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

Development Application for _____
Name of Applicant

Address of site 26 Darley Street, 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 26/7/19 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 **26 Darley Street, Mona Vale**

Report Date: 26/7/19

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 26 Darley Street, 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 **26 Darley Street, Mona Vale**

Report Date: 26/7/19

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **12/7/19**
(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 **12/7/19**

☒ 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 Aged Care Centre at **26 Darley Street, Mona Vale**

1. Proposed Development

1.1 Demolish the existing aged care centre and construct a new part four-storey aged care centre by excavating to a maximum depth of ~5.9m.

1.2 Details of the proposed development are shown on 10 drawings prepared by Gartner Trovato Architects, Project number 1812, drawings numbered DA-00 to 09, Revision B, dated 24/7/19.

2. Site Description

2.1 The site was inspected on the 12th July, 2019.

2.2 This residential property is level with the road and has a NW aspect. The block runs longways to the NE so the slope is a cross-fall. It is located on the gently graded middle reaches of a hillslope. The natural slope rises across the property at an average angle of <5°. The slopes above and below the property continue at similar angles.

2.3 At the NW end of the road frontage, a concrete driveway runs to a parking area at the W corner of the building (Photo 1). At the SE end of the road frontage, a concrete and brick-paved driveway runs along the SE side of the building and wraps around the NE side (Photos 2 & 3). The part two-storey brick and concrete block building and surrounding landscaping works will be demolished as part of the proposed development (Photo 4).

3. Geology

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

4. Subsurface Investigation

One auger hole (AH) was put down to identify the soil materials. Six Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to 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:

AUGER HOLE 1 (~RL12.1) **–** AH1 (Photo 5)

Depth (m)	Material Encountered
0.0 to 0.2	**TOPSOIL**, sandy soil, dark brown, loose, damp, fine to medium grained with fine trace organic matter.
0.2 to 0.4	**CLAYEY SAND**, dark brownish grey, loose, damp, fine to coarse grained with fine trace organic matter.
0.4 to 0.6	**CLAY**, brown, firm, damp, fine grained.
0.6 to 0.8	**CLAY**, weathered shale, brown and mottled purple, very stiff, dry, fine grained.

End of hole @ 0.8m in weathered shale. No watertable encountered.

DCP RESULTS ON NEXT PAGE

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** (~RL12.1)	**DCP 2** (~RL12.4)	**DCP 3** (~RL11.5)	**DCP 4** (~RL9.8)	**DCP 5** (~RL10.2)	**DCP 6** (~RL11.1)
0.0 to 0.3	4	1	3F	9	6	1F
0.3 to 0.6	6	26	1	11	7	1
0.6 to 0.9	21	25	11	15	25	5
0.9 to 1.2	45	36	23	#	#	11
1.2 to 1.5	#	#	45			25
1.5 to 1.8			#			30
1.8 to 2.1						#
	End of Test @ 1.2m	End of Test @ 1.1m	End of Test @ 1.5m	Refusal @ 0.8m	Refusal @ 0.9m	End of Test @ 1.8m

#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, maroon, and purple shale on dry tip, maroon clay in collar above tip.

DCP2 – End of test @ 1.1m, DCP still very slowly going down, brown shale on wet tip, brown clay in collar above tip.

DCP3 – End of test @ 1.5m, DCP still very slowly going down, white and maroon shale on dry tip.

DCP4 – Refusal @ 0.8m, DCP bouncing, white and brown impact dust on dry tip.

DCP5 – Refusal @ 0.9m, DCP bouncing, brown clay on wet tip, maroon clay in collar above tip.

DCP6 – End of test @ 1.8m, DCP still very slowly going down, maroon shale on wet tip.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. They consist of a thin sandy topsoil over firm to stiff clays. In the test locations, the clays merge into the weathered zone of the underlying shale at an average depth of ~1.0m below the current surface. The weathered zone is interpreted as Extremely Low Strength Shale. It is to be noted that this material can appear as a mottled stiff clay when it is cut up by excavation equipment.

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 several metres below the base of the proposed excavation.

7. Surface Water

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 proposed excavation is a potential hazard until retaining walls are installed (**Hazard One**).

Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The proposed excavation collapsing onto the work site before retaining walls are in place.
LIKELIHOOD	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (30%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})
RISK TO LIFE	9.8×10^{-4}/annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Sections 13** are to be followed.

(See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

9. Suitability of the Proposed Development for the Site

The proposed development is suitable for the site. No geotechnical hazards will be created by the completion of the proposed development provided it is carried out in accordance with the requirements of this report and good engineering and building practice.

10. Stormwater

The fall is to the street. Roof water from the development is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to a maximum depth of ~5.1m is required to install the basement level of the proposed aged care centre. The excavation is expected to be through a shallow soil over a firm to stiff clay with Extremely Low Strength Shale expected at an average depth of ~1.0m below the current surface. 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 damage.

13. Excavation Support Requirements

The excavation for the basement level of the proposed aged care centre will reach a maximum depth of ~5.9m and, allowing for back-wall drainage, will be set back ~3.8m from the SE common boundary, ~4.3m from the NW common boundary, ~6.5m from the NE common boundary, and ~5.5m from the road reserve. The neighbouring buildings are set back sufficiently from the excavation. Thus, the only neighbouring properties to the NW and SE, and the road reserve will be within the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 45° line from the base of the excavation

towards the surrounding structures or boundaries. This line reduces to 30° through the sandy soil.

To ensure the integrity of the NW and SE neighbouring properties, and the road reserve, and due to the depth of the excavation, ground support will need to be installed along all sides of the excavation with the support installed before the excavation commences with a staged retaining wall. A spaced pier wall is one of the suitable methods of support. Pier spacing is typically ~2.0m but can vary between 1.6 to 2.4m depending on the design. The piers can be supported by embedment and/or propping installed as the excavation is lowered. To drill the pier holes for the wall, a powerful excavator or small pilling rig that can excavate through Medium Strength Rock will be required. If a machine of this type is not available, we recommend carrying out core drilling before the construction commences to confirm the strength of the rock and to ensure the excavation equipment is capable of reaching the required depths. As the excavation is lowered in 1.5m lifts, infill sprayed concrete panels or similar are added between the piers to form the wall. Drainage is installed behind the panels. The walls are to be tied into the concrete floor and ceiling slabs after which any temporary support can be released.

The geotechnical consultant is to inspect the drilling process of the entire first pile and the ground materials at the base of all pier holes/excavations for ground support purposes.

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	Passive
Soil and Residual Clays	20	0.40	0.55	N/A
Extremely Low Strength Shale	22	0.25	0.35	Kp 2.5 ultimate

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. It should be noted that passive pressure is an ultimate value and should have an appropriate safety factor applied. No passive resistance should be assumed for the top 0.4m to account for any disturbance from the excavation. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

A multi-propped or anchored shoring system can be designed using a rectangular lateral earth pressure distribution using a magnitude of 6H kPa, where H is the depth of the excavation in metres (or to the top of medium strength rock). It is likely a wall designed this way will be relatively conservative and that a wall designed with a soil/structure analysis program (Plaxis, Wallap, or similar) would result is in a less conservative design. Due to the variability of the ground material, a propped system will likely be easier to design and install than an anchored system. Permanent support of the basement is to be provided by bracing from the proposed building.

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 raft or thickened concrete slab supported on the underlying Extremely Low Strength Shale are suitable footings for the proposed aged care centre. This ground material or better is expected to be exposed across the entire base of the proposed excavation. Where the footprint of the child care centre does not fall over the footprint of the excavation, piers embedded into the Extremely Low Strength Shale will be required to maintain a uniform bearing pressure. The minimum depth requirement for these piers in 1.5m below the current surface. A maximum allowable pressure of 600kPa can be assumed for Extremely Low Strength Shale.

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

- The geotechnical professional is to inspect the drilling process of the entire first pile of the retaining wall and the ground materials at the base of all the piers before any concrete is placed.

- All footings are to be inspected and approved by the geotechnical professional 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 – 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

BALCONIES
ROOF RL20.44
SP3100
STORMWATER PIT
Grate RL:10.35
Invert RL:9.74
CONCRETE DRIVEWAY
RENDERED
RETAINING WALL
GARDEN
DCP6
DCP5
DCP4
DCP3
DCP2
DCP1
AH 1
CONCRETE
FOOTPATH
VERANDAH
AWNING 14.83
GUTTER RL 15.10
EXTENT OF PROPOSED DEVELOPMENT SHOWN SHADED IN RED
RIDGE RL 17.95
SINGLE STOREY RENDERED NURSING HOME "SEABEACH GARDENS" No. 26
DP 881594
1749 m² (Deed)
DARLEY STREET EAST
FOOTPATH
GUTTER RL 15.40
308°07'40" ~ 34.515
GUTTER RL 15.30
STORMWATER PIT
Grate RL:9.47
Invert RL:8.70
STONE PAVEMENT
STORMWATER PIT
Grate RL:9.60
Invert RL:9.13
STORMWATER PIT
Grate RL:10.21
Invert RL:9.29
STORMWATER PIT
Grate RL:10.35
Invert RL:9.52
STORMWATER PIT
Grate RL:10.43
Invert RL:9.71
DOOR HEAD RL 12.64
FL RL 10.58
RIDGE RL 17.46
RIDGE RL 14.92
RIDGE RL 22.20
GUTTER RL 13.32
GUTTER RL 20.69
GUTTER RL 18.18
51
DP881594
THREE STOREY BRICK NURSING HOME
No. 1 SEABEACH AVENUE
RIDGE RL 20.83
EXISTING RETAINING WALL TO BE RE-BUILT
PATIO
BRICK PAVEMENT
STONE PAVEMENT
(PERGOLA OVER)
S/W GRATE
Grate RL:11.99
Invert RL:11.80
SUB
EXISTING SUB TO BE RELOCATED
218°07'40" ~ 40.845
219°50'30"
FL 12.49
GUTTER RL 15.67
GUTTER RL 16.07
GUTTER RL 15.13
GUTTER RL 17.18
WINDOW (GND): HEAD RL16.59 SILL INACCESSIBLE
SINGLE STOREY BRICK RESIDENCE No. 22A
2
DP520433
RIDGE RL 20.77
GUTTER RL 13.93
RIDGE RL 15.08
GUTTER RL 14.22
BENCHMARK CUT IN KERB RL12.57 A.H.D.
D: 0.3 S: 8 H: 8
D: 0.5 S: 10 H: 12
D: 0.7 S: 8 H: 6
D: 0.3 S: 7 H: 6
D: 0.5 S: 10 H: 10
D: 0.4 S: 8 H: 8
D: 0.2 S: 4 H: 6
D: 0.3 S: 4 H: 4
D: 0.2 S: 3 H: 4
D: 0.2 S: 3 H: 3
D: 0.5 S: 8 H: 8

GARTNERTROVATO ARCHITECTS

Issue Date	Rev	Description	Drawn	Checked
17/07/19	A	PRE DA ISSUE TO CONSULTANTS	JR	SG
24/07/19	B	DA ISSUE	JR	SG

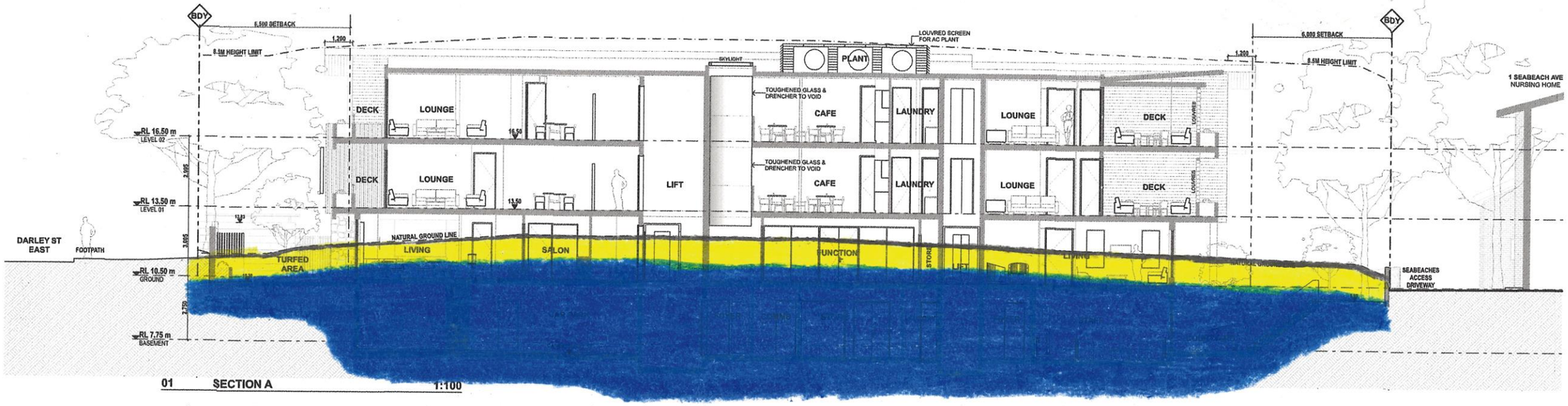
THOMPSON HEALTH CARE

PROJECT: THOMPSON HEALTH MONA VALE PROPOSED AGED CARE FACILITY 26 DARLEY ST EAST, MONA VALE NSW LOTS 53 DP 881594 FOR THOMPSON HEALTH CARE

DRAWING TITLE: EXISTING SITE PLAN AND DEMOLITION

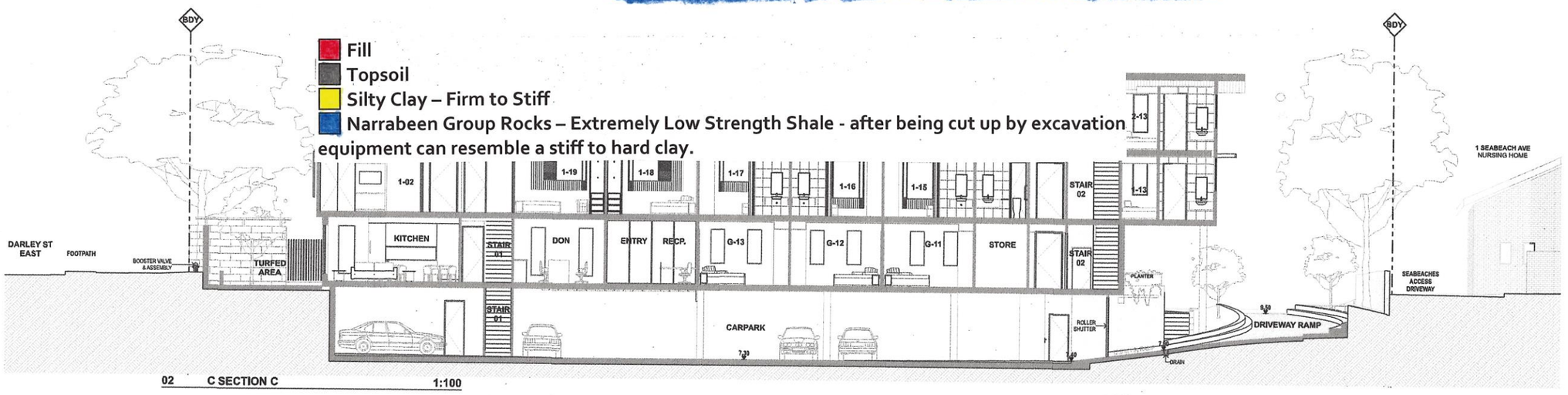
SCALE	DRAWN BY	DATE
1:100 @ A1	JR	24/7/19
PROJECT NO.	DRAWING NO.	REVISION
1812	DA-01	B

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

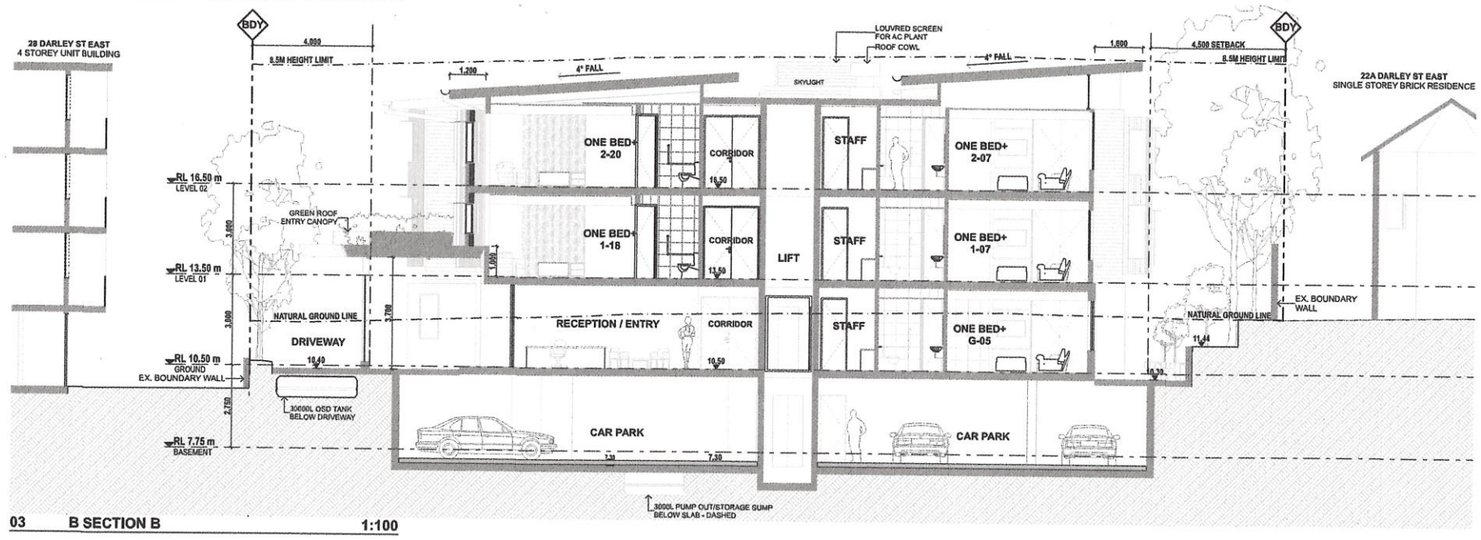


01 SECTION A 1:100

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.



02 C SECTION C 1:100



03 B SECTION B 1:100

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Issue Date	Rev.	Description	Drawn	Checked
17/07/19	A	PRE DA ISSUE TO CONSULTANTS	JR	SG
24/07/19	B	DA ISSUE	JR	SG

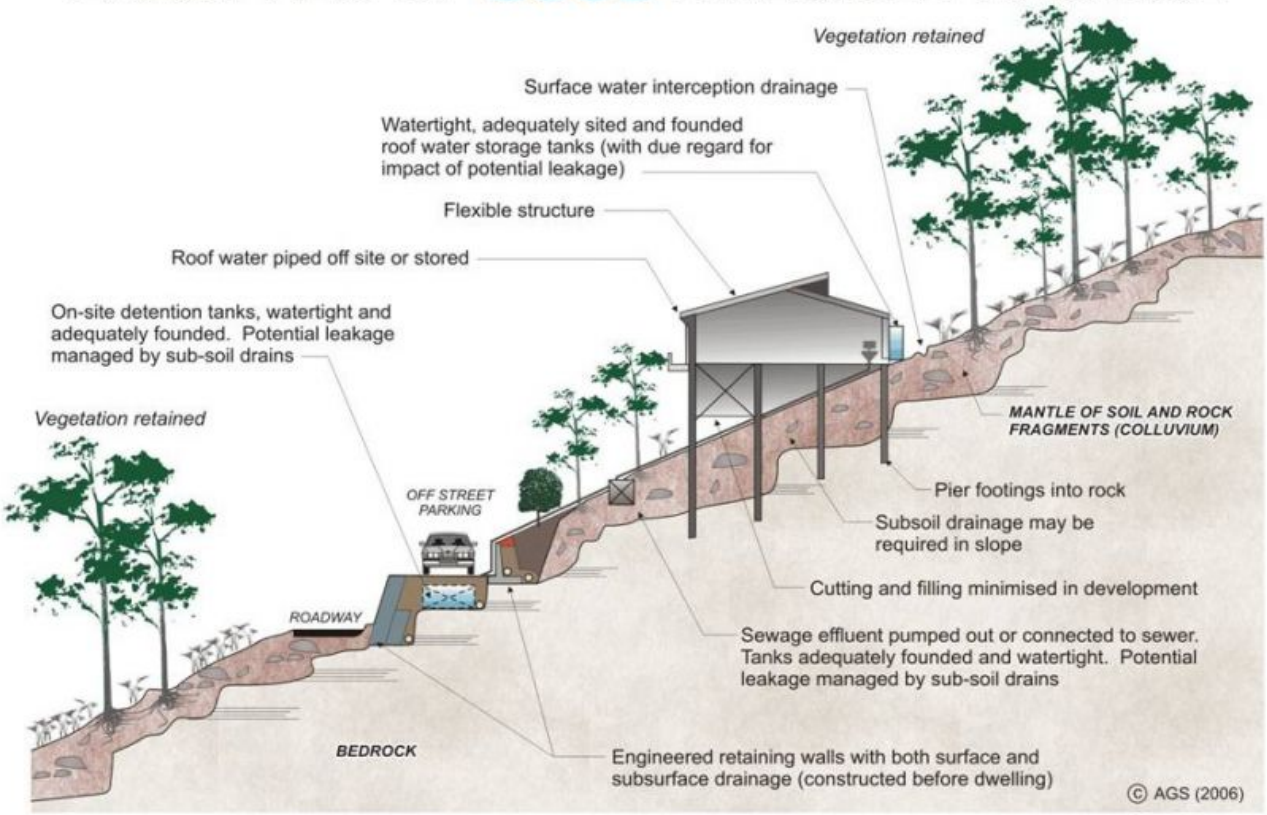
CLIENT: THOMPSON HEALTH CARE

PROJECT: THOMPSON HEALTH MONA VALE SECTIONS A + B + C

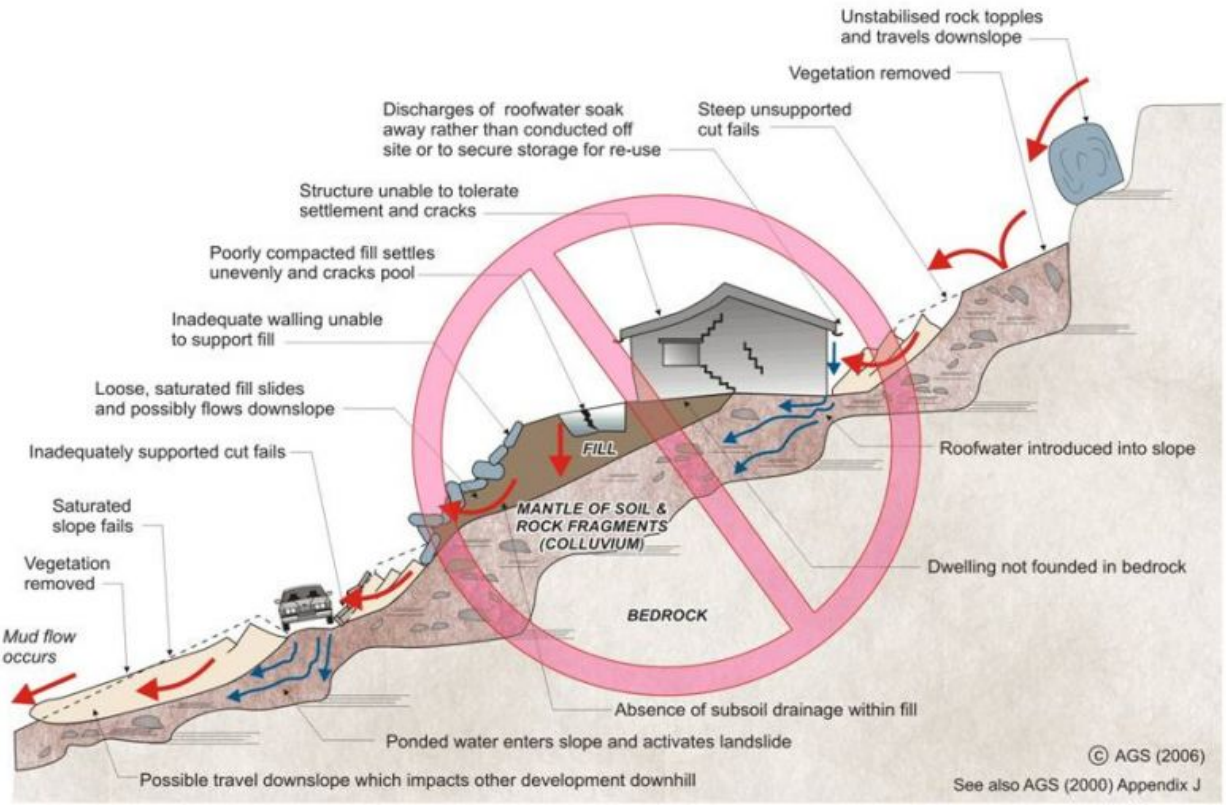
PROPOSED AGED CARE FACILITY
26 DARLEY ST EAST, MONA VALE
NSW
LOTS 52 DP 881594
FOR THOMPSON HEALTH CARE

SCALE	DRAWN BY	DATE
1:100 @ A1	JR	24/7/19
PROJECT No.	DRAWING No.	REVISION
1812	DA-09	B

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE



J2256A.
18th July, 2019

26 Darley Street, Mona Vale

Geotechnical Comments for Potential Acid Sulfate Soils.

The clays encountered throughout the ground testing (performed as part of our geotechnical report) are in situ and derived from the Newport Formation Shales. This formation is Middle Triassic in age and is much older than the Holocene sediments from which acid sulphates are generally derived from on the east coast. Additionally, Newport Formation Shale does not contain high concentrations of sulphides which can provide the required iron concentrations for acid generation in older bedrock.

The ground materials underlying the site do not generate acid sulfate or potential acid sulfate conditions and so a preliminary acid sulfate assessment is not required.

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