

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

Development Application for _____
Name of Applicant

Address of site 13 Minkara Road, Bayview

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 3/6/19 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least \$10million.

I:

Please mark appropriate box

- ☒ have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☐ have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.
- ☐ have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- ☐ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- ☐ have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: Geotechnical Report 13 Minkara Road, Bayview

Report Date: 3/6/19

Author: BEN WHITE

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

Documentation which relate to or are relied upon in report preparation:

Australian Geomechanics Society Landslide Risk Management March 2007.

White Geotechnical Group company archives.

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature



Name

Ben White

Chartered Professional Status

MScGEOLAusIMM CP GEOL

Membership No.

222757

Company

White Geotechnical Group Pty Ltd

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1(a) - Checklist of Requirements for Geotechnical Risk Management Report for Development Application

Development Application for	Name of Applicant
Address of site	<u>13 Minkara Road, Bayview</u>

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 <u>13 Minkara Road, Bayview</u>
Report Date: <u>3/6/19</u>
Author: <u>BEN WHITE</u>
Author's Company/Organisation: <u>WHITE GEOTECHNICAL GROUP PTY LTD</u>

Please mark appropriate box

- ☒ Comprehensive site mapping conducted 28/5/19
(date)
- ☒ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ☒ Subsurface investigation required
 - ☐ No Justification _____
 - ☒ Yes Date conducted 28/5/19
- ☒ Geotechnical model developed and reported as an inferred subsurface type-section
- ☒ Geotechnical hazards identified
 - ☐ Above the site
 - ☒ On the site
 - ☐ Below the site
 - ☐ Beside the site
- ☒ Geotechnical hazards described and reported
- ☒ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
 - ☒ Consequence analysis
 - ☒ Frequency analysis
- ☒ Risk calculation
- ☒ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.
- ☒ Design Life Adopted:
 - ☒ 100 years
 - ☐ Other _____
specify
- ☒ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified
- ☒ Additional action to remove risk where reasonable and practical have been identified and included in the report.
- ☐ Risk assessment within Bushfire Asset Protection Zone.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.


Signature _____
Name Ben White
Chartered Professional Status MScGEOLAusIMM CP GEOL
Membership No. 222757
Company White Geotechnical Group Pty Ltd

GEOTECHNICAL INVESTIGATION:

New Shed, Tennis Court, Carport, and Awning at **13 Minkara Road, Bayview**

1. Proposed Development

- 1.1** Construct a new shed with storage under on the downhill side of the property by excavating to a maximum depth of ~2.2m.
- 1.2** Construct a new tennis court on the downhill side of the property.
- 1.3** Construct a new carport on the uphill side of the office.
- 1.4** Construct a new awning on the uphill side of the house.
- 1.5** Details of the proposed development are shown on 9 drawings prepared by Blue Sky Building Designs, Project number 2018049, drawings numbered A101 to 109, dated 25/2/19.

2. Site Description

- 2.1** The site was inspected on the 28th May, 2019, and previously on the 4th December, 2018.
- 2.2** This large rural/residential property is accessed by a long brick driveway off Minkara Road. The property has a N aspect. The block is located on the gently graded upper reaches of a hillslope. The natural surface falls across the property at an average angle of ~5°. The slope above and below the property continues at similar angles. No signs of movement related to slope instability were observed over the land surface or in the built structures on the property.
- 2.3** At the road frontage, a long brick driveway runs across the slope to the property (Photo 1). The driveway runs to a parking area on the E side of the site, garages on the E side of the office (Photo 2), and to a carport and parking area on the uphill side of the house (Photo 3). A dam has been constructed in the SE corner of the

property (Photo 4). The dam recently went through the council approval process that involved this firm and it is currently considered stable. An excavation has been made in the slope for the house and office buildings. The cut is supported by a stable ~1.5m high sandstone block retaining wall (Photo 5). A pool has been cut into the slope to the W of the house (Photo 6). The water level of the pool indicates no ground movement has occurred in the shell of the pool since its construction. A creek runs down and under the W side of the property (Photo 7). A stable timber outbuilding has been constructed in the SW corner of the property (Photo 8). A large lawn area encompasses the majority of the downhill side of the property (Photo 9). Another dam has been constructed near the entrance to the property that will be removed as part of the proposed works (Photo 10). Competent Medium Strength Sandstone outcrops above this dam (Photo 11). The earthworks for the proposed tennis court (including a cut and fill) had already been completed prior to our first inspection (Photo 12). The earthworks were subject to a separate approval process and are currently considered stable.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

Twelve Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil, the relative density of the compacted crushed sandstone for the tennis court, and the depth to bedrock. The locations of the tests are shown on the site plan. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural

rock surface. This is not expected to be an issue for the testing on this site and the results are as follows:

DCP TEST RESULTS – Dynamic Cone Penetrometer						
Equipment: 9kg hammer, 510mm drop, conical tip.				Standard: AS1289.6.3.2 - 1997		
Depth(m) Blows/0.3m	DCP 1 (~RL120.1)	DCP 2 (~RL120.1)	DCP 3 (~RL120.0)	DCP 4 (~RL120.0)	DCP5 (~RL123.5)	DCP6 (~RL122.5)
0.0 to 0.3	27	17	25	25	7	Rock Exposed at Surface
0.3 to 0.6	#	#	25	18	8	
0.6 to 0.9			20	27	25	
0.9 to 1.2			12	20	#	
1.2 to 1.5			9	10		
1.5 to 1.8			8	7		
1.8 to 2.1			15	12		
2.1 to 2.4			8	14		
2.4 to 2.7			#	#		
	Refusal on Rock @ 0.1m	Refusal on Rock @ 0.1m	Refusal on Rock @ 2.3m	End of Test @ 2.4m	Refusal on Rock @ 0.8m	

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

DCP TEST RESULTS – Dynamic Cone Penetrometer						
Equipment: 9kg hammer, 510mm drop, conical tip.				Standard: AS1289.6.3.2 - 1997		
Depth(m) Blows/0.3m	DCP7 (~RL121.5)	DCP8 (~RL120.6)	DCP9 (~RL127.1)	DCP10 (~RL127.1)	DCP11 (~RL127.3)	DCP12 (~RL127.3)
0.0 to 0.3	3	8	7	5	6	18
0.3 to 0.6	8	7	25	25	#	#
0.6 to 0.9	17	6	20	#		
0.9 to 1.2	#	#	#			
	Refusal on Rock @ 0.9m	Refusal on Rock @ 0.9m	Refusal on Rock @ 0.8m	Refusal on Rock @ 0.6m	Refusal on Rock @ 0.1m	Refusal on Rock @ 0.3m

#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 @ 0.1m, DCP bouncing off rock surface, yellow sandstone on wet tip.
DCP2 – Refusal on rock @ 0.1m, DCP bouncing off rock surface, clean dry tip.
DCP3 – Refusal on rock @ 2.3m, DCP bouncing off rock surface, yellow sand on damp tip.
DCP4 – End of test @ 2.4m, DCP still very slowly going down, muddy wet tip.
DCP5 – Refusal on rock @ 0.8m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP6 – Rock exposed at surface.
DCP7 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, brown sand on wet tip.
DCP8 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, brown sand on wet tip.
DCP9 – Refusal on rock @ 0.8m, DCP bouncing off rock surface, wet muddy tip, test taken below ~1.5m high retaining wall.
DCP10 – Refusal on rock @ 0.6m, DCP thudding, wet muddy tip, test taken below ~1.5m high retaining wall.
DCP11 – Refusal on rock @ 0.1m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP12 – Refusal on rock @ 0.3m, DCP bouncing off rock surface, white impact dust on dry tip.

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 natural sandy soils and firm to stiff sandy clays that fill the bench step formation. In DCPs 5 to 12, where it was not exposed, rock was encountered at depths of between 0.1 to 0.9m below the current surface, being slightly deeper due to the stepped nature of the underlying rock. The exposed sandstone across the site is estimated to be Medium Strength and a similar strength rock is expected to underly the entire site. See Type Section attached for a diagrammatical representation of the expected ground materials.

The earthworks for the proposed tennis court consist of a cut and fill (Photo 12). Competent Medium Strength Sandstone was observed to be outcropping through the low cut and DCPs 1 & 2 confirm that the sandstone underlies the surface at shallow depths across the uphill

side. The ground tests confirm that the fill placed across the downhill side has been adequately compacted to a consistency of hard clay/weathered rock. The fill overlies the natural surface at a maximum depth of ~1.2m. Medium Strength Sandstone was then encountered at a maximum depth of ~2.4m below the current surface.

6. Groundwater

Ground water seepage is expected to move over the buried surface of the rock and through the cracks. As a creek flows down the W side of the block (Photo 7), we expect groundwater seepage to be slightly higher across the block as slope seepage will move toward the creek. 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

Apart from the flowing creek down the W side of the site, no evidence of surface flows were observed on the property during the inspection. It is expected that normal sheet wash will move onto the site from above the property during heavy down pours.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below, or beside the property. The vibrations from the proposed excavation are a potential hazard (**Hazard One**). A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process is a potential hazard (**Hazard Two**).

RISK ANALYSIS SUMMARY ON THE NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The vibrations produced during the proposed excavation impacting on the surrounding structures.	A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (20%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	5.3×10^{-7} /annum	4.6×10^{-5} /annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in Section 12 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

There is fall to the creek that runs down the W side of the property (Photo 7). Roof water from the development is to be piped to the creek through any tanks that may be required by the regulating authorities. A diffuser is to be installed at the outlet of any new stormwater pipes that divert stormwater to the creek channel.

11. Excavations

An excavation to a maximum depth of ~2.2m is required to construct the proposed shed. The excavation is expected to be almost entirely through Medium Strength Sandstone.

It is envisaged that excavations through sandy soil and sandy clays can be carried out with a bucket and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

The proposed excavation is set back sufficiently from any surrounding structures or boundaries so that vibrations from the excavation will not exceed tolerable limits for building or infrastructure damage.

13. Excavation Support Requirements

No structures or boundaries will be within the zone of influence of the excavation.

The soil portions of the cut batters are to be battered temporarily at 1.0 Vertical to 2.0 Horizontal (30°) until the retaining walls are in place. Medium Strength Sandstone or better will stand at vertical angles unsupported subject to approval by the geotechnical consultant.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. The materials and labour to construct the retaining walls 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.

Upon completion of the excavation, it is recommended the 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.

During the excavation process, the geotechnical consultant is to inspect the cut batters in 1.5m intervals as they are lowered to ensure the ground materials are as expected and no wedges or other geological defects are present that could require additional support.

All excavation spoil is to be removed from site.

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
Sandy Soil	20	0.4	0.55
Medium Strength Sandstone	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 wall, 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 wall 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

A concrete slab and shallow piers supported directly off Medium Strength Sandstone is a suitable footing for the proposed shed. This material is expected to be exposed across most of the base of the excavation. Where it is not exposed, and where the footprint of the proposed shed does not fall over the excavation, piers will be required to maintain a uniform bearing material.

Shallow piers supported directly off Medium Strength Sandstone is a suitable footing for the proposed awning on the uphill side of the house. This material is expected to be encountered at shallow depths.

The proposed carport slab on the uphill side of the office is to be supported on shallow piers taken to the underlying Medium Strength Sandstone expected at ~0.6m below the current surface in this location.

A maximum allowable bearing pressure of 800kPa can be assumed for footings on Medium Strength Sandstone.

The density testing that was carried out on the earthworks for the proposed tennis court confirmed the fill has been adequately compacted for a maximum allowable bearing pressure of 100kPa.

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 pad 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. 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 owner or the regulating authorities if the following inspections have not been carried out during the construction process.

- During the excavation process, the geotechnical consultant is to inspect the cut faces as they are lowered in 1.5m intervals to ensure ground materials are as expected and that there are no wedges or other defects present in the rock that may require additional support.
- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment is still onsite and before steel reinforcing is placed or concrete is poured.

White Geotechnical Group Pty Ltd.



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



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5

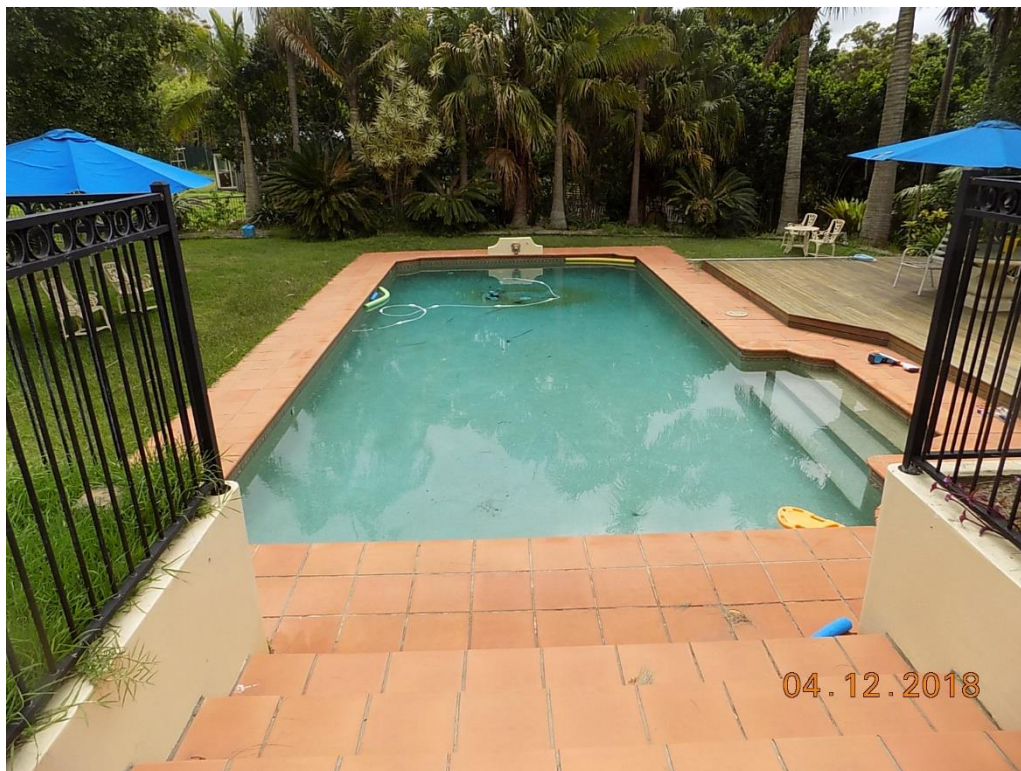


Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12

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.

[illegible]

2	SITE PLAN
A101	1 : 500

SHEET TITLE: SITE PLAN

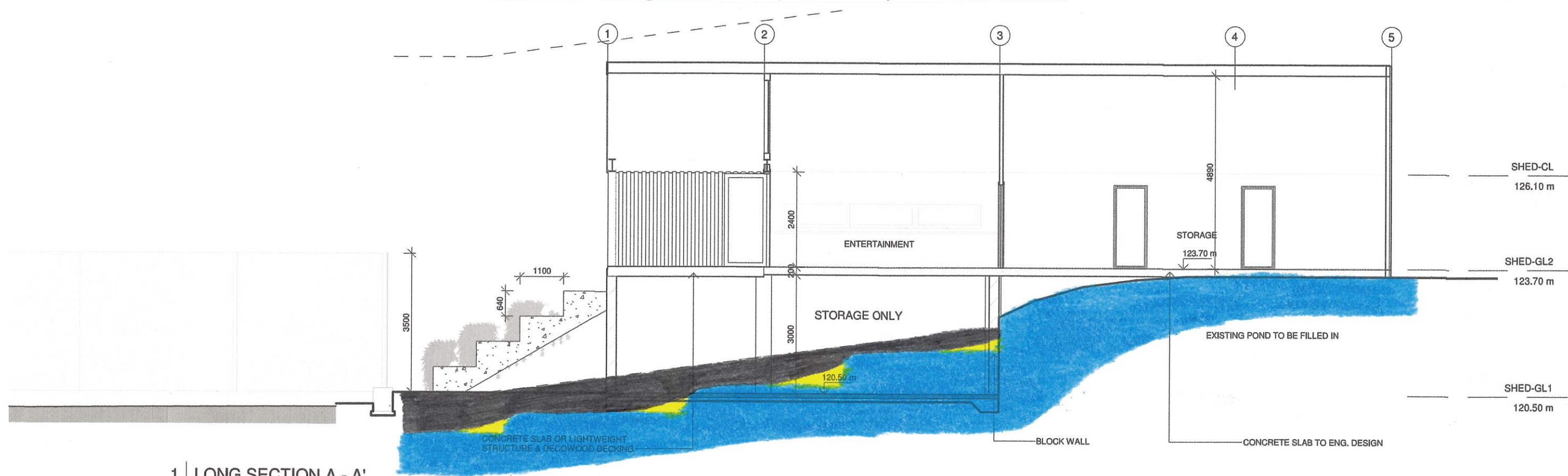
SHEET NO: A101

SCALE A3: 1 : 500

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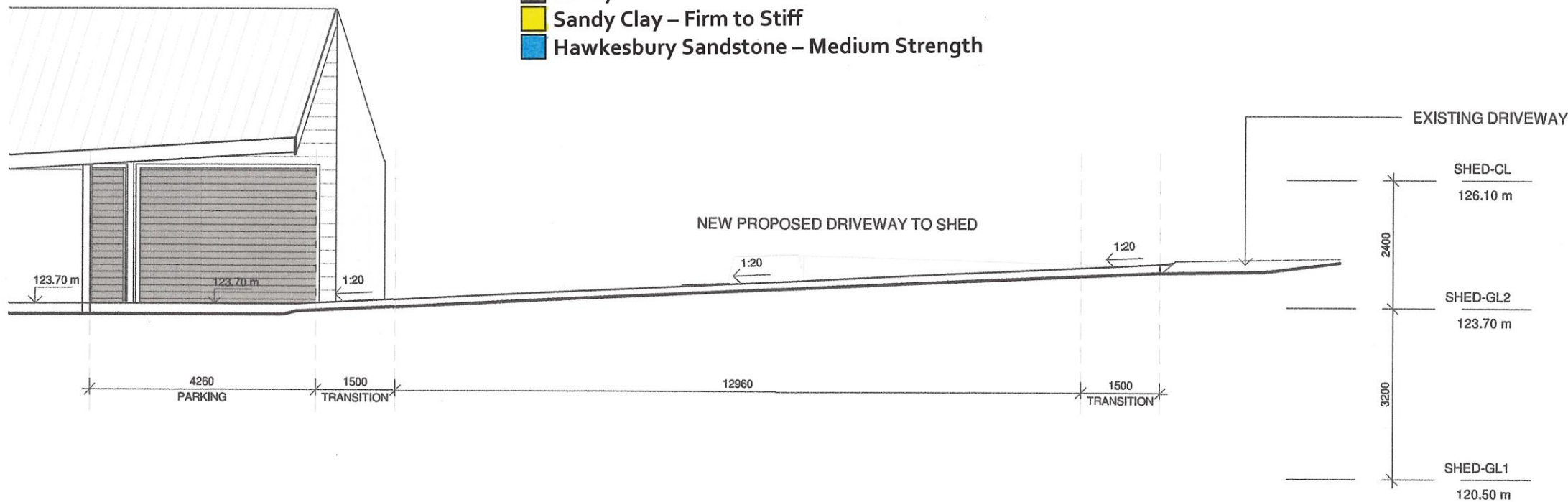
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



1 LONG SECTION A - A'

A107 1 : 100

- Fill
- Sandy Soil
- Sandy Clay – Firm to Stiff
- Hawkesbury Sandstone – Medium Strength



2 NEW DRIVEWAY LONG SECTION

A107 1 : 100

Do not scale from plans. All dimensions and levels shown on plan are subject to confirmation on site.

ISSUE	DATE	DESCRIPTION	DRWN	CHKD
-	25.02.2019	DA ISSUE	KM	

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PROJECT TITLE: NEW PROPOSED SHED
PROJECT NO.: 2018049
AT: 13 Minkara Rd, Bayview
FOR: 3rd Solution Investment Pty Ltd

SHEET TITLE: SECTIONS
SHEET NO: A107
SCALE A3: 1 : 100

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE

