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

Development Application for _____
Name of Applicant

Address of site 1742 Pittwater 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 8/8/19 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 **1742 Pittwater Road, Bayview**

Report Date: 5/8/19

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 1742 Pittwater Road, Bayview

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 **1742 Pittwater Road, Bayview**

Report Date: 5/8/19

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted 1/8/19 (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 1/8/19

☒ 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 Pool and Boatshed at **1742 Pittwater Road, Bayview**

1. Proposed Development

1.1 Demolish the existing pool and construct a new pool and boatshed on the downhill side of the property by excavating to a maximum depth of ~1.9m for the boatshed.

1.2 Details of the proposed development are shown on 6 drawings prepared by Gartner Trovato Architects, Project number 1920, drawings numbered A-01 to 06, dated 29/7/19.

2. Site Description

2.1 The site was inspected on the 1st August, 2019, and previously on the 31st July, 2014.

2.2 This residential property is on the low side of the road and has a NE aspect. It encompasses the steep bank that rises at the waterfront some 3.5m and the gentle slope above that grades at angles of some 6°. The slope rises beyond the site at similar gentle angles for ~300m before the grade gradually increases in the slope to Bayview Plateau.

2.3 At the road frontage, a concrete driveway runs to a garage attached to the uphill side of the house and to a carport on the uphill side of the property (Photos 1 & 2). The part two-storey framed and clad house is recently constructed and in good condition (Photo 3). A gently sloping lawn extends off the downhill side of the house (Photo 4). At the NE end of the block, the bank that descends to the waterfront is landscaped with flagging walls and low rockeries (Photos 5 & 6). An old dilapidated pool and surrounding paving is located at the toe of the bank (Photo 7). The retaining walls and pool will be demolished as part of the proposed works. A stone and concrete

seawall runs along the downhill side of the pool in the vicinity of the mean high-water mark (Photo 8).

3. Geology

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

4. Subsurface investigation

Five 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. 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. 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**	**DCP 2**	**DCP 3**	**DCP 4**	**DCP 5**
0.0 to 0.3	3	7	3	8	1
0.3 to 0.6	12	10	6	9	7
0.6 to 0.9	12	10	12	13	9
0.9 to 1.2	22	12	11	18	14
1.2 to 1.5	#	17	21	#	22
1.5 to 1.8		#	#		#
	End of test@ 1.2m	Refusal @ 1.4m	End of test@ 1.5m	End of test@ 1.2m	Refusal @ 1.5m

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

Notes:
DCP1 – End of test @ 1.2m still going down slowly, maroon shale fragments on dry tip.
DCP2 – Refusal @ 1.4m, nothing on dry tip.
DCP3 – End of test @ 1.5m still going down slowly, maroon shale fragments on dry tip.
DCP4 – End of test @ 1.2m still going down slowly, maroon shale fragments on dry tip.
DCP5 – Refusal @ 1.5m, nothing on dry tip.

5. Geological Observations and Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of sandy clays and clays with rock fragments throughout the profile. The sandy clays and clays merge into the weathered zone of the underlying shale at depths expected to be in the range of 1.2m to 1.5m below the natural surface. The weathered zone is interpreted to be Extremely Low Strength Rock that becomes progressively stronger with depth. 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 clay and rock and through the cracks in the rock. Due to the slope and elevation of the block, the water table in the location 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 street drainage system for Pittwater Road above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above, below, or beside the property. The steep bank that rises from the waterfront is a potential hazard (**Hazard One**). The proposed excavation is a potential hazard until retaining walls are in place (**Hazard Two**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The steep bank that rises at the waterfront failing and impacting on the proposed works.	The excavation for the proposed boatshed (up to a depth of ~1.9m) collapsing onto the work site before retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-5})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Minor' (8%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (5×10^{-6})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/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.

(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 of the property is to the Pittwater so any stormwater runoff from the proposed development can be piped to the waterfront through any tanks that may be required by the regulating authorities.

11. Excavations

The excavation for the proposed boatshed will be taken to depths of ~1.9m. It is expected to be through shallow topsoil, firm to stiff clay to ~1.2m before encountering Extremely Low Strength Shale. This material will appear as a grey to mottled maroon clay when cut up by excavation equipment. It is expected that the excavations can be carried out with an excavator and bucket.

12. Vibrations

Excavations through clay and Extremely Low Strength Shale carried out with an excavator and bucket will be well below the threshold limit for building damage.

13. Excavation Support Requirements

The excavation for the proposed boatshed will be taken close to flush with the SE common boundary. It will reach a maximum depth of ~1.9m along the boundary but will taper away in height along the SE side. The cut will require temporary support to maintain the integrity of neighbouring property until permanent retaining walls are in place.

Along the SE common boundary, the cut will require temporary support such as stacked bulka bags or similar support installed as the excavation is progressed. The support is to be approved/designed by the structural engineer. The temporary support is to remain in place until the retaining wall is built.

The remaining cut batters may stand at near-vertical angles for a short period of time until the retaining structures are installed provided the cut batters are kept from becoming

saturated. If the cut batters remain unsupported for more than a few days before retaining works commence, they are to be supported with temporary support as above.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. Unsupported cut batters through fill, soil, and clay are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The covers are to be tied down with metal pegs or other suitable fixtures so they can't blow off in a storm. The materials and labour to construct the retaining structures 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 garage cut in 1.5m intervals as it is lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and no additional temporary support is required.

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 pressure 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, Sandy Soil, and Residual Clays	20	0.40	0.55
Extremely Low Strength Shale	22	0.25	0.35

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 likely hydrostatic pressures are to be accounted for in the structural design.

15. Foundations

The proposed boatshed can be supported on a concrete slab and piers taken to Extremely Low Strength Shale. This ground material is expected to be exposed across a portion of the base of the excavation. Where the slope drops away on the downhill side, this ground material is expected at depths of between ~1.2 to 1.5m below the current surface.

The proposed pool can be supported on piers taken to and embedded ~0.6m into Extremely Low Strength Shale. This ground material is expected at similar depths as above.

A maximum allowable bearing pressure of 600kPa can be assumed for footings on Extremely Low Strength Shale. It should be noted that this material is a soft rock and a rock auger will cut through it so the builders should not be looking for refusal to end the footings.

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

If a rapid turnaround from footing excavation to the concrete pour is not possible, a sealing layer of concrete may be added to the footing surface after it has been cleaned.

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

16. 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 Occupation Certificate if the following inspections have not been carried out during the construction process.

- During the excavation process, the geotechnical consultant is to inspect the cut in 1.5m intervals as it is lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and no temporary support is required.

- 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

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.

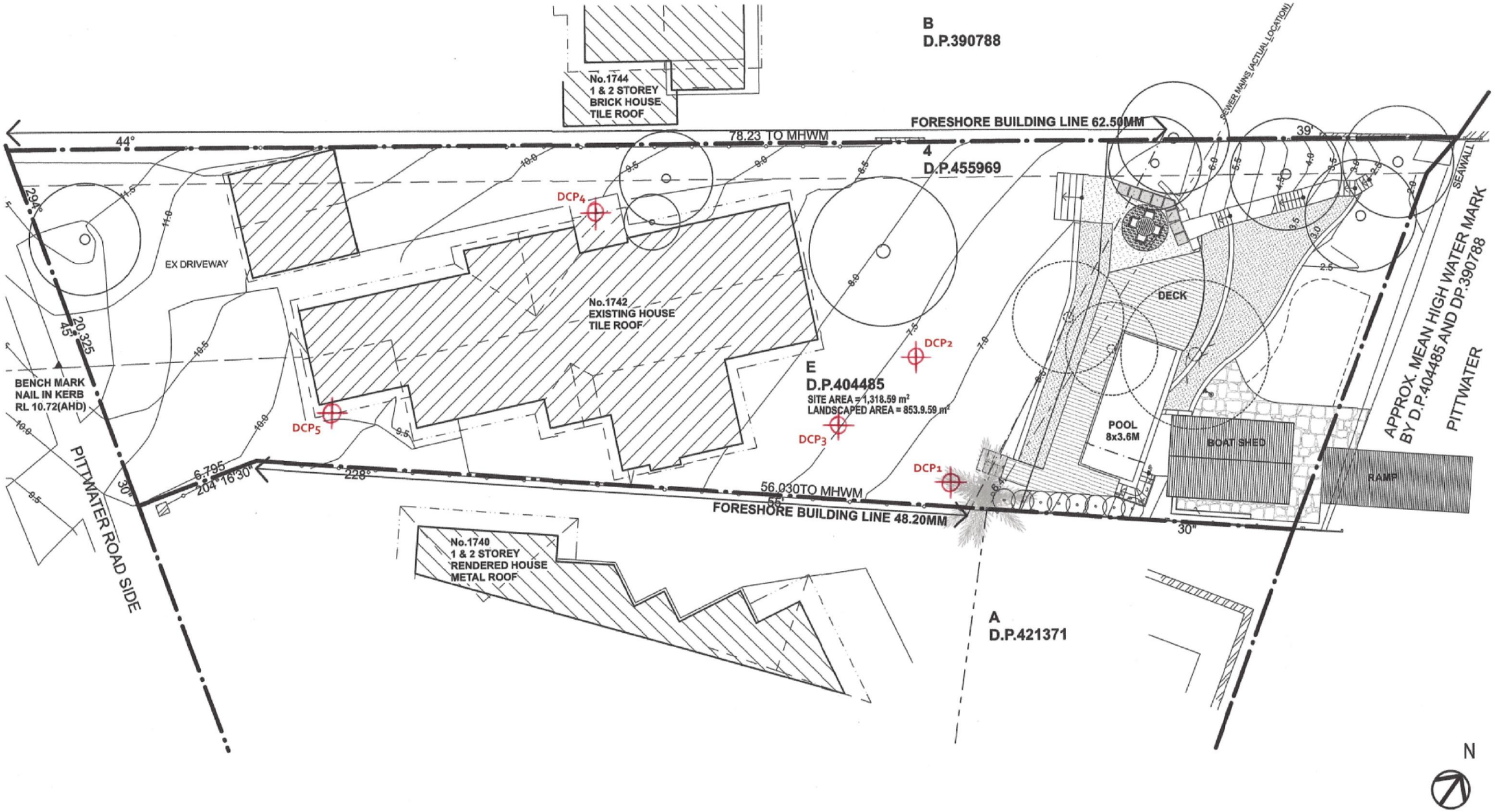
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



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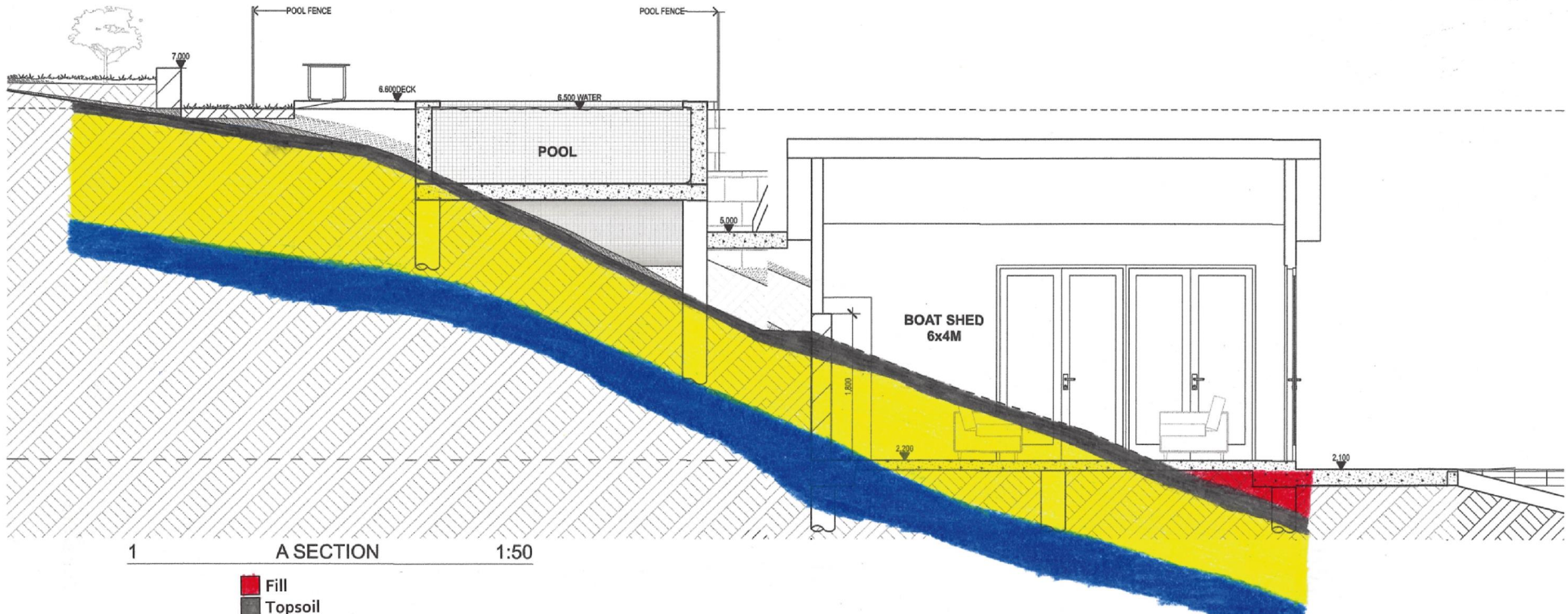
SITE PLAN

PROJECT
ELMSLIE POOL
NEW POOL AND BOATSHED
1742 PITTWATER ROAD, BAY VIEW NSW

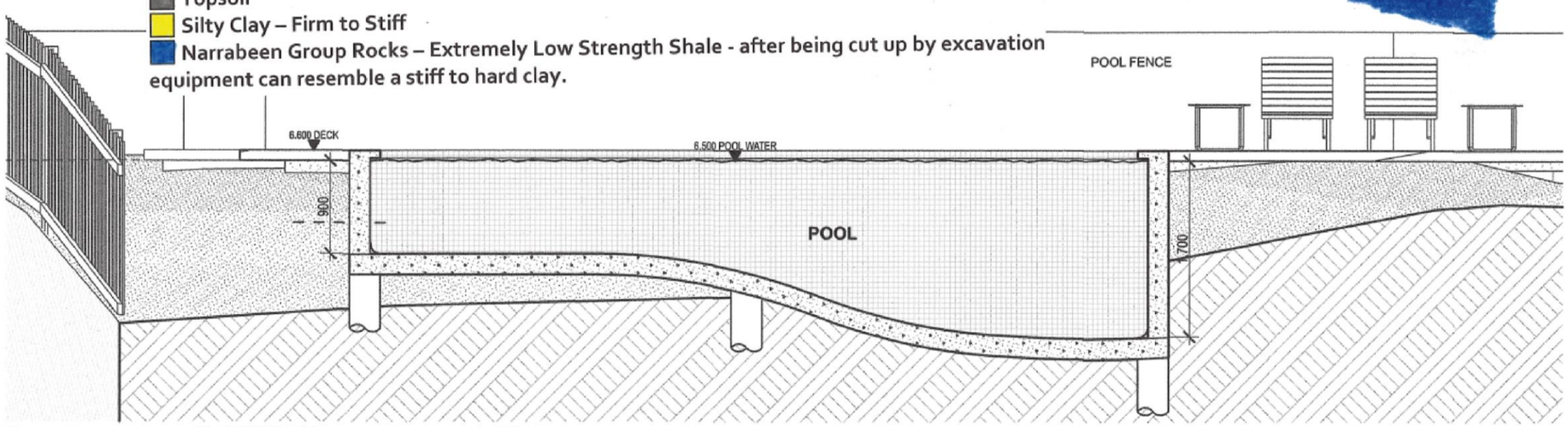
PROJECT NO.	SCALE	DATE	DRAWING NO.	REVISION
1920	1:200 @ A3	28/7/19	A-01	

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



1 A SECTION 1:50

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



2 B SECTION 1:50

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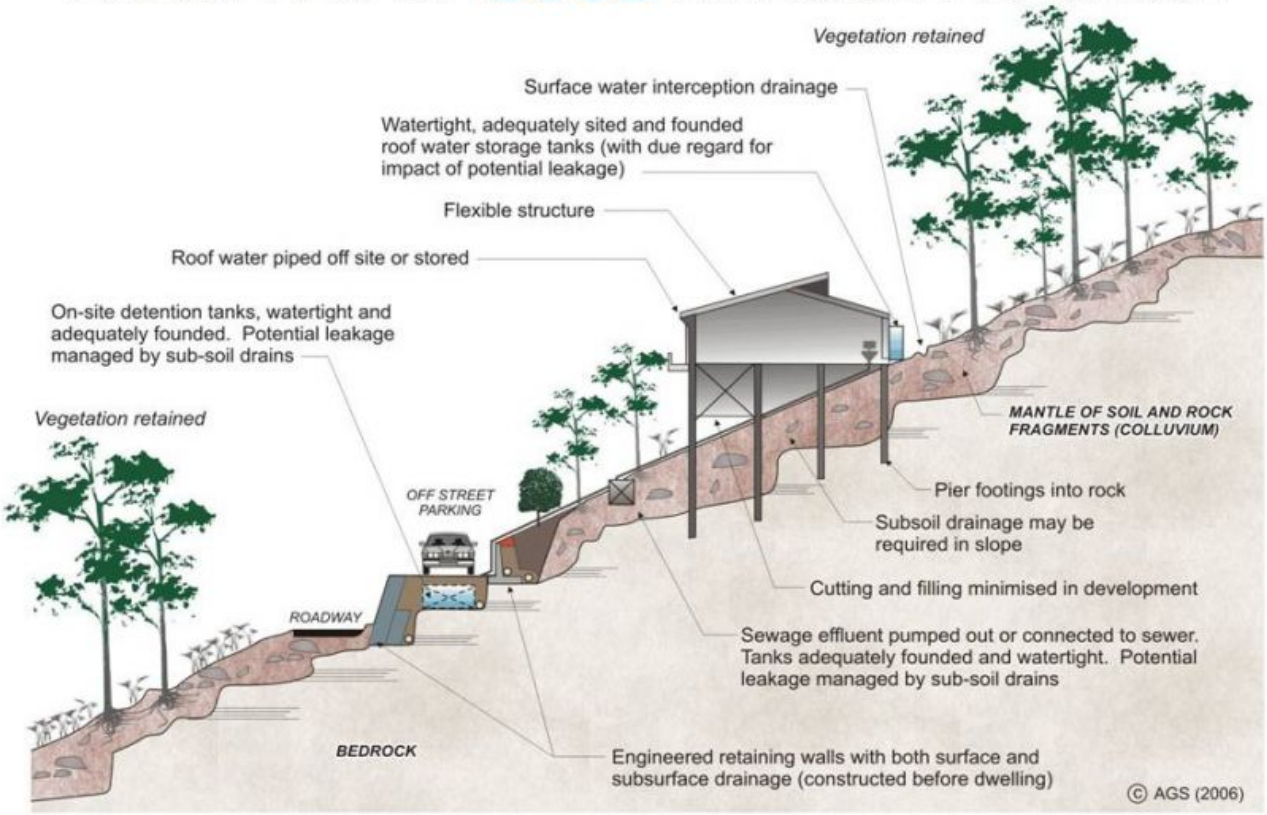
SECTIONS

PROJECT
ELMSLIE POOL
NEW POOL AND BOATSHED
1742 PITTWATER ROAD, BAY VIEW NSW

PROJECT NO.	SCALE	DATE	DRAWING NO.	REVISION
1920	1:50 @ A1	29/7/19	A-06	

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE