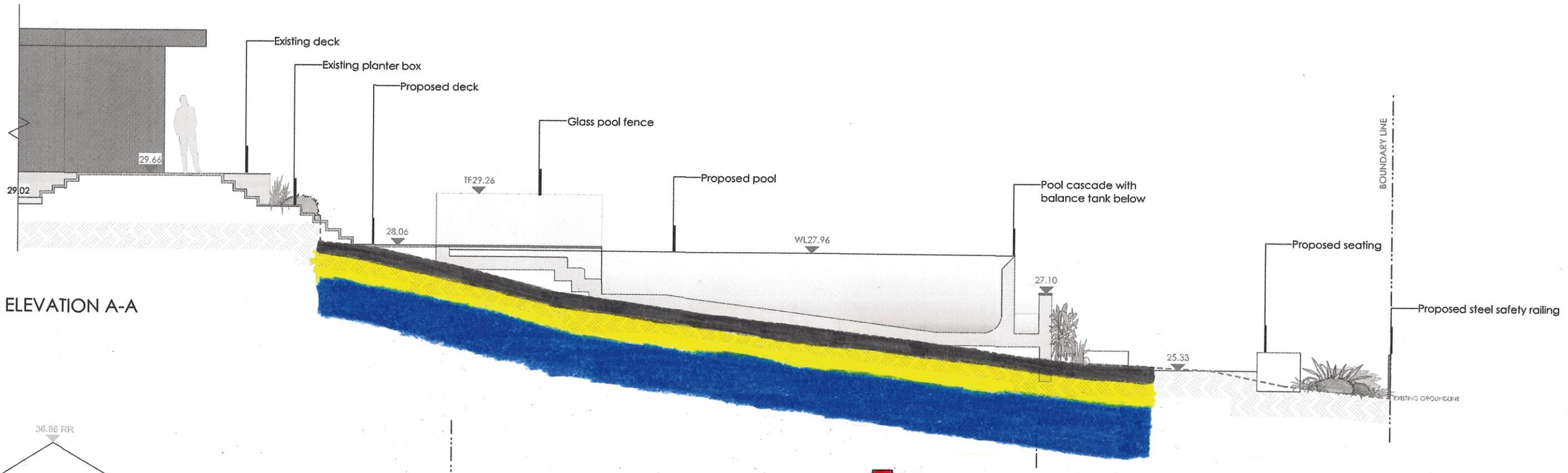
LANDSCAPE MASTER PLAN (LANDSCAPE AND POOL)

28/08/2019 | DRAWN: KB | SCALE: 1:100@A1

DWG NO: LMP 01

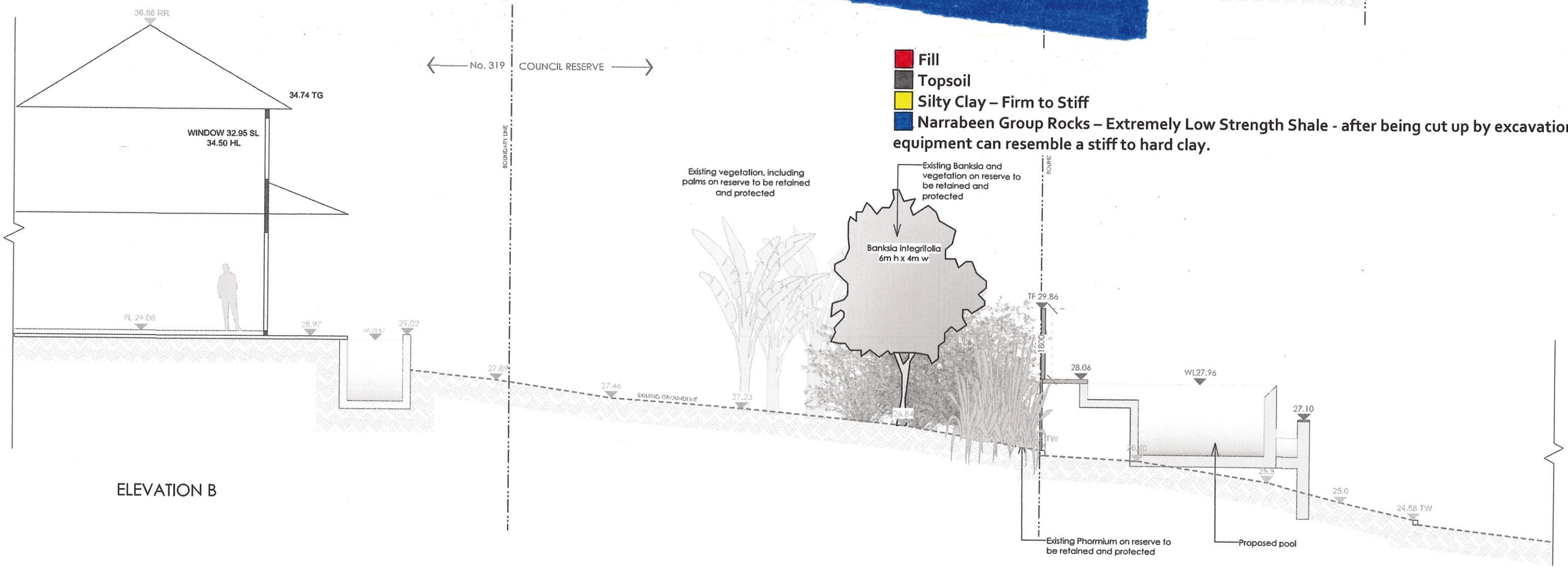
REVISION: B

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



ELEVATION A-A

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



ELEVATION B

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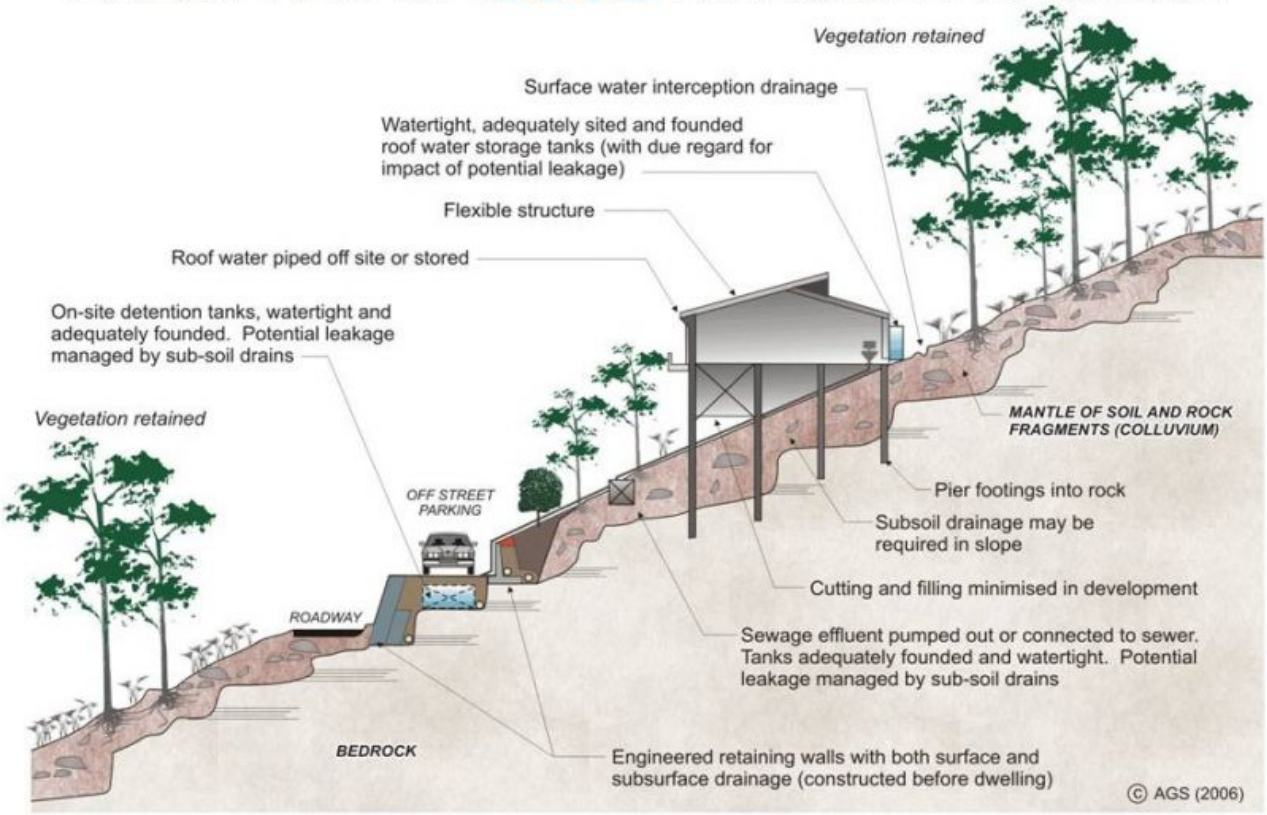
CLIENT: Blampied & Webster Residence	ELEVATIONS		
PROJECT: 323-325 Whale Beach Road, Palm Beach Lots 241 & 242 D.P. 16362	28/08/2019	DRAWN: KB	SCALE: 1:100@A3

DWG NO	REVISION
SE 01	B

B	19/11/19	For DA submission
A	24/9/19	For external consultants review

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE