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

Development Application for _____
Name of Applicant

Address of site 94 Whale Beach Road, Whale 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 21/12/21 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 **94 Whale Beach Road, Whale Beach**
Report Date: 21/12/21

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 94 Whale Beach Road, Whale 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 **94 Whale Beach Road, Whale Beach**

Report Date: 21/12/21

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **23/11/21**
(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 **23/11/21**

☒ 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 Deck and Gym at **94 Whale Beach Road, Whale Beach**

1. Proposed Development

1.1 Construct a new deck off the S and E side of the house.

1.2 Construct a gym on the downhill side of the property by excavating to a maximum depth of ~2.9m.

1.3 Various other minor external alterations and additions.

1.4 Details of the proposed development are shown on 30 drawings prepared by MM+J Architects, project number 2142, drawings numbered EX01 to EX09, and SK01 to SK21, dated 7/12/2021.

2. Site Description

2.1 The site was inspected on the 23rd November, 2021.

2.2 This residential property is on the low side of the road and has a S aspect. It is located on the moderately graded upper reaches of a hillslope. The natural slope falls across the property at an average angle of ~12°. The slope above the property eases to the crest of the hill and the slope below the property continues at similar angles.

2.3 At the road frontage, a concrete driveway runs down the slope to a garage underneath the E side of the house (Photo 1). In between the road frontage and the house is a level lawn area (Photo 2). The part-two storey rendered brick house is supported on rendered brick walls and brick piers (Photo 3). The brick walls show no significant signs of movement and the brick piers stand vertical. A cut to create the level platform for the house is supported by a stable ~1.3m high concrete retaining wall (Photo 4). A pool has been cut into the slope on the downhill side of the property (Photo 5). No significant signs of movement were observed in the concrete shell of the

pool. Immediately below the pool deck, a series of timber log retaining walls reaching up to ~1.5m in height terrace the slope to the lower common boundary (Photos 6 & 7). Several of these retaining walls are tilting to a maximum angle of ~15°. These timber log retaining walls are to be demolished and rebuilt as part of the proposed works. A moderately sloping lawn extends to the lower common 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 cuts the property. Given the ground test results, the Newport Formation of the Narrabeen Group is expected to underlie the proposed works. 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. Four 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:

AUGER HOLE 1 (~RL41.5) **–** AH1 (Photo 9)

Depth (m)	**Material Encountered**
0.0 to 0.1	**FILL**, dark brown clayey soil, fine to medium grained, loose, fine trace of organic matter, dry.

0.1 to 0.3 **FILL**, orange and brown clay, fine grained, firm, pebbles present throughout, dry.
0.3 to 0.5 **CLAY**, orange, fine grained, firm to stiff, dry.
0.5 to 0.7 **CLAY**, sandy, orange, fine to coarse grained, stiff, dry.

End of test @ 0.7m. No water table 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** (~RL41.2)	**DCP 2** (~RL41.5)	**DCP 3** (~RL39.5)	**DCP 4** (~RL44.3)
0.0 to 0.3	4	4	4	4
0.3 to 0.6	6	9	9	8
0.6 to 0.9	9	21	16	11
0.9 to 1.2	30	29	31	21
1.2 to 1.5	#	35	38	32
1.5 to 1.8		#	#	32
1.8 to 2.1				#
	Refusal on Rock @ 1.2m	End of Test @ 1.5m	End of Test @ 1.5m	End of Test @ 1.8m

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

DCP Notes:
DCP1 – Refusal on rock @ 1.2m, DCP thudding, orange and brown clay on wet tip.
DCP2 – End of test @ 1.5m, DCP still going down slowly, orange clay on dry tip.
DCP3 – End of test @ 1.5m, DCP still going down slowly, orange clay on dry tip.
DCP4 – End of test @ 1.8m, DCP still going down slowly, orange clay on dry tip.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of soil and clays. The clays merge into the underlying weathered rock at depths of between ~0.9m to ~1.5m 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 Whale Beach Road above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above or beside the property. The moderately graded slope that falls across the property and continues below is a potential hazard (**Hazard One**). The proposed excavation is a potential hazard until retaining walls are in place (**Hazard Two**). The proposed excavation undercutting the footings for the pool is a potential hazard (**Hazard Three**).

RISK ANALYSIS ON THE NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The moderate slope that falls across the property and continues below failing and impacting on the proposed works.	The excavation for the gym (up to a maximum depth of ~2.9m) collapsing onto the work site before retaining walls are in place.	The proposed excavation for the gym undercutting the foundations of the pool shell causing failure.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (20%)	'Medium' (35%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'High' (2×10^{-3})
RISK TO LIFE	9.1×10^{-7}/annum	5.9×10^{-5}/annum	5.3×10^{-5}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.	This level of risk to life and property is 'UNACCEPTABLE'. To move 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)

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 away from the street. The stormwater engineer is to refer to council stormwater policy for suitable options.

11. Excavations

An excavation to a maximum depth of ~2.9m will be required to create the level platform for the gym on the downhill side of the property. The excavation is expected to be through soil and clay with Extremely Low Strength Shale encountered at depths of between 0.9m and 1.5m below the current surface in the area of the proposed works. 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, sandy 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 gym on the downhill side of the property will reach a maximum depth of ~2.9m. Allowing for 0.5m of back wall drainage, the setbacks are as follows:

- Flush with the shell of the existing swimming pool.
- Flush with the SE common boundary.
- ~5.0m from the NW common boundary.

As such, the SE boundary and the shell of the existing swimming pool will lie within the zone of influence of the proposed excavation. In this instance, the zone of influence is the area above a theoretical 45° line from the base of the excavation towards the surrounding structures and boundaries. This line reduces to 30° through the fill and soil.

To ensure the integrity of the pool structure and the property boundary, ground support will need to be installed along the SE and uphill sides of the excavation with the support installed before the excavation commences or in a staged construction.

For ease of construction, it might be desirable to continue the spaced pile wall along the NW side of the excavation to provide shoring support. Alternatively, the cut face on the NW side will require the installation of temporary or other permanent shoring installed as the excavation is progressed so the cut face is not left unsupported.

See the site plan attached for the minimum required extent of the shoring shown in blue.

A spaced piled retaining wall is a suitable method of support. Pier spacing for the wall is typically ~2.0m but can vary between 1.6 to 2.4m depending on the design. All piers can be supported by embedment and/or bracing installed as the excavation is lowered. To drill the pier holes for the wall, a mini piling rig or similar that can excavate through Medium to High Strength Rock will be required. If a machine of this type is not available, we recommend carrying out core drilling before the construction commences to confirm the strength of the rock and to ensure the excavation equipment is capable of reaching the required depths. As the excavation is lowered in 1.5m lifts, infill sprayed concrete panels or similar are added between the piers to form the spaced wall. Drainage is installed behind the panels. Upon completion of the excavation, the piled walls are to be tied into the concrete floor and ceiling slabs of the gym to provide permanent bracing.

The geotechnical consultant is to inspect the drilling process of the entire first pile and the ground materials at the base of all pier holes/excavations for ground support purposes.

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/m³)	**'Active' K_a**	**'At Rest' K_0**	**Passive Pressure 'Ultimate'**
Soil and Residual Clays	20	0.40	0.55	N/A
Extremely Low Strength Shale	22	0.25	0.35	Kp 2.5 ultimate

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, such as that from the pool, and assume retaining walls are fully drained. It should be noted that passive pressure is an ultimate value and should have an appropriate safety factor applied. No passive resistance should be assumed for the top 0.4m to account for any disturbance from the excavation. 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 gym on the downhill side of the property 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 the ground falls away with the slope, piers will be required to maintain

a uniform bearing material across the structure. The piers will need to be embedded at least 0.5m into the Extremely Low Strength Shale measured from the downhill side of each pier hole. This ground material is expected at depths of between 0.9m to 1.5m below the current surface in the area of the proposed works. As such, the required depths of the piered foundations are expected to be between 1.4m and 2.0m below the current surface measured 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.

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.

The proposed deck along the S and E sides of the house is proposed to be supported directly off the existing concrete slab. The structural adequacy of the existing concrete slab is to be assessed by the structural engineer.

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 inspection has not been carried out during the construction process.

- The geotechnical consultant is to inspect the ground materials while the first pier for the ground support is being dug to assess the ground strength and to ensure it is in line with our expectations.

- All finished pier holes for piled wall/excavations for ground support are to be inspected and measured before concrete is placed.

- 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

Photo 9 (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.

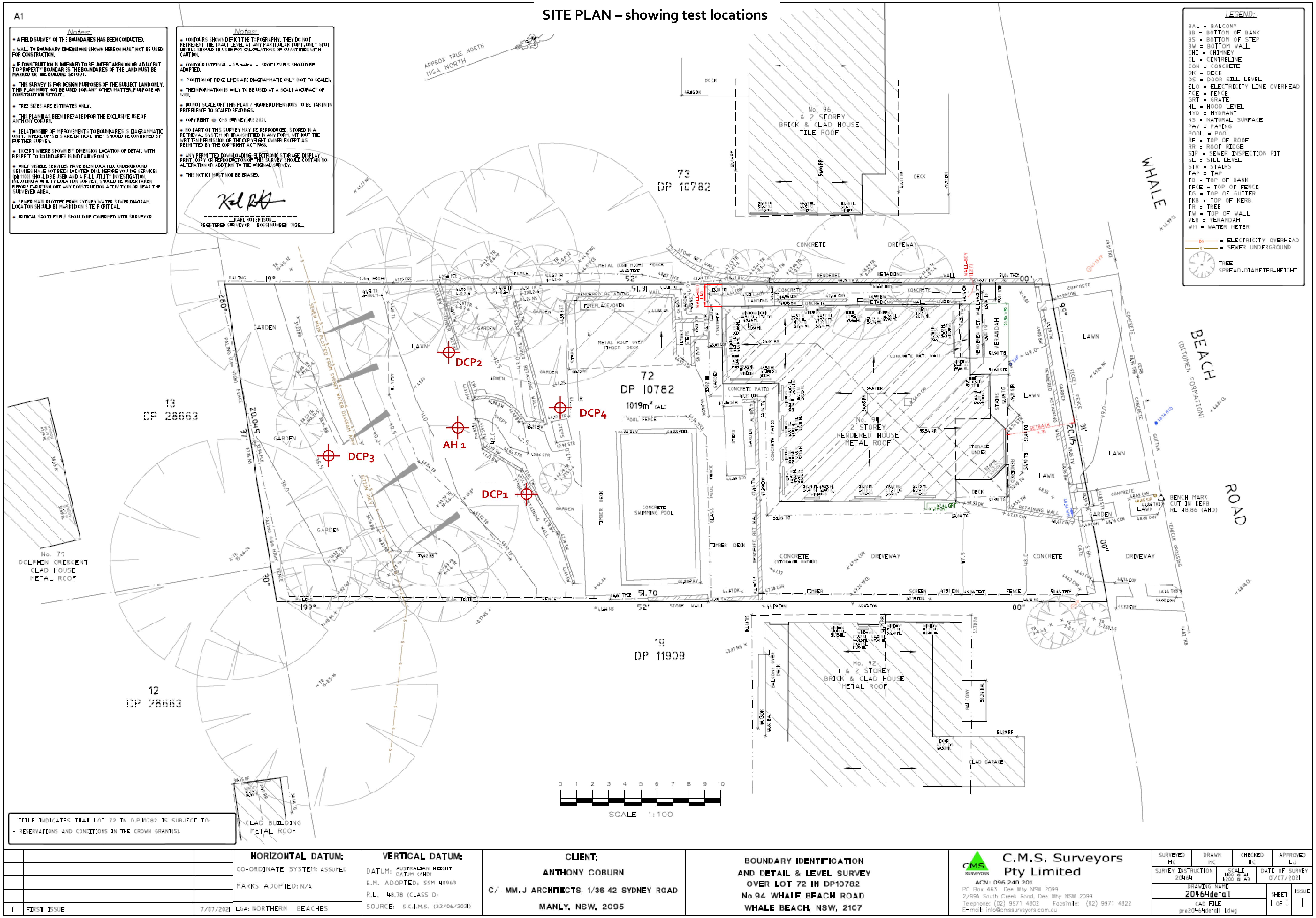
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

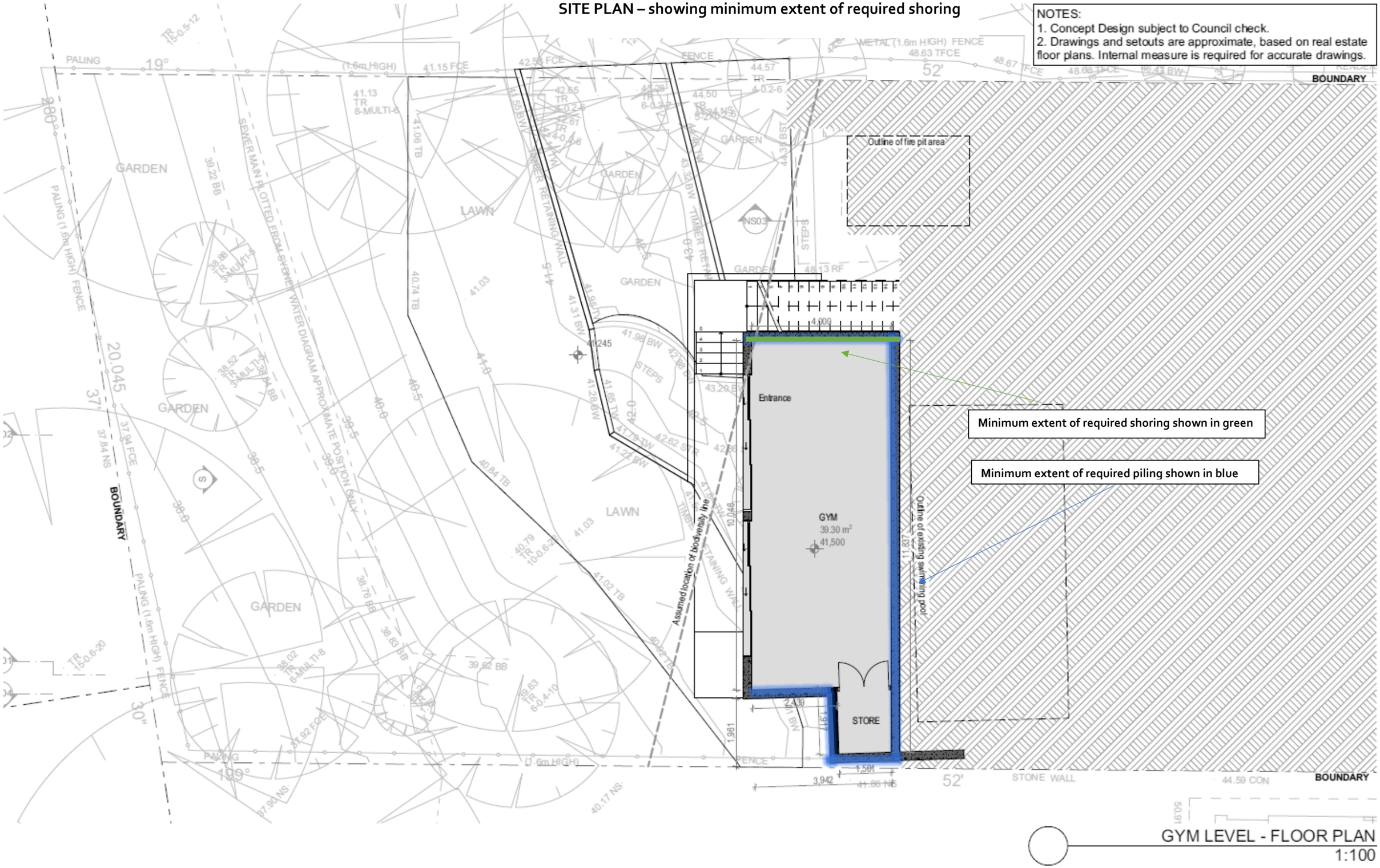
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar 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



SITE PLAN – showing minimum extent of required shoring

NOTES:
1. Concept Design subject to Council check.
2. Drawings and setouts are approximate, based on real estate floor plans. Internal measure is required for accurate drawings.



GYM LEVEL - FLOOR PLAN
1:100

NOTES:
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All dimensions to be verified on site.
This drawing is not to be used for authority or construction purposes.
CONCEPT DESIGN

REV	DATE	DESCRIPTION
A	30.07.2021	Proposed gym

mm+j architects
SUITE 1, 36-42 SYDNEY RD, MANLY NSW 2095
Nom. arch. Luisa Manfredini | NSWARB 6666
admin@mmjarchitects.com.au

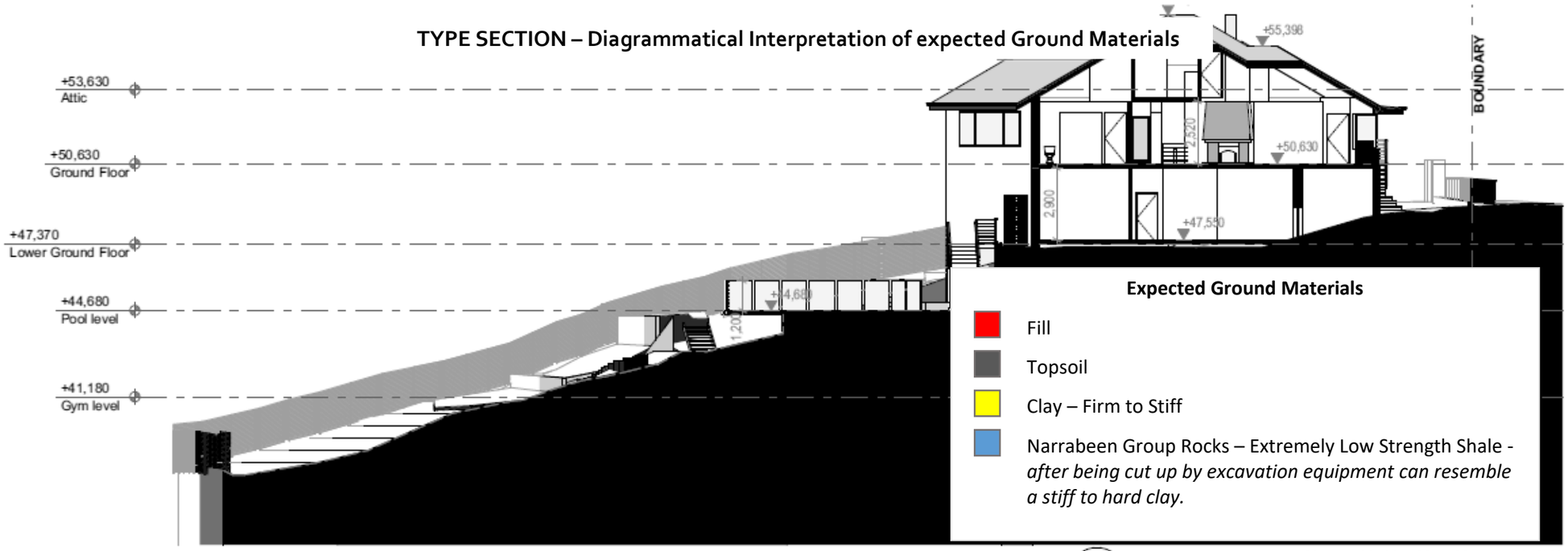
CLIENTS: ANTHONY COBURN
PROJECT: ALTERATIONS & ADDITIONS TO DETACHED RESIDENCE
94 WHALE BEACH ROAD, WHALE BEACH NSW 2107
TITLE: GYM LEVEL FLOOR PLAN

SCALE: 1:100
DRAWN: VAC
DATE: 7/12/2021
JOB NO: **2142**
DRAWING NO: **SK04**
ISSUE: **A**

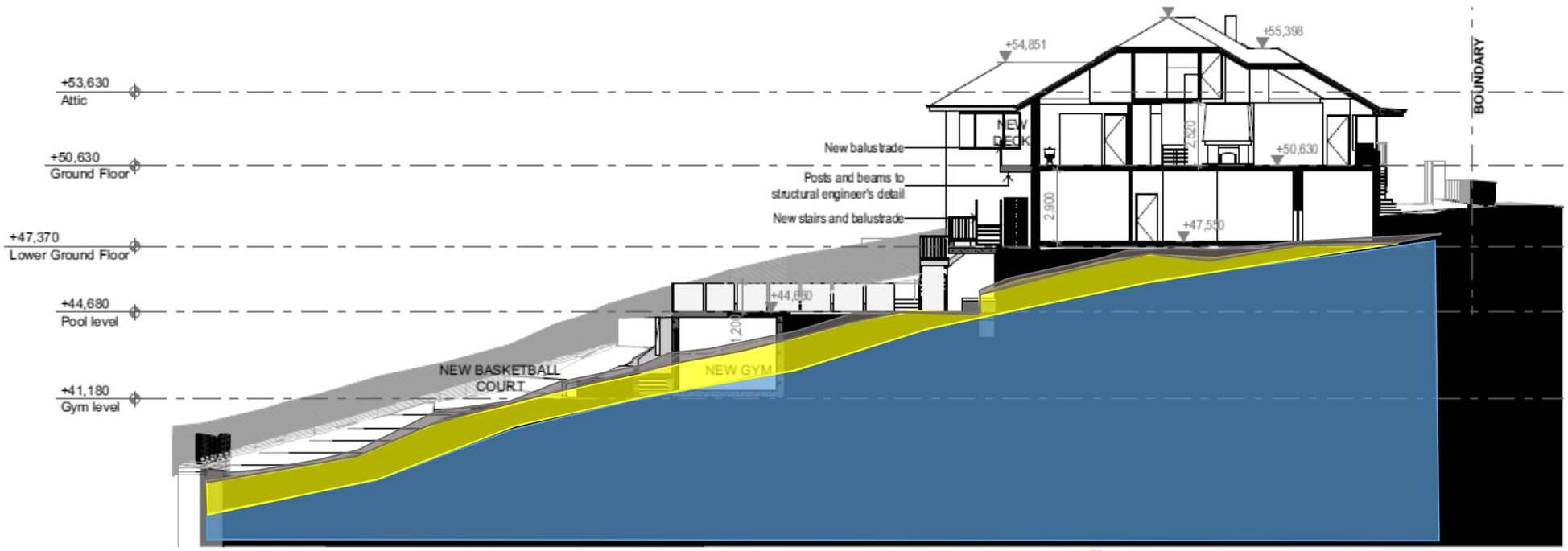
PLOTTED 7/12/2021 10:19 AM

2142 Whale Beach 94_SK_211207_MS.pln

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



EXISTING SECTION NS-02
1:200

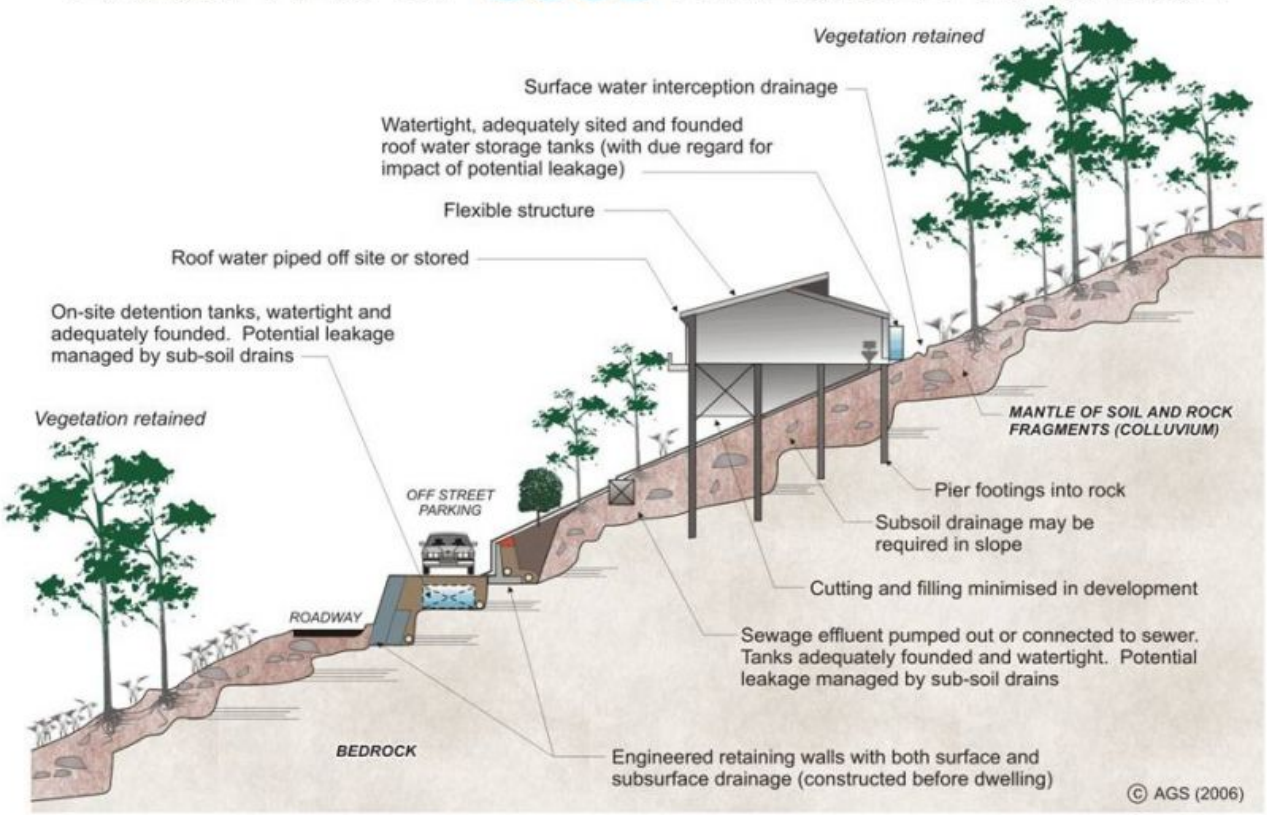


PROPOSED SECTION NS-02
1:200

	NOTES: This drawing is and remains copyright and is the property of mm+j architects p/l. It may not be used or copied in whole or in part without written consent. All dimensions to be verified on site. This drawing is not to be used for authority or construction purposes. **CONCEPT DESIGN**	REV / DATE / DESCRIPTION	mm+J architects SUITE 1, 36-42 SYDNEY RD, MANLY NSW 2095 Nom. arch. Luisa Manfredini | NSWARB 6666 admin@mmjarchitects.com.au	CLIENTS: ANTHONY COBURN PROJECT: ALTERATIONS & ADDITIONS TO DETACHED RESIDENCE TITLE: **94 WHALE BEACH ROAD, WHALE BEACH NSW 2107** SECTIONS 03	SCALE: 1:200 DRAWN: VAC DATE: 7/12/2021 JOB NO: **2142**	DRAWING NO: SK11 ISSUE:	PLOTTED: 7/12/2021 10:19 AM

2142 Whale Beach 94_SK_211207_MS.pln

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE