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

Development Application for _____
Name of Applicant

Address of site 39B Ocean 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 18/2/22 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 **39B Ocean Road, Palm Beach**
Report Date: 18/2/22

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 39B Ocean 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 **39B Ocean Road, Palm Beach**

Report Date: 18/2/22

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **15/2/22**
(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 **15/2/22**

☒ 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 Cabana at **39B Ocean Road, Palm Beach**

1. Proposed Development

1.1 Construct a Cabana on the downhill side of the property by excavating to a maximum depth of ~2.0m.

1.2 Details of the proposed development are shown on 7 drawings prepared by Cadence and Co, drawings numbered A00 to A06, dated 3.2.2022.

2. Site Description

2.1 The site was inspected on the 15th February, 2022.

2.2 This dual-access residential property is on the low side of Florida Road and high side of Ocean Road. The block has an E aspect. It is located on the gentle to steeply graded lower reaches of a hillslope that falls to Palm Beach. From the downhill side of the property to the uphill side of the house the slope rises at an average angle of ~9° and continues at ~30° to the uphill road frontage. The slope above the property continues at steep angles, the slope below the property eases to the waterfront.

2.3 At the road frontage to Ocean Road, a Right of Carriageway (ROW) runs up the slope to a gate at the property frontage (Photo 1). A paved driveway runs from the gate to a paved parking area and garage under the subject house (Photo 2). A retaining wall along the E side of the downhill boundary supports a fill for a level lawn that extends off the downhill side of the house (Photo 3). The downhill side of the wall was not accessible however, no signs of movement were observed in the soil immediately behind the wall on the uphill side. The part three-storey rendered brick house is supported on brick walls. The external walls of the house showed no significant signs of movement. A pool on the E side of the property appears to be in good condition

with no significant signs of cracking or movement observed in the visible pool shell (Photos 4). Stable sandstone block retaining walls reaching a maximum height of ~1.0m support a cut for a staircase that runs up the E side of the house (Photo 5). The block narrows above the uphill side of the house and continues up the slope to Florida Road above. Medium to large detached sandstone joint blocks scatter the steep slope (Photo 6). A stable ~2.2m high sandstone block retaining wall supports a fill for a level area on the uphill side of the property (Photo 7).

3. Geology

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

4. Subsurface Investigation

One hand Auger Hole (AH) was put down to identify soil materials. Six 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 attached. 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. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations. See the appended “Important information about your report” for a more comprehensive explanation. The results are as follows:

GROUND TEST RESULTS ON THE NEXT PAGE

AUGER HOLE 1 (~RL33.6) **–** AH1 (Photo 8)

Depth (m)	Material Encountered
0.0 to 0.5	**FILL**, sandy soil, brown, loose, rock fragments, fine to medium grained, dry.
0.5 to 0.6	**SILTY SAND**, light brown, loose, rock fragments, fine to medium grained, dry.

End of test @ 0.6m in silty sand. No watertable encountered.

DCP TEST RESULTS – Dynamic Cone Penetrometer

Equipment: 9kg hammer, 510mm drop, conical tip. Standard: AS1289.6.3.2 - 1997

Depth(m) Blows/0.3m	DCP 1 (~RL23.1)	DCP 2 (~RL22.4)	DCP 3 (~RL21.7)	DCP 4 (~RL33.6)	DCP 5 (~RL27.7)	DCP 6 (~RL31.1)
0.0 to 0.3	6	6	5	2	6	4
0.3 to 0.6	8	8	8	7	20	7
0.6 to 0.9	12	11	17	14	8	7
0.9 to 1.2	16	16	13	24	#	8
1.2 to 1.5	21	20	17	#		26
1.5 to 1.8	25	21	24			#
1.8 to 2.1	30	25	31			
2.1 to 2.4	#	31	#			
2.4 to 2.7		#				
	End of Test @ 2.1m	End of Test @ 2.4m	End of Test @ 2.1m	Refusal on Rock @ 1.2m	Refusal on Rock @ 0.7m	Refusal on Rock @ 1.4m

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

DCP NOTES ON THE NEXT PAGE

DCP Notes:

DCP1 – End of test @ 2.1m, DCP still going down slowly, orange clay on wet tip.
DCP2 – End of test @ 2.4m, DCP still going down slowly, orange and red clay on wet tip.
DCP3 – End of test @ 2.1m, DCP still going down slowly, orange, brown, and red clay on wet tip.
DCP4 – Refusal on rock @ 1.2m, DCP bouncing off rock surface, red shale on dry tip.
DCP5 – Refusal on rock @ 0.7m, DCP bouncing off rock surface, red rock fragments on dry tip.
DCP6 – Refusal on rock @ 1.4m, DCP still very slowly going down, red and yellow impact dust on dry tip.

5. Geological Observations/Interpretation

In the location of the proposed works for the cabana, the slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of shallow soils over clays. The clay merges into the underlying weathered rock at depths of between ~1.8m to ~2.1m below the current surface. The weathered zone is interpreted to be Extremely Low Strength Shale. 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 works.

7. Surface Water

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

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed below or beside the property. The gentle to steeply graded slope that rises across the property and continues above is a potential hazard (**Hazard**

One). The proposed excavations are a potential hazard until retaining walls are in place (**Hazard Two**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The gentle to steeply graded slope that rises across the property and continues above failing and impacting on the proposed works.	The excavation for the cabana (up to a maximum depth of ~2.0m) collapsing onto the work site before retaining structures are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	9.1×10^{-7}/annum	8.3×10^{-6}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNNACEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** are to be followed.

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

9. Suitability of the Proposed Development for the Site

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

10. Stormwater

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

11. Excavations

An excavation up to a maximum depth of ~2.0m is required to construct the proposed cabana. The excavations are expected to be through shallow soil over clay with Extremely Low Strength Shale expected at depths of between ~1.8m and ~2.1m. It is envisaged that excavations through soil, clay, and Extremely Low Strength Shale can be carried out with an excavator and bucket.

12. Vibrations

No excessive vibrations will be generated by excavation through soil, clay, and Extremely Low Strength Shale. Any vibrations generated by a domestic machine and bucket up to 16 ton carrying out excavation works will be below the threshold limit for infrastructure or building damage.

13. Excavation Support Advice

The excavation for the proposed cabana will reach a maximum depth of ~2.0m. Allowing for 0.5m of back wall drainage, the setbacks are as follows:

- ~0.4m from the W common boundary.
- ~2.2m from the subject house.

As such, only the W common boundary will lie within the zone of influence of the proposed cabana excavation. In this instance, the zone of influence is the area above a theoretical 45° line through clay and shale from the base of the excavation towards the surrounding structures and boundaries. This line reduces to 30° through the fill and soil.

Where the W common boundary falls within the zone of influence of the cabana excavation, the cut face will require the installation of shoring. Staged temporary or permanent support installed along the W side as the excavation is progressed in spans not less than 2.0m horizontally is one suitable shoring technique in this location. The support is to be designed

by the structural engineer in consultation with the geotechnical consultant. The temporary support is to remain in place until the retaining walls are built.

See site plan attached for extent of minimum required shoring.

The remaining fill and soil portions of the excavation faces for the cabana are to be battered temporarily at 1.0 Vertical to 1.7 Horizontal (30°) until the retaining walls are in place. Excavations through natural clay and weathered rock are expected to stand unsupported for a short period of time at near vertical angles until the retaining walls are in place, provided they are kept from becoming saturated.

During the excavation process for the cabana, 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.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. Unsupported cut batters through soil, and clay are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The covers are to be tied down with metal pegs or other suitable fixtures so they can't blow off in a storm. The materials and labour to construct the retaining walls are to be organised so on completion of the excavations they can be constructed as soon as possible. The excavations are to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast.

All excavation spoil is to be removed from site following the current Environmental Protection Agency (EPA) waste classification guidelines.

14. Retaining Walls

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
Soil, and Residual Clays	20	0.35	0.45
Extremely Low Strength Shale	22	0.3	0.25

For rock classes refer to Pells et al "Design Loadings for Foundations on Shale and Sandstone in the Sydney Region". Australian Geomechanics Journal 1978.

It is to be noted that the earth pressures in Table 1 assume a level surface above the structure, do not account for any surcharge loads, and assume retaining walls are fully drained. 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 structure with free-draining material (such as gravel). This material is to be wrapped in a non-woven Geotextile fabric (i.e., Bidim A34 or similar), to prevent the drainage from becoming clogged with silt and clay. If no back-wall drainage is installed in retaining walls, the likely hydrostatic pressures are to be accounted for in the structural design.

15. Foundations

The proposed cabana can be supported on a thickened edge/ raft slab with piers taken to Extremely Low Strength Shale where necessary. This ground material is expected to be exposed across the uphill side of the excavation. Where it is not exposed, and where this material drops away with the slope, piers will be required to maintain a uniform bearing material across the structure. This ground material is expected at depths of between 1.8m to 2.1m below the current surface in the area of the proposed works.

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.

As the bearing capacity of clay and shale reduces when it is wet, we recommend the footings be dug, inspected, and poured in quick succession (ideally the same day if possible). If the footings get wet, they will have to be drained and the soft layer of wet clay or 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.

16. Geotechnical Review

The structural plans are to be checked and certified by the geotechnical engineer as being in accordance with the geotechnical recommendations. On completion, a Form 2B will be issued. This form is required for the Construction Certificate to proceed.

17. 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 owners and 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 cuts in 1.5m intervals as they are lowered, while the machine/excavation equipment is on

site, to ensure the ground materials are as expected and no additional temporary support is required.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment and contractors are 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 (Top to Bottom)

Important Information about Your Report

It should be noted that Geotechnical Reports are documents that build a picture of the subsurface conditions from the observation of surface features and testing carried out at specific points on the site. The spacing and location of the test points can be limited by the location of existing structures on the site or by budget and time constraints of the client. Additionally, the test themselves, although chosen for their suitability for the particular project, have their own limiting factors. The testing gives accurate information at the location of the test, within the confines of the test's capability. A geological interpretation or model is developed by joining these test points using all available data and drawing on previous experience of the geotechnical consultant. Even the most experienced practitioners cannot determine every possible feature or change that may lie below the earth. All of the subsurface features can only be known when they are revealed by excavation. As such, a Geotechnical report can be considered an interpretive document. It is based on factual data but also on opinion and judgement that comes with a level of uncertainty. This information is provided to help explain the nature and limitations of your report.

With this in mind, the following points are to be noted:

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

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

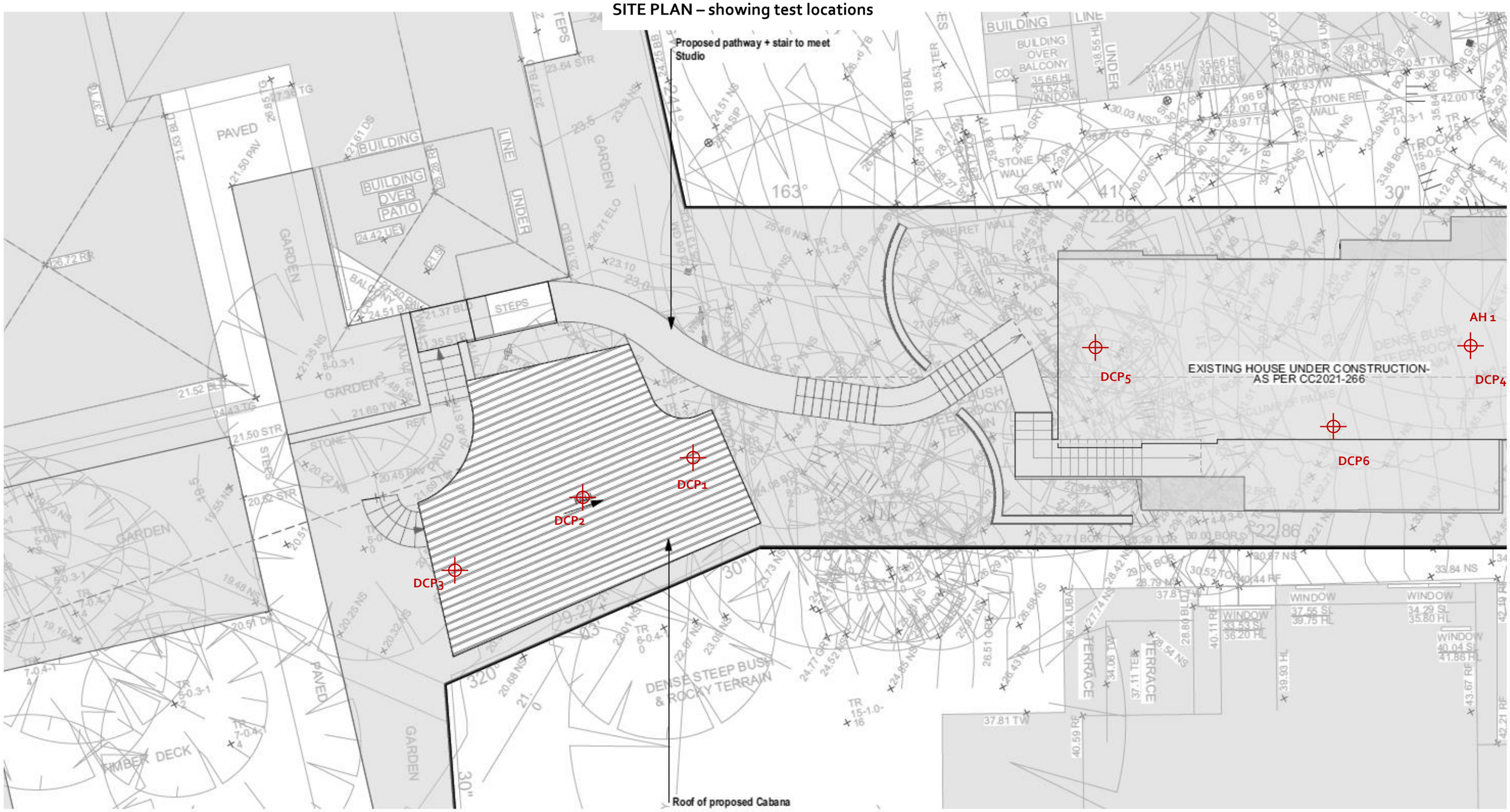
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- This report should not be applied to any other project other than that outlined in section 1.0.

- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.

- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.

SITE PLAN – showing test locations



LANDSCAPED AREA = 1102.82 m2

Legend:

Revision:	Date:	For:
A	3/2/22	Initial consultant coordination

DRAFT

Project: Cabana

Client: Russell & Cindy Aboud

Address: 39B Ocean Road, Palm Beach
Being Lot 1 in D.P. 712236

Drawing Title: Site Plan & Area Calculations

Stage:

Scale: 1:250 @A3

Drawn: NH

Chkd: NG

North: N

Drawing No: A02

Rev: A

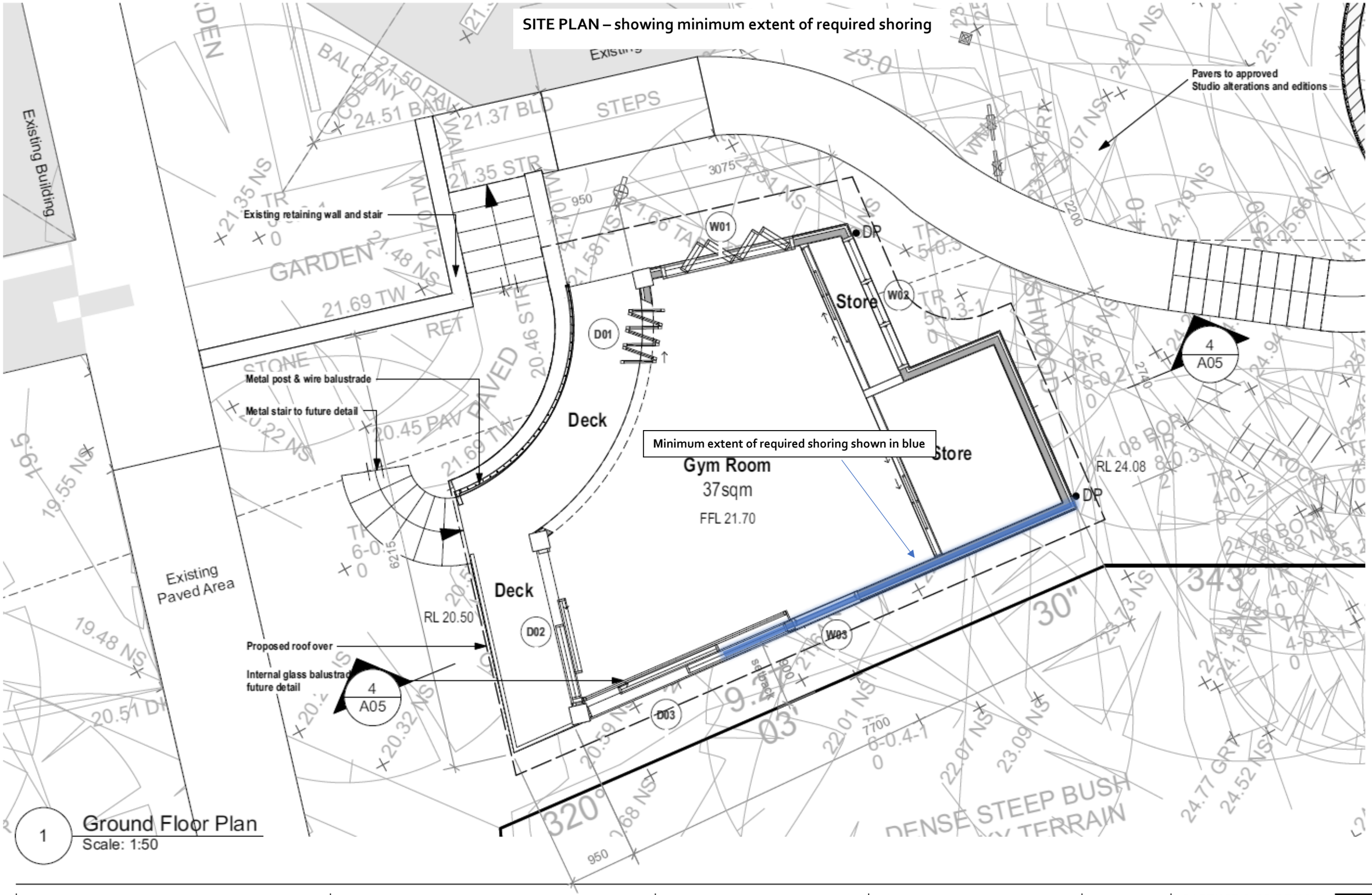
CADENCE & CO DESIGN

Suite 7, 287 Mona Vale Rd
Terrey Hills NSW 2084
P 94501950
E info@cadenceandco.com.au

ABN: 12 168 714 752
Nominated Architect: Sam Samarghandi NSW ARB 9112

CADENCE & CO

SITE PLAN – showing minimum extent of required shoring



1 Ground Floor Plan
Scale: 1:50

Legend:

Revision:	Date:	For:
A	3/2/22	Initial consultant coordination

PRELIMINARY

Project: Cabana

Client: Russell & Cindy Aboud

Address: 39B Ocean Road, Palm Beach
Being Lot 1 in D.P. 712236

Drawing Title: Proposed Plans - Ground Floor

Stage:

Scale: 1:250 @A3 | Drawn: NH | Chkd: NG

North: N

Drawing No: A03 | Rev: A

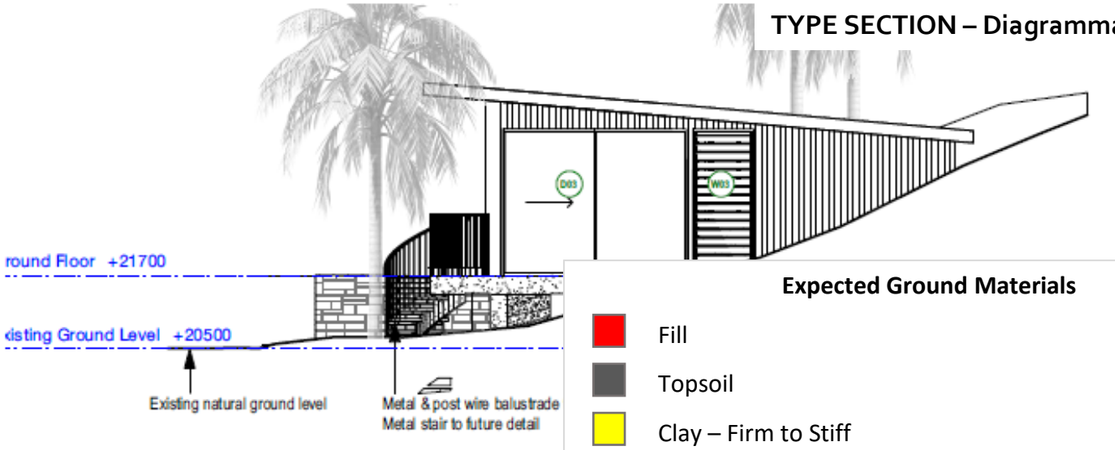
CADENCE & CO DESIGN

Suite 7, 287 Mona Vale Rd
Terrey Hills NSW 2084
P 94501950
E info@cadenceandco.com.au

ABN: 12 168 714 752
Nominated Architect: Sam Samarghandi NSW ARB 9112

CADENCE & CO

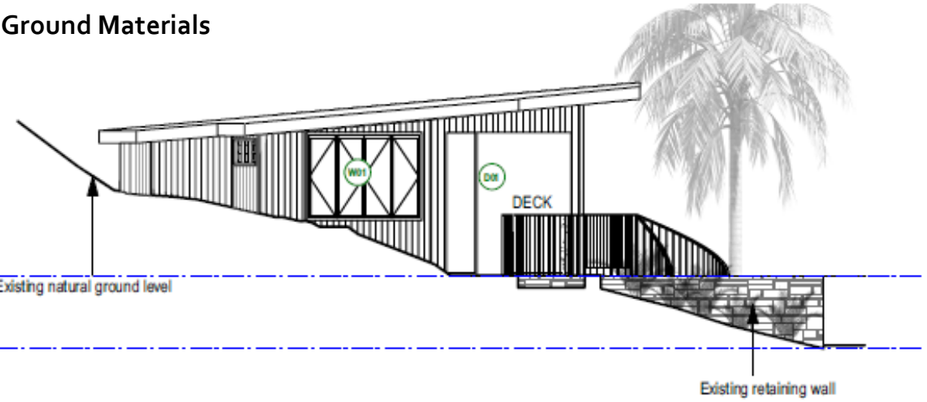
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



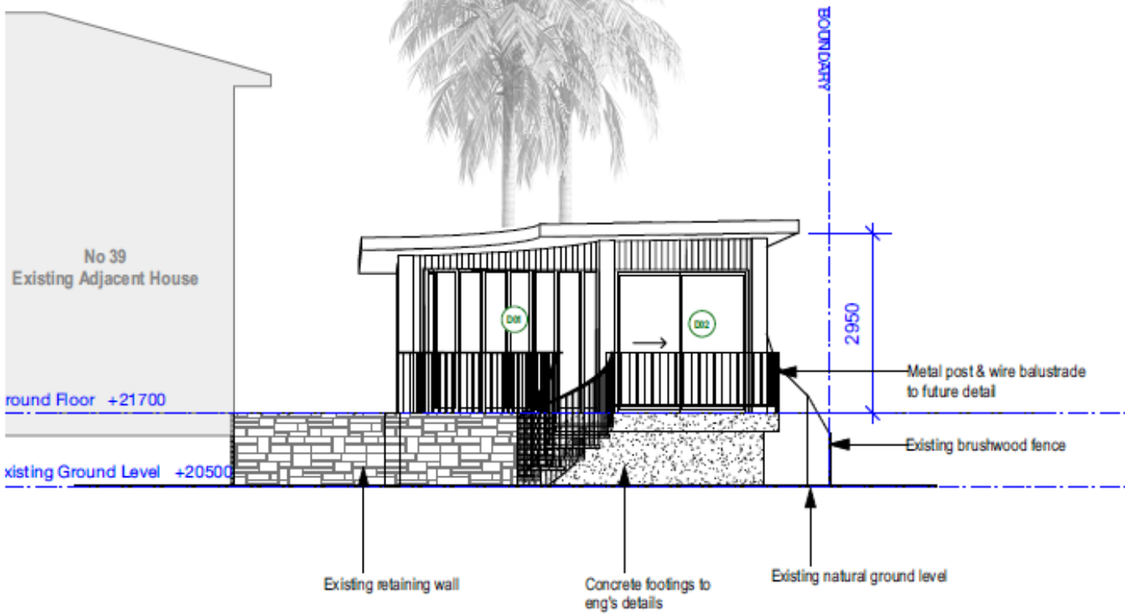
1 Western Elevation
Scale: 1:100

Expected Ground Materials

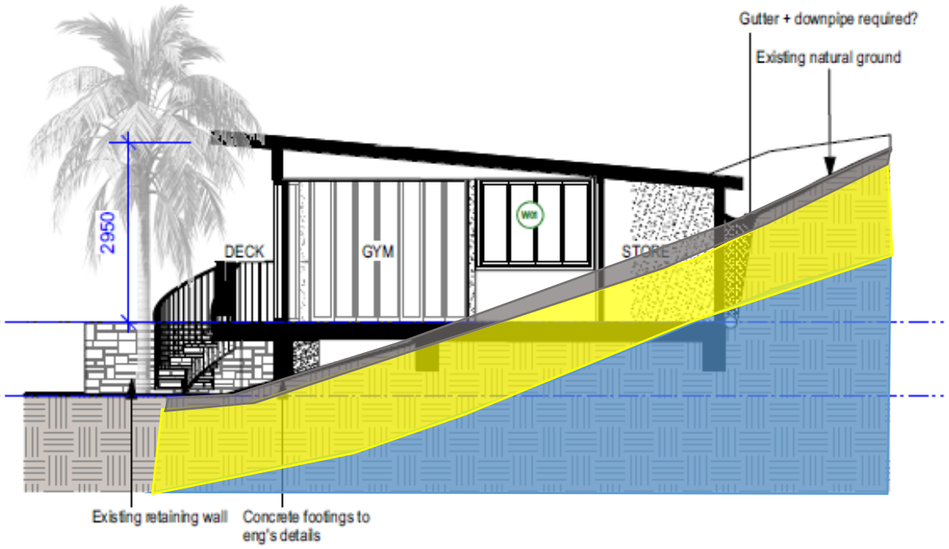
- Fill
- Topsoil
- Clay – Firm to Stiff
- Narrabeen Group Rocks – Extremely Low Strength Shale - *after being cut up by excavation equipment can resemble a stiff to hard clay.*



2 EASTERN ELEVATION
Scale: 1:100



3 NORTHERN ELEVATION
Scale: 1:100



4 WESTERN SECTION
Scale: 1:100

Legend:

Revision:	Date:	For:
A	3/2/22	Initial consultant coordination

DRAFT

Project: Cabana

Client: Russell & Cindy Aboud

Address: 39B Ocean Road, Palm Beach
Being Lot 1 in D.P. 712236

Drawing Title: Elevations & Sections

Stage:

Scale: 1:250 @A3

Drawn: NH

Chkd: NG

North: N

Drawing No: A05

Rev: A

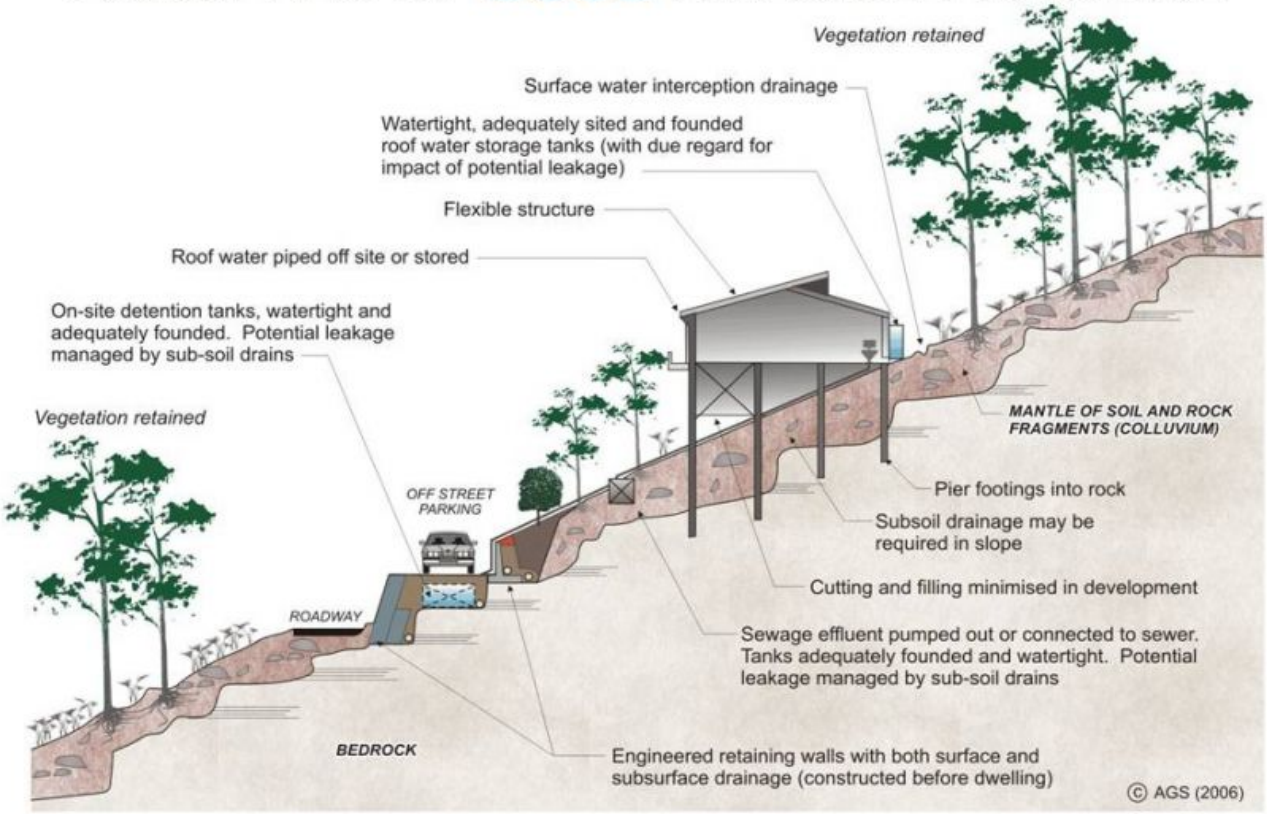
CADENCE & CO DESIGN

Suite 7, 287 Mona Vale Rd
Terrey Hills NSW 2084
P 94501950
E info@cadenceandco.com.au

ABN: 12 168 714 752
Nominated Architect: Sam Samarghandi NSW ARB 9112

CADENCE & CO

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE