

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

Development Application for _____
Name of Applicant

Address of site 20 Sunrise 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 15/3/21 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 20 Sunrise Road, Palm Beach
Report Date: 15/03/21

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 <u>20 Sunrise Road, Palm Beach</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>20 Sunrise Road, Palm Beach</u>
Report Date: <u>15/3/21</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 5/3/21
(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 5/3/21
- 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 Lift at 20 Sunrise Road, Palm Beach

1. Proposed Development

- 1.1** Construct a new lift on the N side of the house by excavating to a maximum depth of ~2.3m into the slope.
- 1.2** Details of the proposed development are shown on 11 drawings prepared by John Daubney numbered 1 to 11 and dated "March 21".

2. Site Description

- 2.1** The site was inspected on the 5th March, 2021.
- 2.2** This residential property has dual access. It is on the low side of Sunrise Road and is on the high side of Ocean Road. The property has an E aspect. The block is located on the steeply graded lower reaches of a hillslope that rises from Palm Beach. The natural surface falls from Sunrise Road at an average angle of ~20° to the approximate mid-point of the property before falling at very steep angles of ~48° to the road frontage with Ocean Road. The slope above the property eases to the crest.
- 2.3** At the road frontage to Sunrise Road, a stone-paved driveway runs to a garage attached to the uphill side of the house (Photo 1). The part three-storey house is supported on brick and concrete block walls and concrete columns (Photo 2). The supporting walls display no significant signs of movement and the supporting columns stand vertical. Some of the supporting walls were observed to be supported directly off competent Medium Strength Sandstone bedrock (Photo 3). A mostly suspended pool has been constructed off the downhill side of the house (Photo 4). The concrete shell of the pool displays no signs of movement related to slope instability and is considered stable. A steep slope falls from the base of the pool to the top of a ~6.0m

high sandstone cliff (Photo 5). The cliff consists of massive Medium Strength Sandstone and displays no significant geological defects. Thus, it is considered stable. A very steep and very densely-vegetated slope falls from the base of the cliff to the road frontage with Ocean Road (Photo 6). Some stable bands of sandstone were observed to be outcropping through this slope (Photo 7).

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. The contact is most likely located at the base of the sandstone cliff that falls below the pool. The Narrabeen Group rocks extend from this point down to the lower boundary and beyond (with some sandstone bands). The rock above this point is Hawkesbury Sandstone and it was observed to be outcropping in the location of the proposed works. It extends above to the upper boundary and beyond. This material is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

As sandstone bedrock was observed to be outcropping and stepping up the entire property, no subsurface investigation was carried out.

5. Geological Observations/Interpretation

The surface features of the upper portion 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 sandy soils over sandy clays that fill the bench step formation. Medium Strength Sandstone was observed to be outcropping in the location of the proposed works. A similar strength rock is expected to underlie the upper portion of the site. 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

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 drainage system for Sunrise Road above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below, or beside the property. The steeply graded slope that falls across the property is a potential hazard (**Hazard One**). The vibrations from the proposed excavation are a potential hazard (**Hazard Two**). The proposed excavation is a potential hazard until retaining walls are in place (**Hazard Three**). The proposed excavation undercutting the footings for the house 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 failing and impacting on the property.	The vibrations produced during the proposed excavation impacting on the surrounding structures.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'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 16 are carried out.	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 excavations undercutting the footings of the house causing failure (Photo 3).
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Medium' (35%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	4.7×10^{-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 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 roofing of the proposed works adds less than $\sim 50\text{m}^2$ to the current roof area so it is possible the existing stormwater system can be used with the approval of the stormwater engineer.

11. Excavations

An excavation to a maximum depth of $\sim 2.3\text{m}$ is required to install the proposed lift. The excavation is expected to be taken entirely through Medium Strength Sandstone.

The excavation is expected to be carried out using hand tools such as rock saws and jack hammers due to access difficulties. If machines are used, the excavation is to be carried out with rock saws or grinders. Machine-mounted rock hammers are not to be used to minimise vibration from the works.

12. Vibrations

The excavation is expected to be carried out using hand tools such as rock saws and jack hammers. No vibration monitoring will be required if these excavation methods are used.

Considering the methods outlined above to excavate the rock, the vibrations generated during the excavation will not exceed the threshold for building damage.

13. Excavation Support Requirements

The excavation will come close to flush with the supporting brick walls of the subject house (Photo 3). However, the excavation will be taken almost entirely through Medium Strength Sandstone and any nearby structures are already supported on the rock. Thus, following the

demolition of the existing courtyard slab, no structures or boundaries will be within the zone of influence of the excavation.

Excavations through Medium Strength Sandstone or better will stand at vertical angles unsupported subject to approval by the geotechnical consultant.

If any supporting walls are required to be removed, the house above is to be propped and supported with beams prior to the excavation through rock commencing.

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.

During the excavation process, the geotechnical consultant is to inspect the excavation as it approaches to not less than 0.7m from the supporting walls of the house to confirm the stability of the cut to go flush with the footings.

Additionally, during the excavation process, the geotechnical consultant is to inspect the excavation as it is lowered at intervals of ~1.5m 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.

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 faces that can occur over time, when unfavourable jointing is obscured behind the excavation faces. 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 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
Medium Strength Sandstone	24	0.00	0.10

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 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 supported directly off Medium Strength Sandstone are suitable footings for the proposed lift. This ground material is expected to be exposed across the entire base of the excavation.

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. Site Maintenance/Remedial Works

Where slopes approach or exceed 30° (such as below the house – Photo 6), it is prudent for the owners to occasionally inspect the slope (say annually or after heavy rainfall events, whichever occurs first). Should any of the following be observed: movement or cracking in retaining walls, cracking in any structures, cracking or movement in the slope surface, tilting or movement in established trees, leaking pipes, or newly observed flowing water, or changes in the erosional process or drainage regime, then a geotechnical consultant should be engaged to re-assess the slope. We can carry out these inspections upon request. The risk assessment in **Section 8** is subject to this site maintenance being carried out.

REQUIRED INSPECTIONS ARE ON THE NEXT PAGE

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 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 excavation as it approaches to not less than 0.7m from the supporting walls of the house to confirm the stability of the cut to go flush with the footings.
- During the excavation process, the geotechnical consultant is to inspect the excavation as it is lowered at intervals of ~1.5m 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

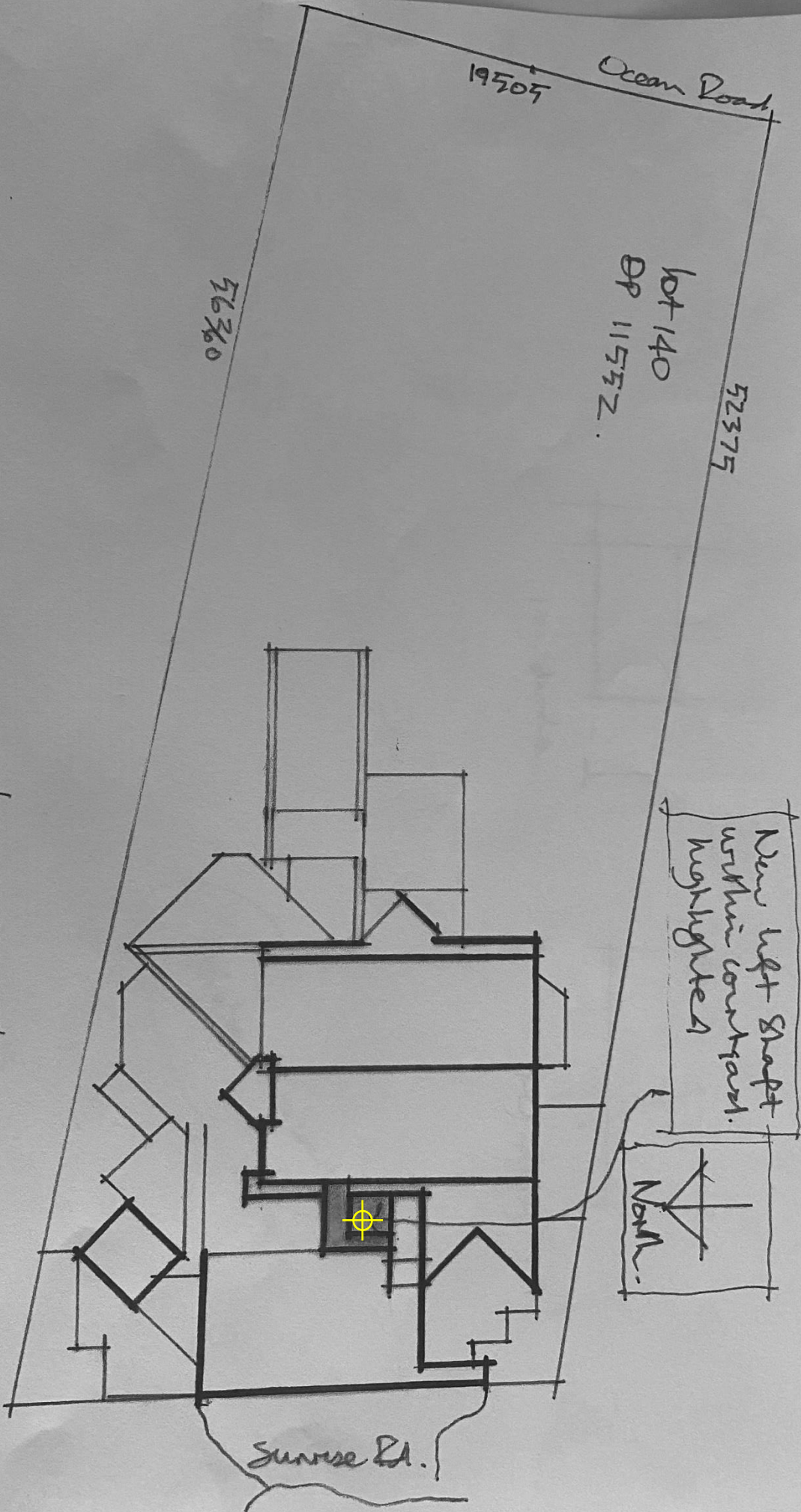
Important Information about Your Report

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:

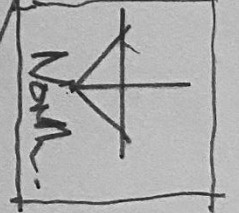
- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly 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 location where Medium Strength Sandstone was observed to be outcropping



John Daubney
Architect

New left shaft
within courtyard.
highlighted



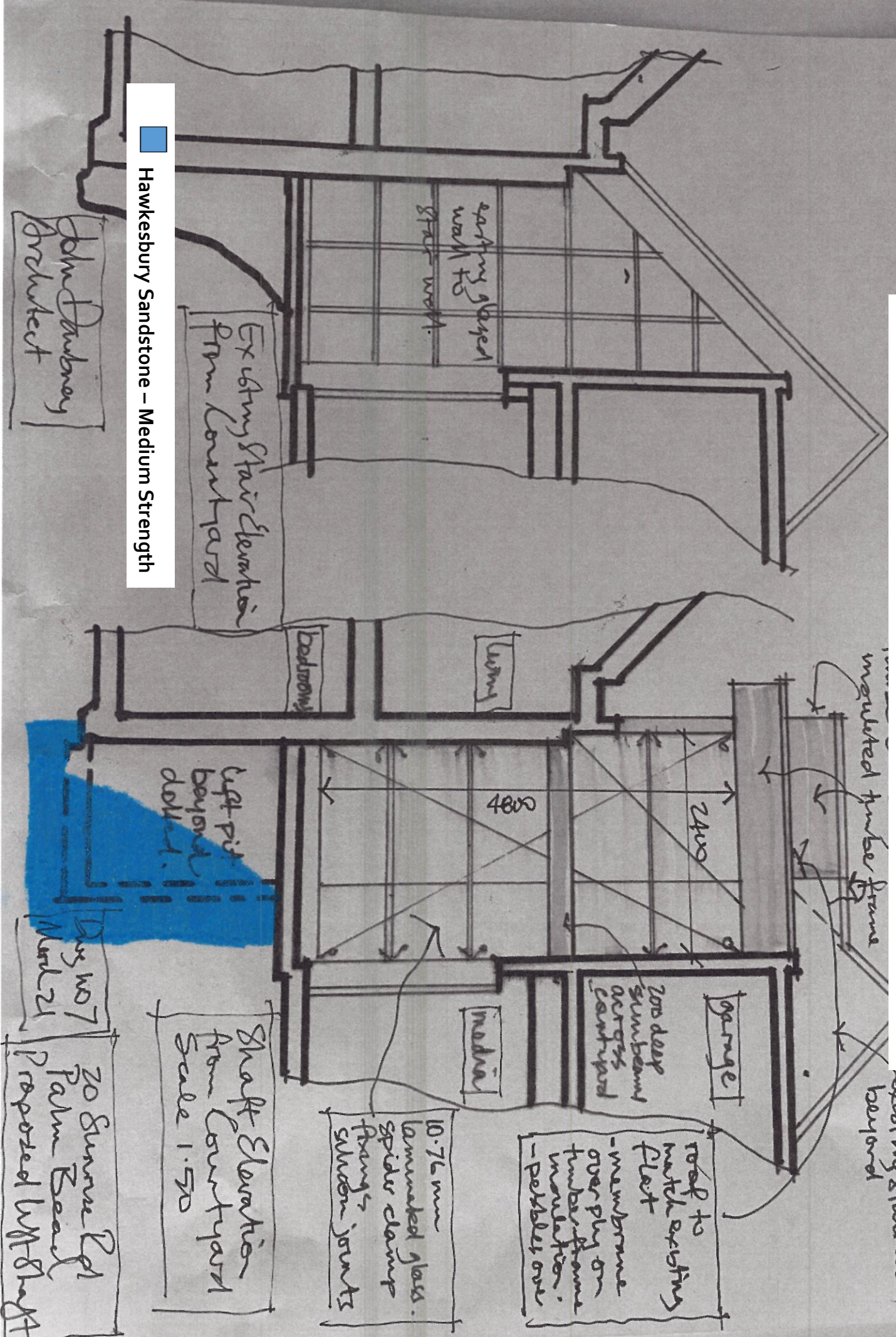
Site Plan
Scale 1:200
Dwg. no 7
March 21

20 Summer Rd
Palm Beach
Proposed left shaft

TYPE SECTION - Diagrammatical Interpretation of expected Ground Materials

Hawkesbury Sandstone - Medium Strength

John Dandrey
Architect



insulated timber frame

existing stairwork beyond

200 deep sunbeam across courtyard

roof to match existing flat - membrane over ply on timber frame insulation - pebbles over

10.76mm laminated glass spider clamp fixings silicon joints

Shaft Elevation from Courtyard Scale 1:50

Dwg NO 7 April 21

20 Summer Rd Palm Beach Reported by Staff

left pit beyond detail

Living

Bedroom

Garage

Kitchen

Bedroom

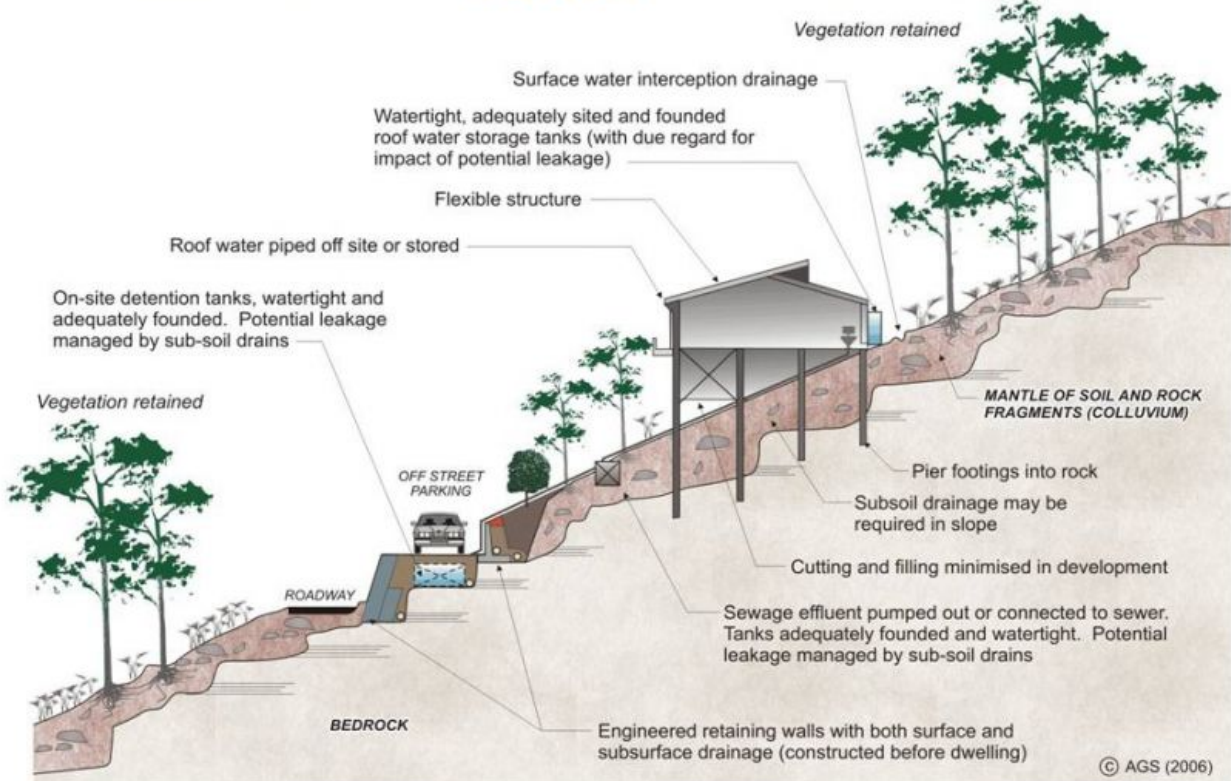
Existing Stair Elevation from Courtyard

existing glazed wall to space work

4800

2400

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE

