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

Development Application for _____
Name of Applicant

Address of site 136 Pacific 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 30/9/24 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 **136 Pacific Road, Palm Beach**

Report Date: 27/9/24

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 MScGEOL AIG., RPGeo

Membership No. 10306

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 136 Pacific 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 **136 Pacific Road, Palm Beach**

Report Date: 27/9/24

Author: BEN WHITE

Author's Company/Organisation: **White Geotechnical Group Pty Ltd**

Please mark appropriate box

☒ Comprehensive site mapping conducted **18/9/24** (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 **18/9/24**

☒ 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 MScGEOL AIG., RPGeo

Membership No. 222757

Company **White Geotechnical Group Pty Ltd**

GEOTECHNICAL INVESTIGATION:

House Extension, Pool, and Lift at **136 Pacific Road, Palm Beach**

1. Proposed Development

1.1 Construct an extension and lift on the downhill side of the house by excavating to a maximum depth of ~3.0m.

1.2 Install a suspended pool below the house.

1.3 Construct a cabana and decking at the location of the proposed pool.

1.4 Various other minor internal and external additions and alterations.

1.5 Details of the proposed development are shown on 21 drawings prepared by INTERLOCK, drawings numbered A000, A005 to 006, A050 to 055, A100 to 106, A200, A300, A600, A603 and A610. All Issue DA01. All Dated 4/9/2024.

2. Site Description

2.1 The site was inspected on the 18th September, 2024.

2.2 This residential property is accessed by a Right of Carriageway (ROW) off the downhill side of Pacific Road. It is on the low side of the ROW and has a NW aspect. It is located on the steeply graded middle reaches of a hillslope. The natural slope falls steeply across the property at an average angle of 27°. The slope above the property continues at similar angles before easing at the crest of the hill. The slope below increases to very steep angles.

2.3 At the road frontage, a concrete ROW and concrete and sandstone paved driveway run to a carport attached to the uphill side of the house (Photo 1). The fill for Pacific Road is well-vegetated and the surface is lined with stacked sandstone boulders (Photo 2). The fill batter is currently considered stable. Fill for the ROW and

various cuts for the house are supported by mortared sandstone block retaining walls reaching up to ~2.3m high (Photo 1 & 3). These walls also comprise the supporting walls of the three-storey house and were observed to be at least partially supported on outcropping competent Medium Strength Sandstone. Cracking in the mortar was measured up to ~5mm in width. The cracking is likely due to settlement that will have occurred shortly after construction and the walls are considered stable. No significant signs of movement were observed in the supporting brick walls of the house. Fill for landscaping on the downhill side of the house is supported by a mortared sandstone block and brick retaining wall reaching ~2.2m high (Photo 4). A large detached joint block has come to rest on the slope in this location. This joint block as well as a scattering of other smaller boulders (Photo 5) on the slope below were observed to be resting/embedded in stable positions (Photo 6).

3. Geology

The Sydney 1:100 000 Geological Sheet indicates the contact of Hawkesbury Sandstone and the Narrabeen Group Rocks is close to the uphill property boundary, although at a residential scale the map is not always accurate. Ground testing and observations on site indicate the site is underlain by geology which is consistent with Hawksbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

One hand Auger Hole (AH) was put down to identify the soil materials. Six Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. The locations of the tests are shown on the site plan 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 have been an issue for this site. But due to the possibility that the actual ground conditions vary from our interpretation there should be allowances in

the excavation and foundation budget to account for this. We refer to the appended "Important Information about Your Report" to further clarify. The results are as follows:

AUGER HOLE 1 (~RL35.1) **–** AH1 (Photo 7)

Depth (m)	**Material Encountered**
0.0 to 0.4	**FILL**, brown, Medium Dense, dry, medium grained.
0.4 to 0.7	**TOPSOIL**, clayey, brown, Stiff, damp, fine to coarse grained, maroon and yellow weathered sandstone fragments included.

Refusal @ 0.7m on rock. Auger grinding. 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** (~RL35.1)	**DCP 2** (~RL37.5)	**DCP 3** (~RL32.4)	**DCP 4** (~RL30.2)	**DCP 5** (~RL30.4)	**DCP 6** (~RL37.7)
0.0 to 0.3	7	Rock Exposed at Surface	3	6	7	Rock Exposed at Surface
0.3 to 0.6	14		4	32	7	
0.6 to 0.9	16		2	16	8	
0.9 to 1.2	#		2	12	12	
1.2 to 1.5			17	12	7	
1.5 to 1.8			23	#	8	
1.8 to 2.1			22		12	
2.1 to 2.4			35		15	
2.4 to 2.7			#		17	
2.7 to 3.0					27	
3.0 to 3.3					28	
3.3 to 3.6					#	
	Refusal on Rock @ 0.9m		Refusal on Rock @ 2.3m	Refusal on Rock @ 1.5m	Refusal on Rock @ 3.3m	

#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 @ 0.9m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP2 – Medium Strength Sandstone exposed at a cut for the house.
DCP3 – Refusal on Rock @ 2.3m, DCP bouncing off rock surface, white and maroon impact dust on damp tip, brown sandy clay in collar above.
DCP4 – Refusal on Rock @ 1.5m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP5 – Refusal on Rock @ 3.3m, DCP bouncing off rock surface, white impact dust and orange clay on damp tip, orange sandy clay in collar above tip.
DCP6 – Medium Strength Sandstone exposed at a cut for the house.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the outcropping and underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger and the benches narrower. Where the slope eases, the opposite is true. Where the rock is not exposed, it is overlain by shallow soils over clays that fill the bench step formation. Filling has been placed to a height of 2.2m across the property and in the location of the proposed works. In the test locations, where the rock is not exposed, it was encountered at depths of between 0.9 to 3.3m below the current surface, being deeper due to the presence of fill and the stepped nature of the underlying bedrock. The outcropping sandstone on the property is estimated to be Medium Strength or better and similar strength rock is expected to underlie the entire site as all the DCP tests bounced at refusal. 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 excavation.

7. Surface Water

Normal sheet wash from the slope above will be intercepted by the street drainage system for Pacific Road above. However, some surface flows will be generated on the steep slope between Pacific Road and the subject property as the ROW above the house is not guttered.

Should the owners be aware, or if at a later time, become aware that significant overland flows enter the property during prolonged heavy rainfall, our office is to be contacted so appropriate drainage advice can be provided and drainage installed to intercept the flows. It is a condition of the risk assessment in **Section 8** that this be done.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The steeply graded slope that falls across the property and continues above and below is a potential hazard (**Hazard One**). The vibrations from the proposed excavation are a potential hazard (**Hazard Two**). A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process is a potential hazard (**Hazard Three**). The proposed excavation undercutting the footings for the stairs is a potential hazard (**Hazard Four**).

RISK ANALYSIS SUMMARY ON THE NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The steep slope that falls across the property, continuing above and increasing in grade below failing and impacting on the proposed works.	The vibrations produced during the proposed excavations impacting on the surrounding structures.
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	5.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE', provided the recommendations in **Section 7 & 16** are followed.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12** are to be followed.

HAZARDS	Hazard Three	Hazard Four
TYPE	A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process.	The proposed excavation undercutting the footings of the stairs causing damage or failure.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	6.6×10^{-5}/annum	5.3×10^{-5}/annum
COMMENTS	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** 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 for stormwater disposal.

11. Excavations

An excavation up to a maximum depth of ~3.0m is required to construct the proposed lift. The excavation is expected to be through fill, soil, and clay, with Medium Strength Rock where it is not already exposed, expected at depths of between ~0.7m and ~0.9m below the current surface in the area of the proposed excavation.

It is envisaged that excavations through fill, soil, and clay can be carried out with an excavator and bucket, and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through fill, soil, and clay will be below the threshold limit for building damage utilising a domestic-sized excavator up to 16 tonnes. It is expected that the majority of the excavation will be through Medium Strength Sandstone or better.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the subject and S neighbouring house. Allowing ~0.5m for backwall drainage, the setbacks from the proposed excavation to the existing structures are as follows:

- ~flush with the subject house.
- ~7.0m from the S neighbouring residence.

Dilapidation reporting carried out on the S neighbouring property is recommended prior to the excavation works commencing to minimise the potential for spurious building damage claims.

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 5mm/sec at house walls. Vibration monitoring will be required to verify this is achieved. Vibration monitoring must include a light/alarm so the operator knows if vibration limits have been exceeded. The equipment is to log and record vibrations throughout the excavation works.

In Medium Strength Rock or better, techniques to minimise vibration transmission will be required. These include:

- Rock sawing the excavation perimeter to at least 1.0m deep prior to any rock breaking with hammers, keeping the saw cuts below the rock to be broken throughout the excavation process.
- Limiting rock hammer size.
- Rock hammering in short bursts so vibrations do not amplify.
- Rock breaking with the hammer angled away from the nearby sensitive structures.
- Creating additional saw breaks in the rock where vibration limits are exceeded, as well as reducing hammer size as necessary.
- Use of rock grinders (milling head).

Should excavation-induced vibrations exceed vibration limits after the recommendations above have been implemented, excavation works are to cease immediately and our office is to be contacted.

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

13. Excavation Support Requirements

The excavation for the lift shaft will reach a maximum depth of ~3.0m. allowing ~0.5m for backwall drainage, the excavation will come flush with the supporting walls of the subject house as well as the garden stairs.

The supporting walls of the house at the studio floor level are shown on the plans to be demolished, as such, only the stairs 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 or top of Medium Strength Rock, whichever is encountered first, towards the surrounding structures and boundaries. This line reduces to 30° through the fill and soil.

As such, any brick walls and posts/piers that fall within the footprint of the excavations are to be removed and the house is to be propped and supported with beams which are to be sufficiently set back from the Zone of Influence of the excavation, prior to the excavation through rock commencing.

Given the shallow depth to rock, we think it is likely the stairs are supported on rock. However, to be sure, where they fall within the zone of influence of the excavation, exploration pits will need to be put down by the builder to determine the foundation depth and material. These are to be inspected by the geotechnical consultant.

If the foundations for the stairs are found to be supported on rock or extend below the zone of influence of the proposed excavation, the excavation may commence. If they are not, the stairs will need to be underpinned to rock prior to the excavation commencing.

Underpinning is to follow the underpinning sequence ‘hit one miss two’. Under no circumstances is the bulk excavation to be taken to the edges of the walls and then underpinned. Underpins are to be constructed from drives that should not exceed 0.6m in width along strip footings and should be proportioned according to footing size for other foundation types. Allowances are to be made for drainage through the underpinning to

prevent a build-up of hydrostatic pressure. Underpins that are not designed as retaining walls are to be supported by retaining walls. The void between the retaining walls and the underpinning is to be filled with free-draining material such as gravel.

The remaining fill, soil, and clay portions of the cut will need to be temporarily or permanently supported as the excavation is progressed in a staged manner, so cut batters are not left unsupported. The support will need to be designed / approved by the structural engineer.

During the excavation process, the geotechnical consultant is to inspect the excavations as they approach no less than 0.5m horizontally from the foundations of the stairs/underpins to confirm the stability of the cut to go flush with the footings.

Medium Strength Rock or better will stand at vertical angles unsupported subject to approval by the geotechnical consultant. To ensure no defects or unstable cut faces are present that require temporary support, the geotechnical consultant is to inspect the excavation as it is lowered in not more than 1.5m intervals or on encounter of softer sections of rock, whichever occurs first. This is particularly relevant to this job as anyone working below the excavation in the lift shaft will be in a very confined space surrounded by high cut faces. A failure could engulf them. Should any weak sections of rock be encountered, works are to stop until temporary or permanent support is in place. Our office is to be informed of any unexpected changes in the ground conditions.

The materials and labour to construct the retaining walls are to be organised so on completion of the excavation they can be constructed as soon as possible.

Upon completion of the excavation, it is recommended all cut faces be supported with retaining walls to prevent any potential future movement of joint blocks in the cut face that can occur over time, when unfavourable jointing is obscured behind the excavation face. Additionally, retaining walls will help control seepage and to prevent minor erosion and sediment movement.

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

14. Retaining Structures

For cantilever or singly propped retaining structures it is suggested the design be based on a triangular distribution of lateral pressures using the parameters shown in Table 1.

Table 1 – Likely Earth Pressures for Retaining Structures

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0
Fill and Topsoil	20	0.40	0.55
Residual Clays	20	0.35	0.45
Medium Strength Rock	24	0.00	0.01

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 structures are fully drained. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

All retaining structures 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 structures the full hydrostatic pressures are to be accounted for in the retaining structure design.

15. Foundations

The proposed extension, lift, cabana, and decking are to be supported on piers taken below the fill to Medium Strength Sandstone. Where it is not exposed, this ground material is expected at depths of between ~0.9m to ~3.3m below the current surface across the location of the proposed works.

The foundations supporting the existing house are currently unknown. Ideally, footings should be founded on the same footing material across the old and new portions of the structure. Where the footing material does change across the structure, construction joints or similar are to be installed to prevent differential settlement, where the structure cannot tolerate such movement.

Piers taken below the fill and socketed at least ~0.3m into Medium Strength Sandstone are suitable footings for the proposed pool and spa. The required depths of the piered foundations at the location of the pool and spa are expected to be between 1.8m and 3.6m below the current surface measured from the downhill side of the pier hole.

A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if, with the approval of the structural engineer, the joint can be spanned or, alternatively, the footing can be repositioned so it does not fall over the joint.

NOTE: If the contractor is unsure of the footing material required, it is more cost effective to get the geotechnical consultant on site at the start of the footing excavation to advise on footing depth and material. This mostly prevents unnecessary over-excavation in clay like shaly rock but can be valuable in all types of geology.

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 certification for the Occupation Certificate or the owner if the following inspections have not been carried out during the construction process.

- The exploration pits to determine the foundation material along the garden stairs are to be inspected by the geotechnical consultant to determine if underpinning is necessary. This is to occur before the bulk excavation for the lift commences.

- During the excavation process, the geotechnical consultant is to inspect the excavations as they approach no less than 0.5m horizontally from the foundation of the stairs/underpins to confirm the stability of the cut to go flush with the footings.

- During the excavation process, the geotechnical consultant is to inspect the cut in 1.5m intervals as it is lowered to ensure the ground materials are as expected and no wedges or other geological defects are present that could require additional support. Should additional ground-support be required, this will likely involve the use of mesh, sprayed concrete, and rock bolts.

- 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.

Reviewed By:

Nathan Gardner B.Sc. (Geol. & Geophys. & Env. Stud.)
AIG., RPGeo Geotechnical & Engineering.
No. 10307
Engineering Geologist & Environmental Scientist.

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

Photo 1

Photo 2

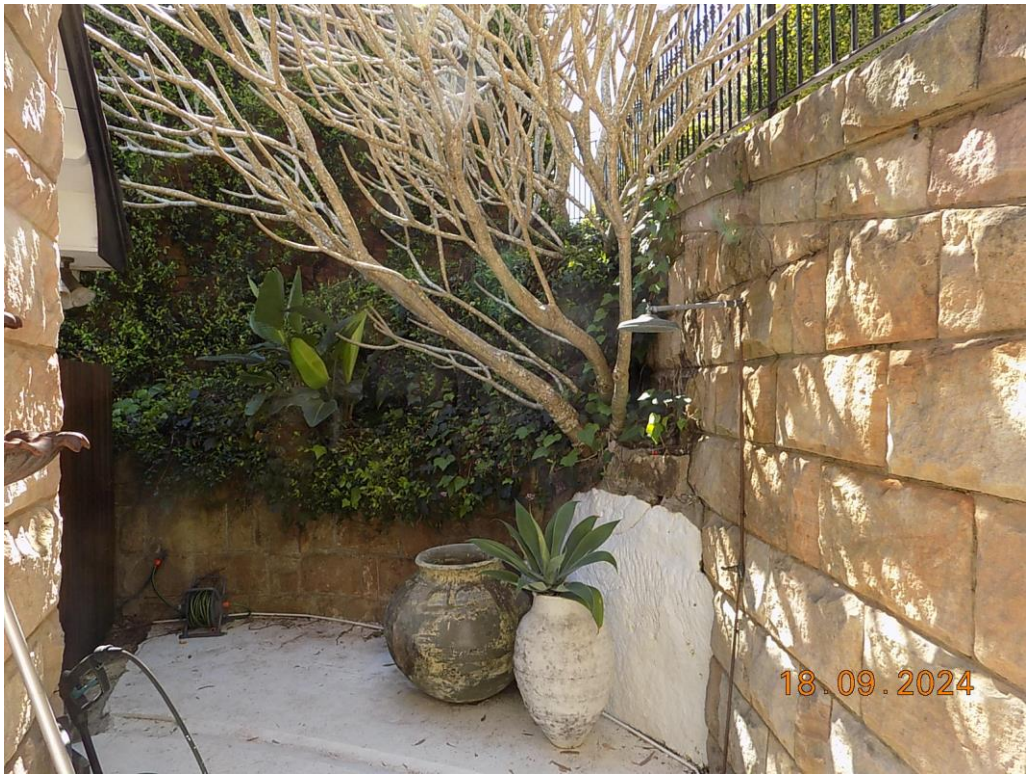


Photo 3

Photo 4

Photo 5

Photo 6

Photo 7 – downhole is left to right

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.

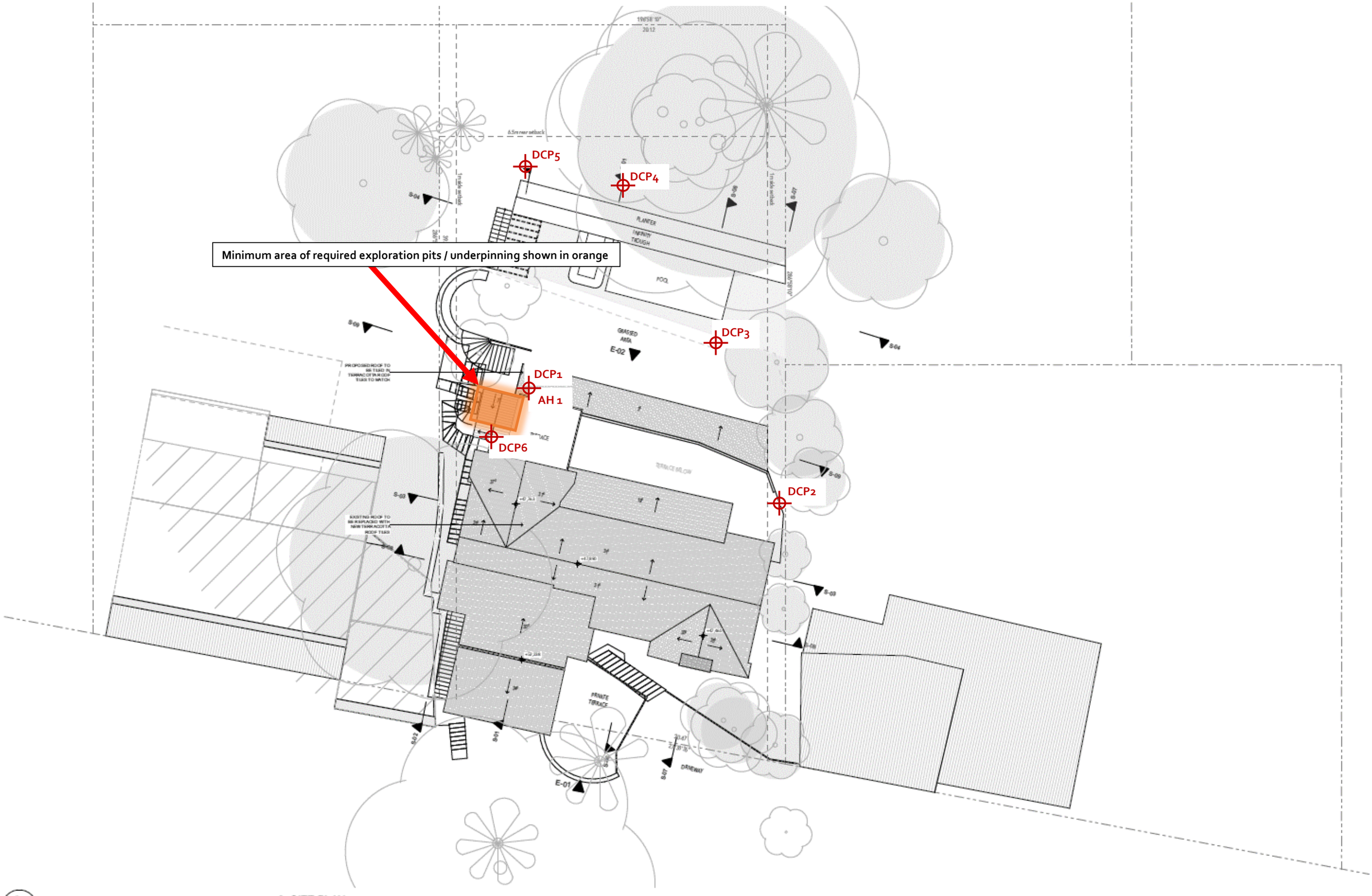
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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 and area of required exploration pits / underpinning



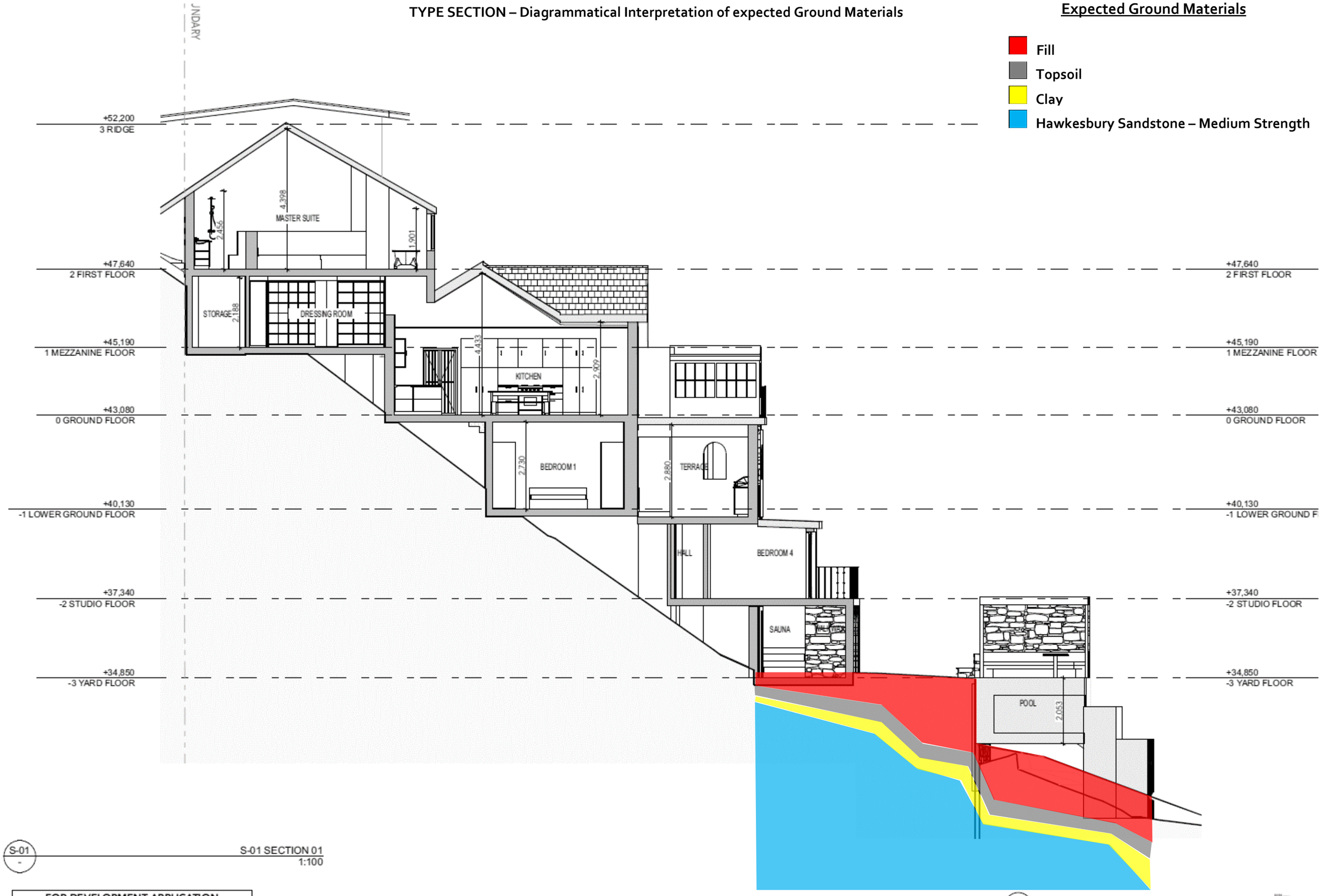
3. SITE PLAN
1:200

FOR DEVELOPMENT APPLICATION

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Expected Ground Materials

- Fill
- Topsoil
- Clay
- Hawkesbury Sandstone – Medium Strength



S-01 – S-01 SECTION 01 1:100

FOR DEVELOPMENT APPLICATION

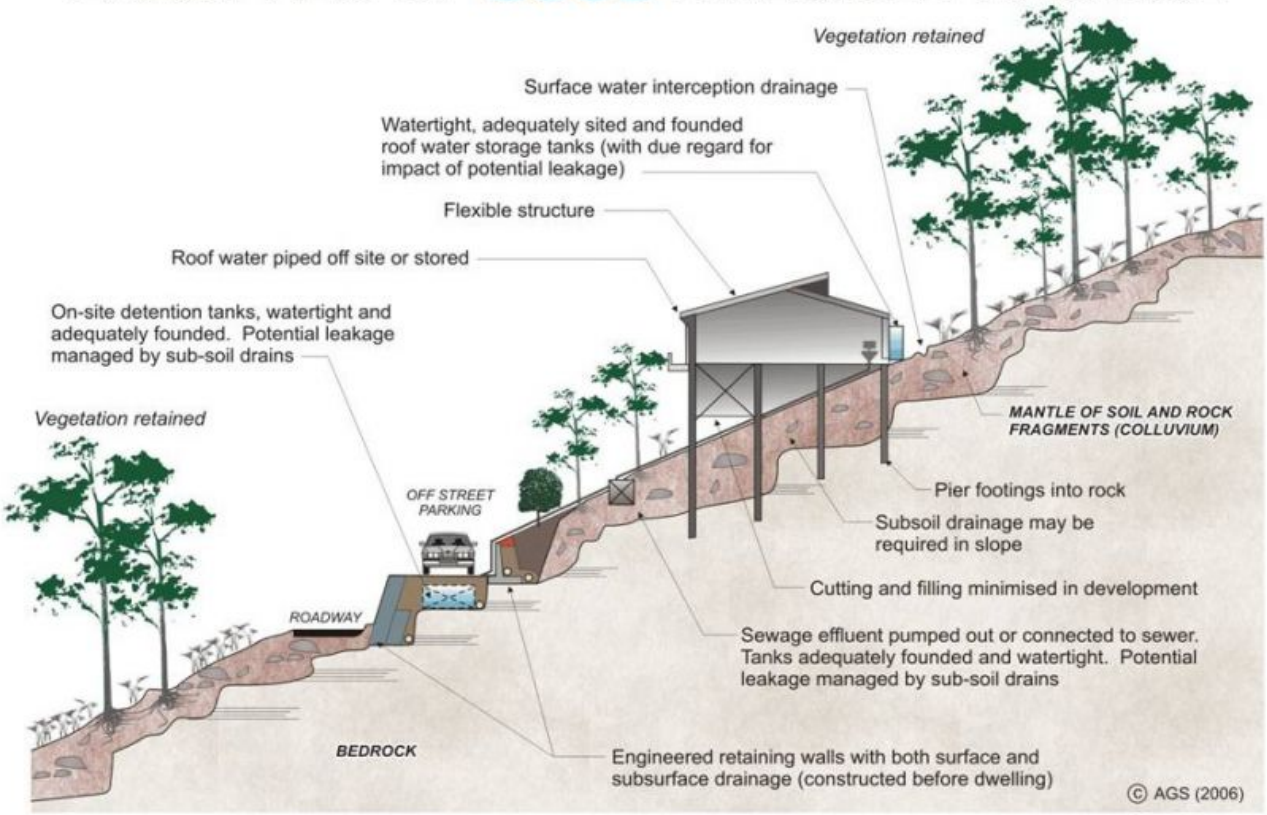
INTERLOCK | Construction | Design | Project Management | Nominated Architect: Troy Newman No.10699 | E: info@interlockconstruction.co

136 PACIFIC RD - PALM BEACH	BEN MAY	DA01	4/9/2024	A300	SECTIONS	1:100 @ A3

0 1 2 3 4 5

INTERLOCK

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE