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

Development Application for _____
Name of Applicant

Address of site 103 Narrabeen Park Parade, Mona Vale

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 20/12/19 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 **103 Narrabeen Park Parade, Mona Vale**

Report Date: 20/12/19

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 103 Narrabeen Park Parade, Mona Vale

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 **103 Narrabeen Park Parade, Mona Vale**

Report Date: 20/12/19

Author: BEN WHITE

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

Please mark appropriate box

- ☒ Comprehensive site mapping conducted **28/11/19** (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 **28/11/19**
- ☒ 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 Carport, Storeroom and Lift at **103 Narrabeen Park Parade, Mona Vale**

1. Proposed Development

1.1 Construct a new suspended driveway and carport with a storeroom below by excavating to a maximum depth of 1.3m.

1.2 Construct a new lift connecting the proposed carport with the existing house.

1.3 Details of the proposed development are shown on 12 drawings prepared by James de Soyres + Associates Architects, drawings numbered DA-01 to DA-30, dated 16th December 2019.

2. Site Description

2.1 The site was inspected on the 28th of November, 2019.

2.2 This residential property is on the low side of the road and has a SE aspect. The block is located on the moderately graded middle reaches of a hillslope. The natural surface falls across the property at an average angle of ~15°. The slope above the property decreases in grade and the slope below the property increases in grade.

2.3 From the road frontage, steps and a pedestrian ramp lead to a concrete and brick paved driveway, which runs down the slope to a garage just below the uphill boundary of the property (Photos 1, 2 & 3). The fill batter for the road merges into the natural slope. In a small section adjacent to the stairs it is lined with bricks (Photo 4). The timber and weatherboard clad garage is supported on a concrete slab which shows some cracking but no movement related to slope instability (photo 5). Between the driveway and house are garden beds and a lawn (photos 6 & 7). An excavation has been made in the slope to provide a level platform for the house. The cut below the

garden is supported by a stable stack rock retaining wall ~1.0m high (photo 8). The cut below the lawn is supported by a stable sandstone retaining wall ~1.0m high (photo 9). The two storey timber and weatherboard clad house is supported on brick walls, brick piers and concrete piers (photos 10 to 14). The supporting walls and piers show no significant signs of movement. A stable timber retaining wall supports a cut batter located underneath the downhill side of the house (photo 13). A suspended timber deck supported on timber posts extends off the downhill side of the house. (photo 15). A fill that provides a level platform for a stone pavement is supported by a stable timber retaining wall (photos 12, 16 & 17). A moderately sloping lawn descends downhill to the SE boundary of the property (photo 18). Below the boundary the surface is covered in coastal shrub and continues to Warriewood Beach (photos 19 & 20).

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

One auger hole was put down to identify the soil materials. Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The locations of the tests are shown on the site plan. 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:

TEST RESULTS ARE ON THE NEXT PAGE

AUGER HOLE 1 (~RL34.5) **–** AH1 (photo 21)

Depth (m)	**Material Encountered**
0.0 to 0.2	**SANDY SOIL**, grey, fine to medium grained.
0.2 to 0.5	**SANDY CLAY**, grey-brown, mottled with red, course grained, firm to stiff, dry.
0.5 to 0.8	**SANDY CLAY**, orange brown, firm to stiff, moist.

End of hole @ 0.8m in firm to stiff sandy clay. No watertable 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** (~RL36.5)	**DCP 2** (~RL34.5)	**DCP 3** (~RL33.9)	**DCP 4** (~RL32.5)
0.0 to 0.3	17	9	13	11
0.3 to 0.6	20	13	24	10
0.6 to 0.9	35	14	17	8
0.9 to 1.2	40	38	30	14
1.2 to 1.5	#	#	40	25
1.5 to 1.8			#	30
1.8 to 2.1				29
2.1 to 2.4				40
2.4 to 2.7				#
	End of Test @ 1.2m	End of Test @ 1.2m	End of Test @ 1.4m	End of Test @ 2.3m

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

DCP Notes:

DCP1 – End of test @ 1.2m, DCP still very slowly going down, orange shale on dry tip.

DCP2 – End of test @ 1.2m, DCP still very slowly going down, sandy soil on dry tip.

DCP3 – End of test @ 1.4m, DCP still very slowly going down, white brown clay on dry tip.

DCP4 – End of test @ 2.3m, DCP still very slowly going down, orange and maroon shale on dry tip.

5. Geological Interpretation

The slope materials are colluvial at the near surface and residual at depth. They consist of a sandy topsoil over sandy clays. In the test locations, the clays merge into the weathered zone of the underlying rocks at an average depth of ~1.5m below the current surface. The weathered zone of the underlying rock is interpreted as Extremely Low Strength Shale. It is to be noted that this material is a soft rock and can appear as a mottled stiff clay when it is cut up by excavation equipment.

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.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate to steeply graded slope that falls across the property and continues above and below is a potential hazard (**Hazard One**). The excavation for the proposed carport and store room is a potential hazard until retaining walls are place (**Hazard Two**).

RISK ANALYSIS SUMMARY IS ON THE NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that falls across the property and continues above and below failing and impacting on the property.	The unsupported cut batters for the excavations collapsing onto the work site before permanent support is in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Minor' (5%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (5×10^{-5})
RISK TO LIFE	8.3×10^{-7}/annum	8.3×10^{-7}/annum
COMMENTS	'ACCEPTABLE' level of risk to life & property.	This level of risk to life and property is 'TOLERABLE'. To move the risk levels 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

Warriewood Beach Reserve is immediately below the property so stormwater can be piped to the downhill boundary through a diffuser or spreader.

11. Excavations

An excavation to a maximum depth of ~1.3m will be required to construct the proposed carport and storeroom. The excavation is expected to be through a sandy soil over firm to

stiff clay, with Extremely Low Strength Shale expected at the base of the excavation. Excavations through soil, clay and Extremely Low Strength Shale can be carried out with an excavator and bucket.

12. Vibrations

It is expected the proposed excavation will be carried out with an excavator and bucket and the vibrations produced will be below the threshold limit for building or infrastructure damage.

13. Excavation Support Requirements

The excavation for the proposed carport and storeroom will reach a maximum depth of ~1.3m. The soil portion of the proposed excavation is to be battered temporarily at 1.0 Vertical to 1.7 Horizontal (30°) until the retaining walls are in place. Cut batters through Firm to Stiff Clay and Extremely Low Strength Shale will stand at near-vertical angles for short periods of time until the retaining walls are installed, provided the cut batters are kept from becoming saturated.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. All unsupported cut batters are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. 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.

All excavation spoil is to be removed from site or is to be supported by engineered retaining walls.

14. Retaining Walls

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
Sandy Soil	20	0.40	0.55
Residual Clays	20	0.35	0.45
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 full hydrostatic pressures are to be accounted for in the retaining structure design.

15. Foundations

The proposed lift, suspended driveway and carport are to be supported on piers embedded into the underlying Extremely Low Strength Shale. This ground material is expected at a depth of ~1.5m below the natural surface. A maximum allowable bearing pressure of 600kPa can be assumed for footings embedded in 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.

It is expected that the footings of the existing house are supported on clay. Footings should be founded on the same footing material across 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.

As the bearing capacity of 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 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 inspection as well as council geotechnical policy. We cannot provide geotechnical certification for the owners or the Occupation Certificate if the following inspection has not been carried out during the construction process.

- 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

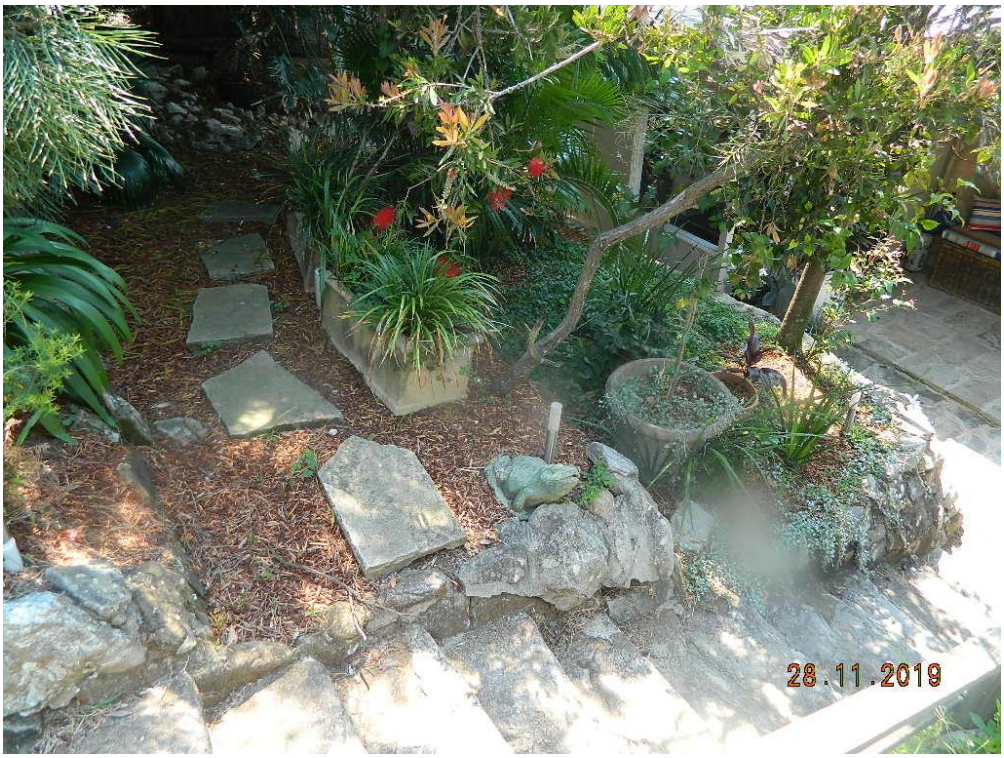


Photo 6

Photo 7

Photo 8

Photo 9

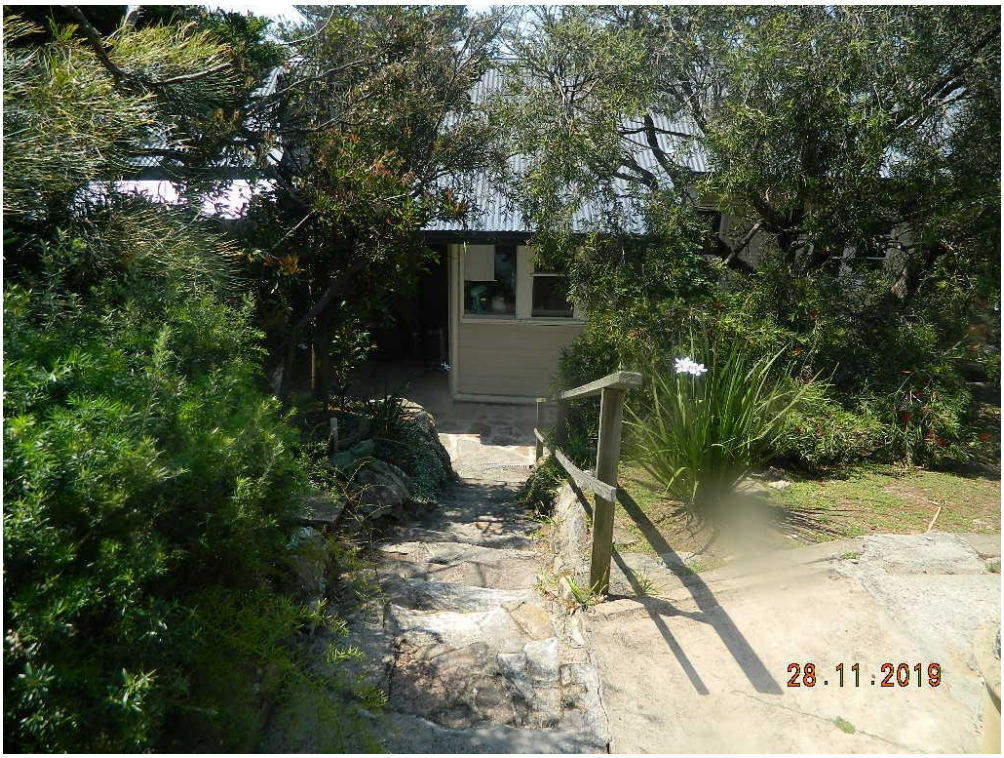


Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

Photo 20

Photo 21: AH1 – Downhole is from top to bottom

Important Information about Your Report

It should be noted that Geotechnical Reports are documents that build a picture of the subsurface conditions from the observation of surface features and testing carried out at specific points on the site. The spacing and location of the test points can be limited by the location of existing structures on the site or by budget and time constraints of the client. Additionally, the test themselves, although chosen for their suitability for the particular project, have their own limiting factors. The testing gives accurate information at the location of the test, within the confines of the test's capability. A geological interpretation or model is developed by joining these test points using all available data and drawing on previous experience of the geotechnical consultant. Even the most experienced practitioners cannot determine every possible feature or change that may lie below the earth. All of the subsurface features can only be known when they are revealed by excavation. As such, a Geotechnical report can be considered an interpretive document. It is based on factual data but also on opinion and judgement that comes with a level of uncertainty. This information is provided to help explain the nature and limitations of your report.

With this in mind, the following points are to be noted:

- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly to overcome if they are addressed early.

- If this report is used by other professionals during the design or construction process, any questions should be directed to White Geotechnical Group as only we understand the full methodology behind the report's conclusions.

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

- This report should not be applied to any other project other than that outlined in section 1.0.

- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.

- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.

SITE PLAN – showing test locations

FOR DEVELOPMENT APPLICATION PURPOSES ONLY
NOT FOR CONSTRUCTION

Notes: Do not scale from drawings

DCP1 DCP2 DCP3 DCP4
AH 1
T1 T10 T11 T13 T14 T15
Tree T13 SRZ
Tree T13 TPZ
Tree T10 SRZ
Tree T10 TPZ
Tree to be removed
Tree to be retained
Tree T14 SRZ
Tree T14 TPZ
Store
Concrete
Existing Foyer
Lift shaft
Existing wall
Demolish existing driveway
Outline of suspended driveway above
Concrete steps to road
New steps
Stone clad masonry wall
Existing Shed
Existing flagging
Paving
Gas
Power pole
CONCRETE DRIVEWAY
CONC. STRIPPED D/WAY
CROSSING
RAMP/STEPS
CONCRETE PATH
STONE PAVING
AWNING
STEPS
PATH
CONCRETE
KERB
RL RIDGE 36.99
RL RIDGE 38.2
RL RIDGE 36.96
RL RIDGE 35.37
RL GUTTER 35.32
RL DECK 32.6
RL GUTTER 35.38
RL GUTTER 35.51
RL ROOF 35.56
RL ROOF 35.59
UPPER LEVEL
LINE OF LOWER LEVEL
FL=32.9
FL=32.78
FL=30.26
RL KERB 38.75
RL INVERT 37.43

Nominated Architect: Reg. No. 6769
m PO Box 657, Newport Beach, NSW 2106
t (02) 9979 1823
e contact@jdesa.com.au
w www.jdesa.com.au

James de Soyres + Associates
architects

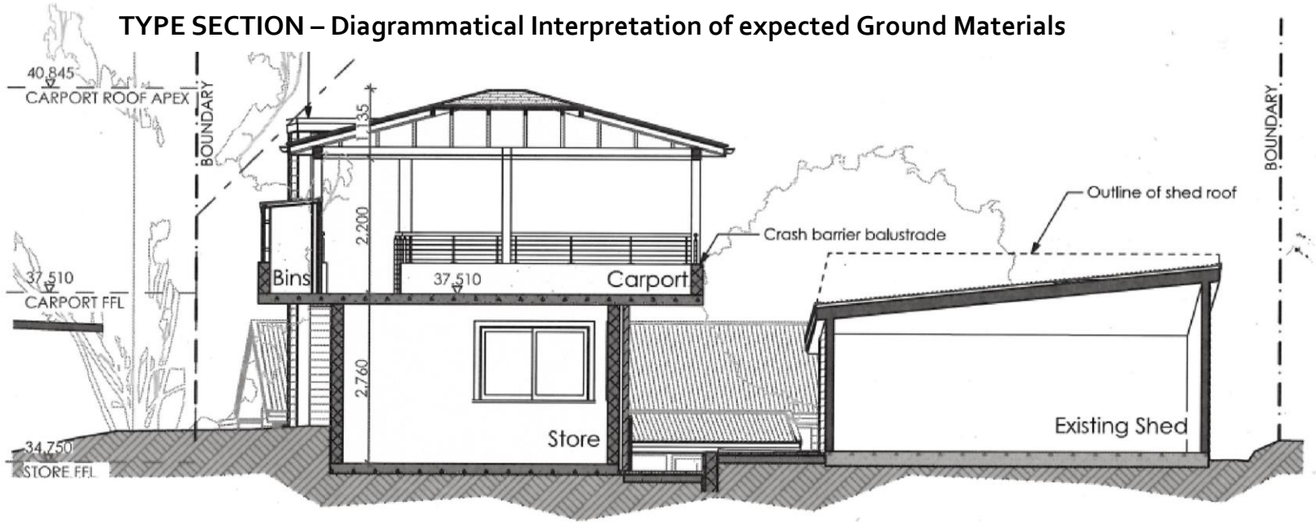
Proposed Carport, Store and Lift
at 103 Narrabeen Park Parade Mona Vale NSW 2105
for R & S Nichols

DEVELOPMENT APPLICATION

Store and Entry Floor Plan

Scale: 1:100
Date of printing: 16/12/2019
Project No: 1905a
Drawing No: **DA-10**
Rev:

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

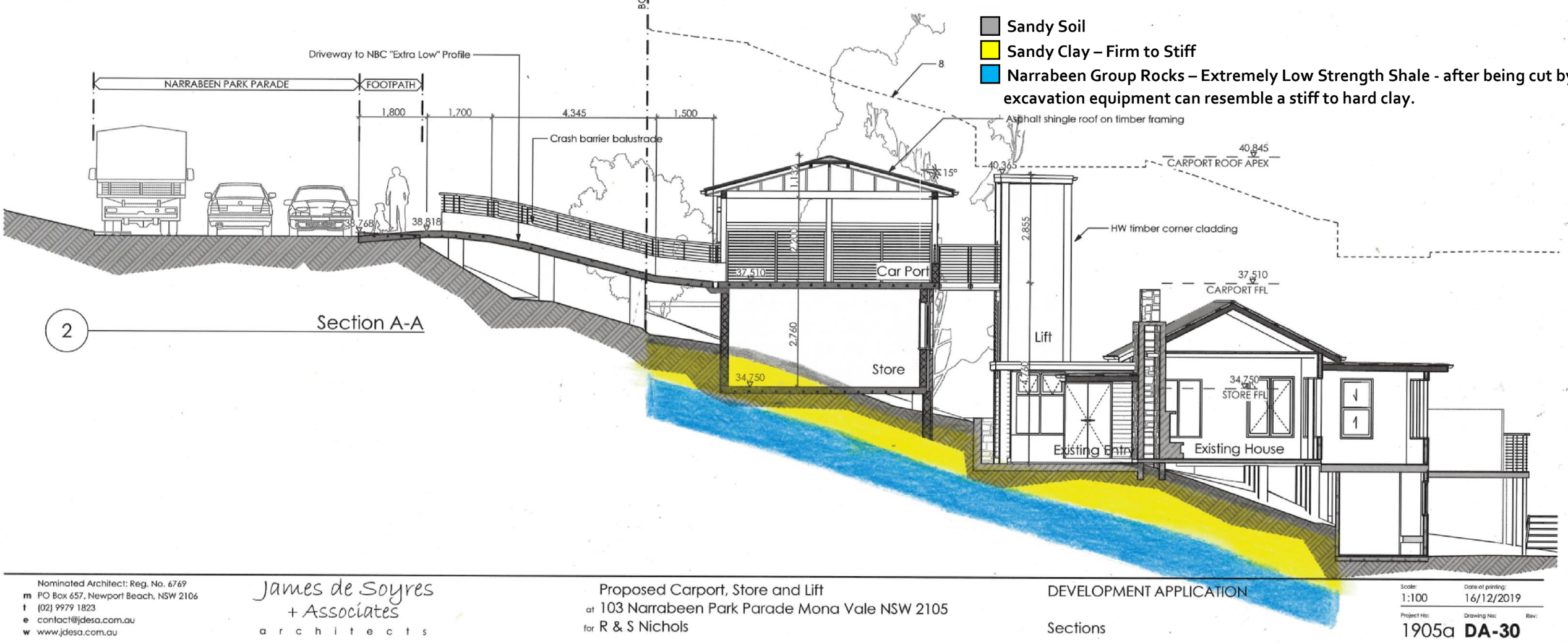


1 Section B-B

FOR DEVELOPMENT APPLICATION PURPOSES ONLY

NOT FOR CONSTRUCTION

Notes: Do not scale from drawings



2 Section A-A

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

Nominated Architect: Reg. No. 6769
m PO Box 657, Newport Beach, NSW 2106
t (02) 9979 1823
e contact@jdesa.com.au
w www.jdesa.com.au

James de Soyres + Associates
architects

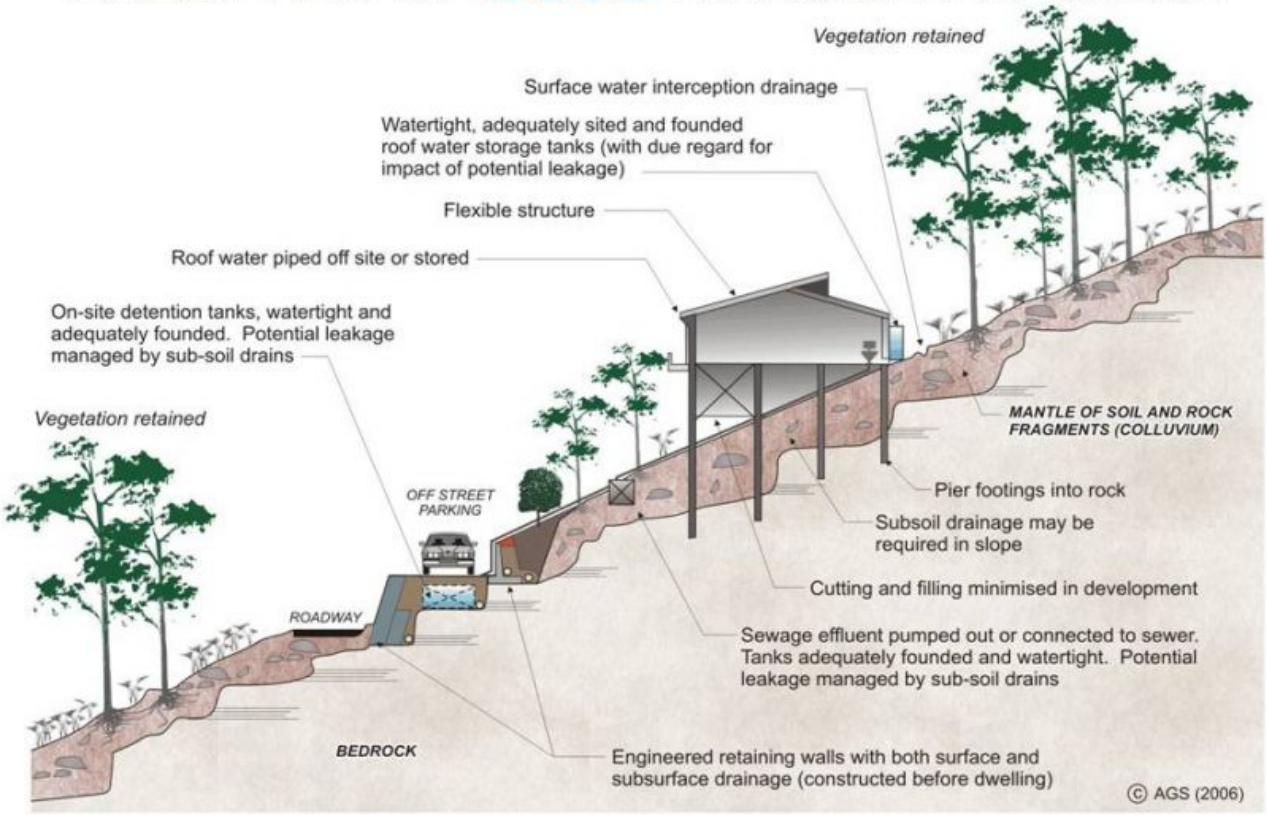
Proposed Carport, Store and Lift
at 103 Narrabeen Park Parade Mona Vale NSW 2105
for R & S Nichols

DEVELOPMENT APPLICATION

Sections

Scale: 1:100
Date of printing: 16/12/2019
Project No: 1905a
Drawing No: DA-30
Rev:

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE