J0152D.
8th December, 2023

63 Marine Parade, Avalon

Geotechnical Comments for Section 4.55

We have reviewed the existing geotechnical report, the original plans, the previous Section 4.55 Letter, and the 5 amended plans by ShimDesign, drawings numbered DWG 0319 1/5 to DWG 0319 5/5, Revision E, dated 10/9/23.

The changes are as follows:

- Extend the proposed lounge 2m downslope.
- Extend the proposed deck 2m downslope.
- Relocate Bed 3.
- Various other minor modifications to the house and external areas.

The changes are considered minor from a geotechnical perspective and do not alter the recommendations or the risk assessment in the original report carried out by this firm numbered J0152 and dated the 10th April, 2014.

White Geotechnical Group Pty Ltd.

Nathan Gardner
B.Sc. (Geol. & Geophys. & Env. Stud.)
Engineering Geologist & Environmental Scientist.

Reviewed By:

Ben White M.Sc. Geol.,
AIG., RPGeo Geotechnical & Engineering.
No. 10306
Engineering Geologist.

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No:
10306

63 Marine Parade, Avalon

Geotechnical Comments for Section 4.55

Proposed Changes

We have reviewed the existing geotechnical report, the original plans, and the amended plans by Shimdesign numbered 0514-1/5, dated 10/12/14, and 0319-2/5 to 5/5, dated 10/12/19.

The changes include:

- Relocate the proposed pool to the SE corner of the property and excavate to a maximum depth of ~2.0m.
- Construct a new addition to the N side of the house.
- Extend the proposed deck on the downhill side of the house.
- Various other internal and external modifications.

The proposed changes increase the overall risk of the development. As such we would add the following advice to the existing report, where the advice contradicts that in the existing report, it supersedes it:

Subsurface Investigation

Two additional Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock in the location of the proposed pool. The locations of the tests are shown on the site plan below.

DCP TEST RESULTS ON 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 7**	**DCP 8**
0.0 to 0.3	9	9
0.3 to 0.6	31	20
0.6 to 0.9	#	35
0.9 to 1.2		#
	Refusal on Rock @ 0.6m	End of Test @ 0.9m

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

DCP Notes:

DCP7 – Refusal on rock @ 0.6m, DCP bouncing off rock surface, brown impact dust on dry tip.
DCP8 – End of test @ 0.9m, DCP still very slowly going down, brown impact dust on dry tip.

Geological Observations and Interpretation

There is a band of Medium Strength Sandstone outcropping through the slope above the retaining wall above the house. The sandstone forms the weather-resistant cap of the sea cliff below.

Geotechnical Hazards and Risk Analysis

The vibrations from the proposed excavation are a potential hazard (**Hazard One**). The excavation for the proposed pool is a potential hazard until the retaining walls are in place (**Hazard Two**).

RISK ANALYSIS SUMMARY ON THE NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The vibrations produced during the proposed excavation impacting on the surrounding structures.	The excavation for the proposed pool (up to a depth of ~2.0m) collapsing onto the work site before retaining walls are in place.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-2})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-3})
RISK TO LIFE	5.3×10^{-7}/annum	5.3×10^{-5}/annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations below are to be followed.	'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.

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

Excavation Support Requirements

During the excavation process, the geotechnical consultant is to inspect the cut in 1.5m intervals as it is lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and no additional temporary support is required.

Refer to the existing excavation support advice.

Vibrations

Possible vibrations generated during excavations through fill, sandy soils, sandy clays, and weathered shale will be below the threshold limit for building damage.

Medium Strength Sandstone may be encountered during the excavation for the proposed pool. Excavations through rock should be carried out to minimise the potential to cause

vibration damage to the subject house. The subject house will be as close as ~5.0m from the edge of the excavation. Close controls by the contractor over rock excavation are recommended so excessive vibrations are not generated.

Excavation methods are to be used that limit peak particle velocity to 10mm/sec at the supporting walls of the subject house and property boundaries. Vibration monitoring will be required to verify this is achieved.

If a milling head is used to grind the rock, vibration monitoring will not be required. Alternatively, if rock sawing is carried out around the perimeter of the excavation boundaries in not less than 1.0m lifts, a rock hammer up to 300kg could be used to break the rock without vibration monitoring. Peak particle velocity will be less than 10mm/sec at the supporting walls of the subject house and property boundaries using this method provided the saw cuts are kept well below the rock to broken.

It is worth noting that vibrations that are below thresholds for building damage may be felt by the occupants of the subject and neighbouring properties.

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 inspections have not been carried out during the construction process.

- During the excavation process, the geotechnical consultant is to inspect the cut in 1.5m intervals as it is lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and no temporary support is required.

Conclusion

Provided these recommendations are followed as well as the recommendations in the original attached report carried out by this firm, we consider the proposed works have an 'acceptable' risk level in accordance with the 2009 Geotechnical Risk Management Policy for Pittwater. Additionally, the proposed changes do not impact on the stability of the coastal scarp/cliff.

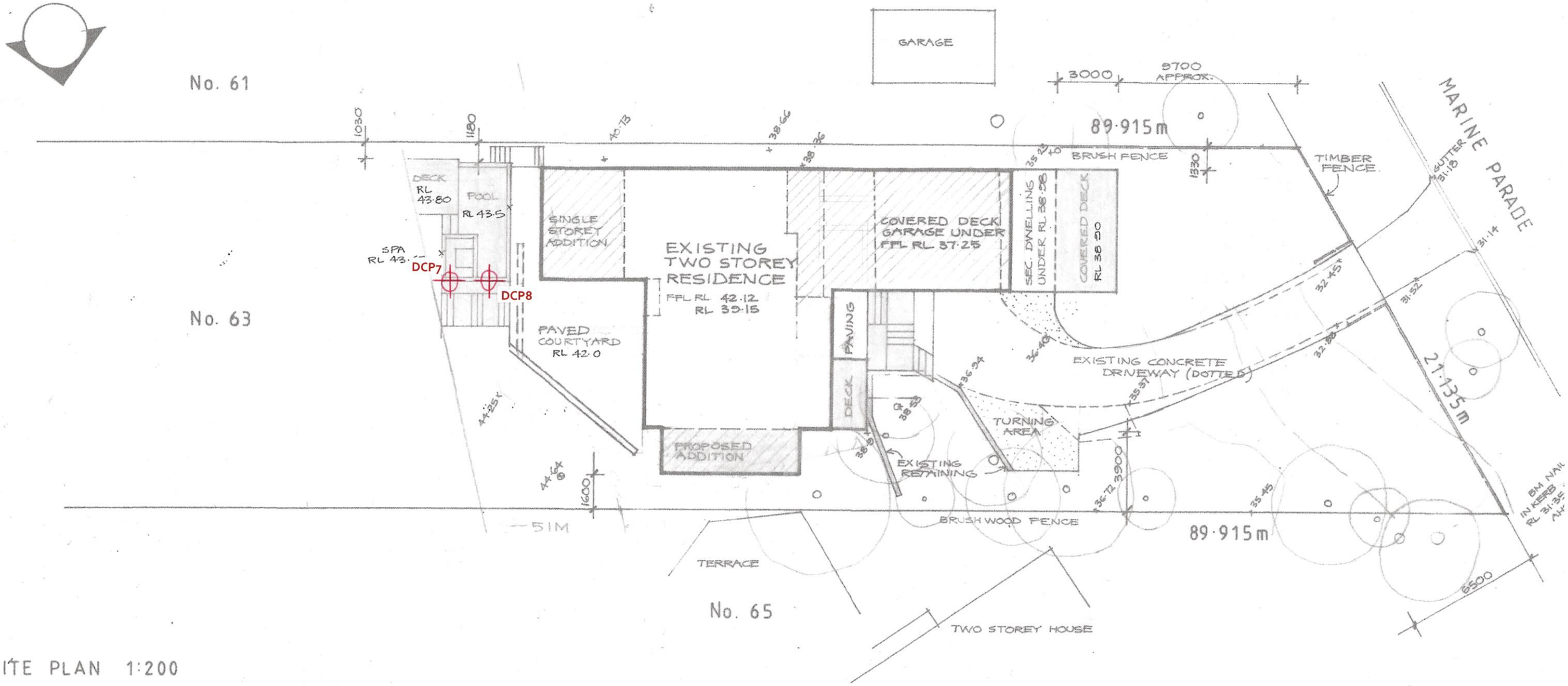
White Geotechnical Group Pty Ltd.

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

NOTES

ALL DIMENSIONS SHOULD BE VERIFIED ON SITE BY THE BUILDER WHO WILL BE RESPONSIBLE FOR THE ACCURATE SETTING OUT OF THE JOB
ALL CONSTRUCTION IS TO COMPLY WITHTHE RELEVANT BUILDING CODES AND LOCAL COUNCIL REQUIREMENTS
ALL DIMENSIONS THAT RELATE TO SITE BOUNDARIES AND EASEMENTS ARE SUBJECT TO VERIFICATION BY A SITE SURVEY
ROOF WATER AND SUBSOIL DRAINAGE TO BE DISPODED OF IN THE APPROVED MANNER OR AS DIRECTED
DOWN PIPE LOCATION TO BE DETERMINED BY THE ROOF PLUMBER
ELECTRICAL, POWER AND LIGHT OUTLETS TO BE DETERMINED BY THE OWNER
STRUCTURAL DETAIL AND DESIGN TO BE APPROVED BY A STRUCTURAL ENGINEER
ANY ADDITIONAL DETAILING SHALL BE RESOLVED BETWEEN THE OWNER AND THE BUILDER
ALL LEVELS TO AUSTRALIAN HEIGHT DATUM

SITE PLAN – showing additional test locations



SITE PLAN 1:200
LOT 109 DP 8394 AREA 1644m²

10·12·14 MODIFICATION TO DA NO 263/14
24·11·14 REDUCE ROOF TO DECK / DELETE CABANA ROOF PERGOLA IN LIEU.

PROPOSED ALTERATIONS AND ADDITIONS
WISEMAN RESIDENCE 63 MARINE PARADE AVALON
MAY 2014 DWG 0514 – 1/5 SHIMDESIGN design and drafting 0400 898 744

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

Development Application for R & R Wiseman
Name of Applicant

Address of site **63 MARINE PARADE, AVALON**

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 12/5/14 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 $2million.
I have:

Please mark appropriate box

☒ 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

☒ I 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 paragraph 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy fro 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 am of the opinion that the Development Application only involves Minor Development/Alterations that do not require a Detailed Geotechnical Risk Assessment and hence my report is in accordance with the Geotechnical Risk Management Policy for Pittwater – 2009 requirements for Minor Development/Alterations.

☐ Provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: Geotechnical report **63 MARINE PARADE, AVALON**

Report Date: 10/5/14

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 R & R Wiseman
Name of Applicant

Address of site **63 MARINE PARADE, 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 **63 MARINE PARADE, AVALON**

Report Date: 10/5/14

Author : BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted 7/5/14 (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 7/5/14

☒ 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 & Additions at **63 Marine Parade, Avalon**

1. Proposed Development

2.1 Extend the house on the uphill and downhill sides.

2.2 Construct a pool and deck as well as a covered deck on the uphill side of the house.

2.2 Details of the proposed development are shown on 5 drawings prepared by SchimDesign, numbered 0514- 1 to 5 and dated May 2014.

2. Site Description

2.1 The site was inspected on the 7th May 2014.

2.2 This residential property is on the high side of the road and has a westerly aspect. It encompasses a hill side slope that rises to the east and a coastal scarp that drops from the crest of this slope at near vertical angles some 50m to the rock platform and ocean below. The eastern property boundary follows the approximate base of the cliff. The grade across the eastern slope averages some 15 degrees. It eases towards the road and is steeper above the house.

2.3 At the road frontage a concrete paved driveway climbs the slope to a brick carport below the house (Photo 1 & 2). The carport is constructed over a cut and fill in the slope. The cut is supported by a brick wall. The fill merges into the natural slope. The house is a two storey brick structure and has also been supported on a cut and fill. At the higher northern side sandstone bedrock is exposed in the cut. At the southern downhill corner some settlement is evident in the exterior supporting wall, where it is likely supported on the fill (Photo 3). On the uphill side of the house a cut has been made in the slope to provide a lawn area. The cut is supported by a brick wall that has cracked and tilted (Photo 4). This wall will be replaced as part of the works. Above the wall sandstone bedrock that caps the cliff outcrops and rises to the crest of the slope. At the crest the surface is level for ~10m before the cliff drops to the ocean (Photo 5). The top half of the face is horizontally bedded sandstone with shale beds forming the lower half (Photo 6). Some minor undercutting was observed through the upper sandstone beds but the majority of the face within the property contained no undercutting and is considered stable. The base of the cliff is protected from the erosive forces of wave action by the rock platform and boulders that have accumulated at the base of the cliff as part of the normal weathering process.

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

Five DCP (Dynamic Cone Penetrometer) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. The location of the tests are shown on the site plan and the results are as follows:

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	DCP 2	DCP 3	DCP 4	DCP 5	DCP 6
0.0 to 0.3	1	4	7	2	8	5
0.3 to 0.6	2	13	17	3	22	29
0.6 to 0.9	21	20	#	6	#	35
0.9 to 1.2	21	#		11		#
1.2 to 1.5	#			11		
1.5 to 1.8				32		
				#		
	End of test@ 1.2m	End of test@ 0.9m	End of test@ 0.6m	End of test@ 1.8m	Refusal @ 0.6m	End of test@ 0.9m

refusal/end of test.

Notes:
DCP1 – end of test @ 1.2m, nothing on dry tip.
DCP2 – end of test @ 0.9m, nothing on dry tip.
DCP3 – end of test @ 0.6m, nothing on dry tip.
DCP4 – end of test @ 0.1.8m, nothing on dry tip.
DCP5 – refusal @ 0.6m on rock, orange impact dust on dry tip.
DCP6 – end of test @ 0.9m, light brown impact dust on dry tip.

5. Geological Observations and Interpretation

The slope materials are colluvial at the near surface and residual at depth. They consist of sandy clays and clays with rock fragments throughout the profile. The sandy clays and clays merge into the weathered zone of the under lying rocks at depths expected to be in the range 0.6 to 1.5m. The weathered shale can appear as a mottled maroon to light grey stiff clay when it is cut up by excavation equipment. Fill is expected at the southern downhill corner of the house, behind the brick retaining wall on the downhill side of the house and below the downhill side of the garage.

6. Groundwater

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

Due to the cliff side location and elevation, the water table in this location is expected to be many metres below the surface.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. Normal sheet wash will move down the slope during heavy down pours.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed on, beside or above the property. The coastal cliff may be considered a potential hazard (**Hazard One**).

Hazard One – Qualitative Risk Assessment on Property

The cliff is some 25m from the eastern side of the house and drops ~ 50m to the rock platform and ocean below. The cliff is made up of horizontally bedded sandstone and shale. The base of the cliff is armoured from the erosive forces of wave action by the rock platform and by boulders at the toe of the cliff. Little undercutting is present in the cliff face within the property boundaries. The average rate of erosion as inferred from the geological record is 5 to 10mm/ year for coastal cliffs in the area. The likelihood of the cliff failing and impacting on the house is 'Rare' (10^{-5}). The consequences to property of such a failure are assessed as 'Major' (60%). The risk to property is 'Low' (6×10^{-6}).

Hazard One – Quantitative Risk Assessment on Property

For loss of life risk can be calculated as follows:

$R_{(LoI)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$ (See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

Annual Probability

The rate of erosion on this cliff face is relatively slow.

$P_{(H)}$ = 0.00001/annum

Probability of Spatial Impact

The cliff would fail in a long series of small failures before reaching the house. Even accounting for possible sea level rise the process would still be relatively slow.

$P_{(S:H)}$ = 0.01

Possibility of the Location Being Occupied During Failure

The average household is taken to be occupied by 4 people. It is estimated that 1 person is in the house for 20 hours a day, 7 days a week. It is estimated 3 people are in the house 12 hours a day, 5 days a week.

For the person most at risk:

$$\frac{20}{24} x \frac{7}{7} = 0.83$$

$P_{(T:S)}$ = 0.83

Probability of Loss of Life on Impact of Failure

If the cliff failed from below the house it is estimated that the vulnerability of a person to being killed in the house when a failure occurs is 1.0.

$V_{(D:T)}$ = 1.0

Risk Estimation

$R_{(LoI)}$ = 0.00001 x 0.01 x 0.83 x 1.0

= 0.000000083

$R_{(LoI)} = 8.3 \times 10^{-8}$/annum **NOTE:** This level of risk is 'ACCEPTABLE'.

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 of the property is to the street so any stormwater runoff from the proposed development can be piped to the drainage system for the street through any tanks that may be required by the regulating authorities.

11. Excavations.

Some minor excavation will be required for levelling and a 1.0m excavation is required for the plunge pool.

12. Vibrations.

Given the distances to the neighbouring structures any vibrations generated from the low excavations carried out with a small to medium sized machine with bucket and/or pneumatic hammer will be well below the threshold limit for building damage.

13. Excavation Support Requirements

Any low excavations are to be battered at 1.0 Vertical to 2.0 Horizontal or be supported by retaining structures.

Where the brick retaining wall on the uphill side of the house is to be demolished and rebuilt with a new retaining wall, the batter behind the wall will stand at near vertical angles provided the batters are covered and kept from getting wet in the short period before the new wall is built. The same applies to the excavation for the pool.

Any cut batters are to be covered to prevent the access of water in wet weather and loss of moisture in dry weather. Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. The materials and labour to construct the retaining walls/ pool structure are to be organised so on completion of the excavations they can be built as soon as possible. No excavations are to commence if heavy or prolonged rainfall is forecast.

14. Retaining Walls

Free standing cantilever retaining walls supporting soil and clay can be designed for a triangular lateral earth pressure distribution and an 'active' earth pressure coefficient K_a of 0.35 for soil, clay and shale. Assume a bulk density of 20kN/m^3 for soil and clay and 22kN/m^3 for rock.

All retaining walls are to have sufficient back wall drainage and be backfilled immediately behind the wall with free draining material such as gravel that is wrapped in a non-woven Geotextile fabric (i.e. Bidim A34 or similar), to prevent the drainage from becoming clogged with silt and clay.

15. Site Classification

The site classification in accordance with AS2870-2011 is Class M.

16. Foundations

For flexible structures (such as timber framed and clad) footings can be supported on strip footings or pads supported on firm to stiff clays of the natural profile. An allowable bearing pressure of 300kPa can be assumed.

For more rigid structures (such as masonry) it is recommended footings be supported off weathered shale. An allowable bearing pressure of 600kPa can be assumed.

Each structure is to be supported on a uniform bearing material across the structure unless, where appropriate, articulated joints are installed to allow independent movement across the structure

To avoid further footing excavation in clay and shale the footings should be dug, inspected and poured with minimal delay so the weather does not deteriorate the footing surface. Exposure to wet weather will soften the footing surface and exposure to dry weather will cause it to crack.

NOTE: If the contractor is unsure of the footing material required it is more cost effective to get the geotechnical engineer/geologist 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.

17. Subgrade Preparation/Filling

No special subgrade preparation is required and no filling is shown on the plans.

18. Inspections

- All footings are to be inspected and approved by the site geotechnical professional before concrete is place.

19. Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The coastal cliff failing and impacting on the house.
LIKELIHOOD	'Rare' (10^{-5})
CONSEQUENCES TO PROPERTY	'Major' (60%)
RISK TO PROPERTY	'Low' (6×10^{-6})
RISK TO LIFE	8.3×10^{-8}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.

White Geotechnical Group Pty Ltd.

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

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 these 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 tests 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 engineer/ geologist. 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 by its very nature 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 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.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

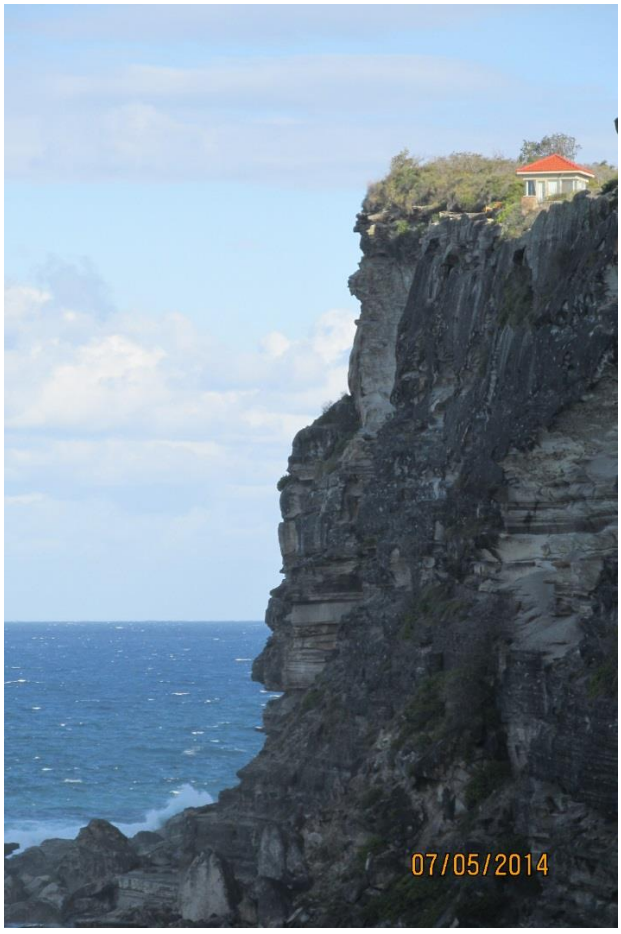
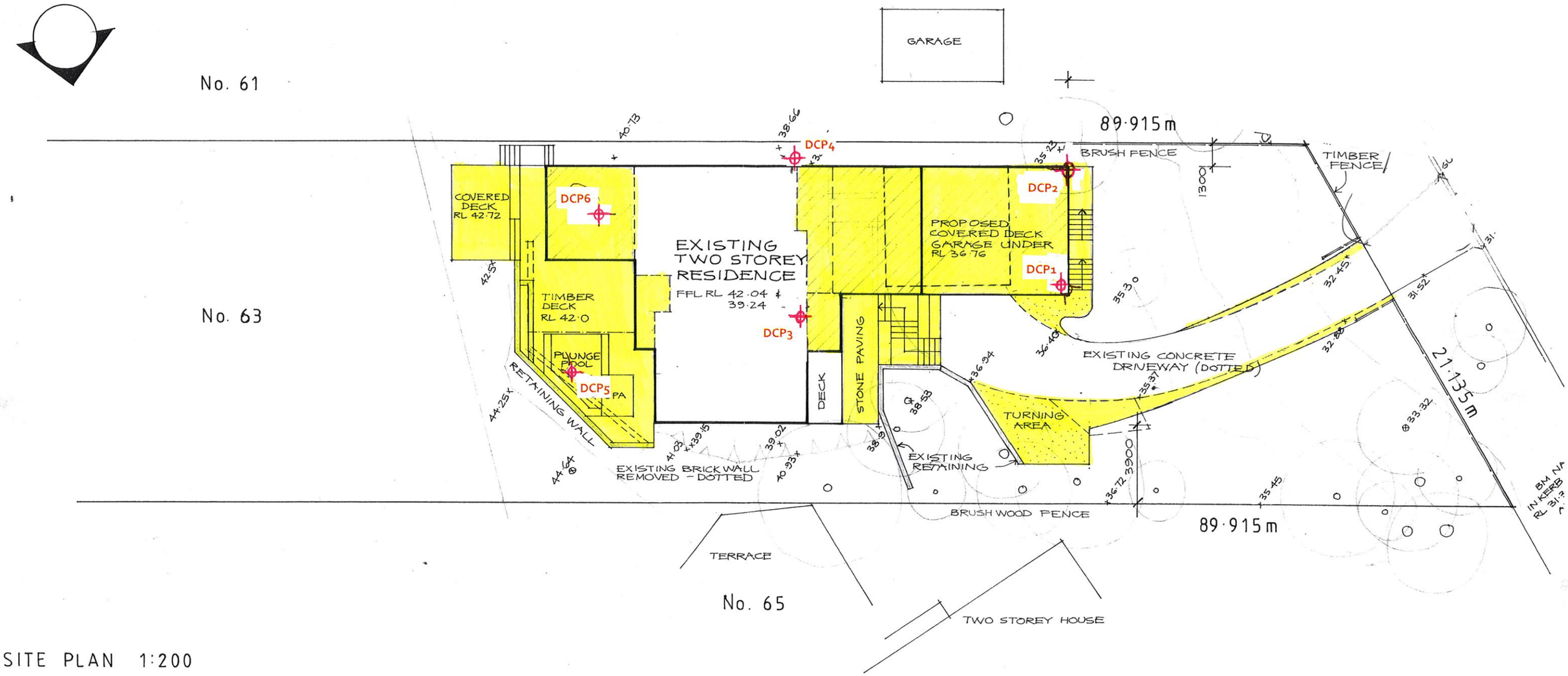


Photo 6

SITE PLAN – showing test locations



SITE PLAN 1:200

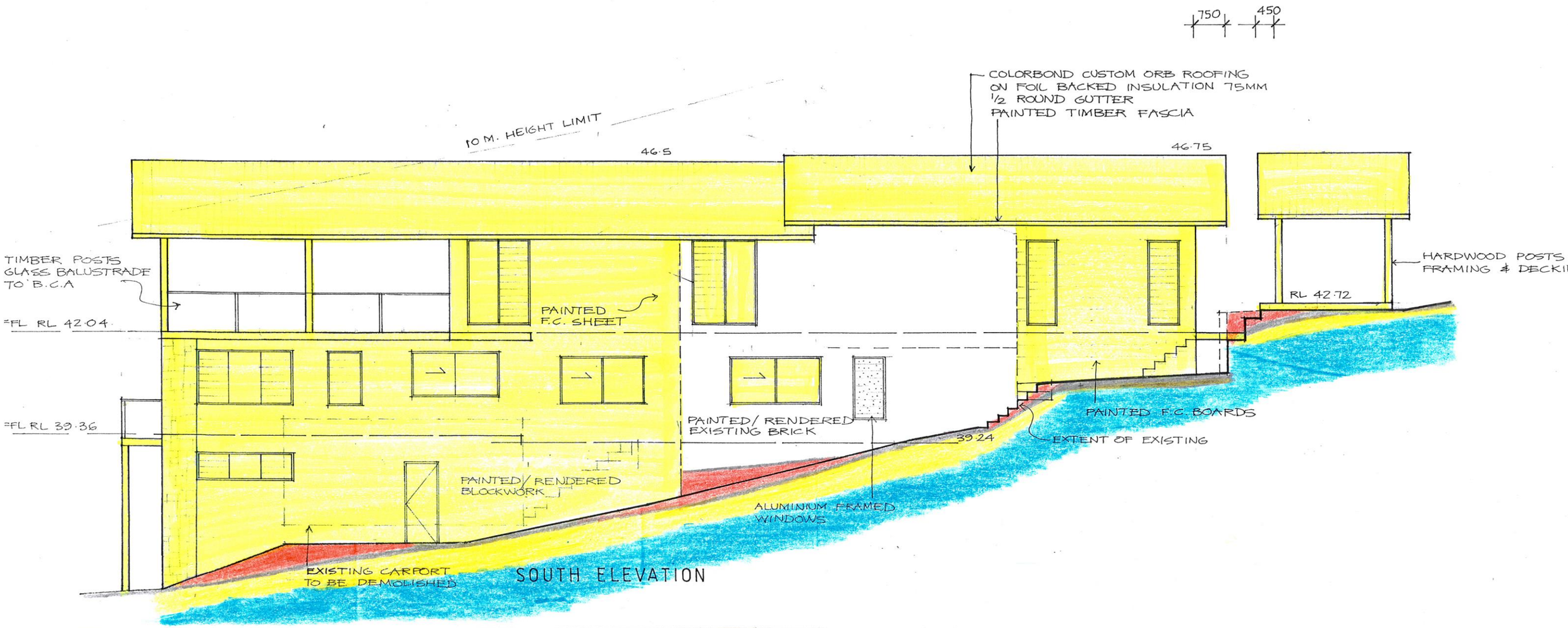
LOT 109 DP 8394 AREA 1644m²

Site Plan
63 Marine Parade, Avalon
J0152
Scale as per dimensions

PROPOSED ALTERATIONS AND ADDITIONS
WISEMAN RESIDENCE 63 MARINE PARADE AVALON
MAY 2014 DWG 0514 – 1/ 5 **SHIMDESIGN** design and drafting 0400 898 744

TYPE SECTION

Fill
Topsoil
Sandy Clay
Narrabeen Group Rocks – sandstone beds expected above the house, shale beds expected below - on encounter after excavation can resemble a stiff to hard clay



Type Section
63 Marine Parade, Avalon
J0152
Scale 1 :100

PROPOSED ALTERATIONS AND ADDITIONS
WISEMAN RESIDENCE 63 MARINE PARADE AVALON
MAY 2014 DWG 0514 –4/ 5 **SHIMDESIGN** design and drafting 0400 898 744