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

Development Application for _____
Name of Applicant

Address of site 31-33 Sturdee Lane, Elvina Bay

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 16/04/2025 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 **31-33 Sturdee Lane, Elvina Bay**

Report Date: 16/04/2025

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 MScGEOL AIG., RPGeo

Membership No. 10306

Company **White Geotechnical Group Pty Ltd**

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No: 10306

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 31-33 Sturdee Lane, Elvina Bay

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 **31-33 Sturdee Lane, Elvina Bay**

Report Date: 16/04/2025

Author: BEN WHITE

Author's Company/Organisation: **White Geotechnical Group Pty Ltd**

Please mark appropriate box

- ☒ Comprehensive site mapping conducted **28/02/25** (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 **28/02/25**
- ☒ 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 MScGEOL AIG., RPGeo

Membership No. 222757

Company **White Geotechnical Group Pty Ltd**

GEOTECHNICAL INVESTIGATION:

New Inclined Lift at **31-33 Sturdee Lane, Elvina Bay**

1. Proposed Development

1.1 Construct an inclined lift over the very steep portion of the slope by excavating to a maximum depth of ~ 4.7m on the downhill side of the properties.

1.2 Partially demolish and extend the existing concrete stairs on No. 33.

1.3 Partially demolish a sandstone block retaining wall and widen the existing steps on No. 31, exposing a cut batter ~1.5m high.

1.4 Other minor external alterations and additions.

1.5 Details of the proposed development are shown on 6 drawings prepared by Peter Downes Designs, project number 2141, drawings numbered A2 2417 00 to 04, and A2 2417 LP. All dated 11.7.24.

2. Site Description

2.1 The site was inspected on the 28th February, 2025.

2.2 These residential properties encompass the crest and moderate to steeply graded flanks of a hillslope. The natural slope rises from the S property boundaries at the Elvina Bay waterfront at an angle of ~37° before quickly easing to gentle angles at the crest of the hillslope. The slope falls at the N side of the crest at gentle angles before increasing to steep angles near the N property boundaries above Sturdee Lane. The slope below the N property boundaries decreases in grade to the waterfront.

2.3 **31 Sturdee Lane** - At the waterfront, a stable timber jetty runs to stable timber clad boat shed (photo 1). The concrete piers for the boat shed stand vertical. Fill for a level lawn at the boat shed is supported by a stable mortared sandstone block seawall

reaching ~1.5m high (Photo 2). The lower portion of the very steeply graded slope between the boat shed and the house is terraced with stable timber retaining walls of mortared sandstone block and timber construction and reaching a combined height of ~2.5m (Photos 3 & 4). Where the slope is not supported above, it is well vegetated. The grade of the slope eases immediately below the house (Photo 5). The two-story timber clad house is supported on sandstone and concrete block walls and steel posts. No significant signs of movement were observed in the visible supporting walls, and the supporting post stands vertical. The land surface surrounding the house is lawn covered.

2.4 33 Sturdee Lane - At the waterfront, a stable timber jetty runs to stable timber clad boat shed (Photo 6). The concrete piers for the boat shed stand vertical. Fill for a level platform at the boat shed is supported by a stable dry stack sandstone seawall reaching ~1.0m high. The cut for the boat shed and toe of the very steeply graded slope above has been braced with ~1.0m high timber boards (Photo 7). This bracing will be replaced with a new retaining wall as part of the proposed works. The very steep slope above is well vegetated (Photo 7) and continues for ~10.0m before decreasing in grade towards the crest of the hillslope. The house has been constructed beyond the crest on the moderately graded N flank (Photo 8). The part two-story timber clad house is supported on brick walls and brick piers. No significant signs of movement were observed in the visible supporting walls of the house, and the supporting brick piers stand vertical. The cut for the lower floor of the house is supported by timber retaining walls (Photo 9). Some of the timber sleepers are in the process of rotting and the star pickets are rusted. However, they currently appear stable. See '**Section 17**' for advice. The land surface surrounding the house is lawn covered. The slope begins increasing in grade to Sturdee Lane below the downhill boundary (Photo 10).

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 hand Auger Hole (AH) was put down to identify 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 attached. 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 have been an issue for this site. But due to the possibility that the actual ground conditions vary from our interpretation there should be allowances in the excavation and foundation budget to account for this. We refer to the appended "Important Information about Your Report" to further clarify. The results are as follows:

AUGER HOLE 1 (~RL8.1) **–** AH1 (Photo 11)

Depth (m)	Material Encountered
0.0 to 0.4	**TOP SOIL**, silty loam, brown, Medium Dense to Dense, dry, fine to medium grained, red shale fragments included.
0.4 to 0.9	**RESIDUAL CLAY** – brown to maroon, Stiff, dry, fine to medium grained, mottled grey and orange shale fragments towards base of hole.

End of test @ 0.9m. No water table 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** (~RL12.0)	**DCP 2** (~RL10.3)	**DCP 3** (~RL8.1)	**DCP 4** (~RL7.1)	**DCP 5** (~RL3.2)	**DCP 6** (~RL3.4)
0.0 to 0.3	2	5	5	7	5	9
0.3 to 0.6	9	10	15	26	25	13
0.6 to 0.9	16	15	15	30	40	24
0.9 to 1.2	#	30	25	#	#	36
1.2 to 1.5		30	#			#
1.5 to 1.8		#				
	Refusal on Rock @ 0.9m	End of Test @ 1.3m	Refusal on Rock @ 1.1m	End of Test @ 0.9m	End of Test @ 0.9m	Refusal on Rock @ 1.2m

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

DCP Notes:

DCP1 – Refusal on Rock @ 0.9m, DCP thudding on rock surface, brown clay on damp tip, mottled grey and brown clay in collar above tip.

DCP2 – End of test @ 1.3m, DCP still very slowly going down, clean dry tip, mottled grey and orange clay in collar above tip.

DCP3 – Refusal on Rock @ 1.1m, DCP thudding on rock surface, grey and orange shale on dry tip.

DCP4 – End of test @ 0.9m, DCP still very slowly going down, white and orange shale on dry tip, grey clay in collar above tip.

DCP5 – End of test @ 0.9m, DCP still very slowly going down, white and orange shale on dry tip, grey clay in collar above tip.

DCP6 – Refusal on Rock @ 1.2m, DCP thudding on rock surface, mottled shale on dry tip, maroon and orange shale in collar above tip.

5. Geological Observations/Interpretation

The natural slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of at least 0.4m of topsoil which is expected to overlie residual clays. The clays merge into the weathered zone of the underlying shale at depths of between 0.6m to 1.2m below the current surface, being deeper due to a variable weathering

profile. The weathered zone is interpreted as Extremely Low to Very Low Strength Shale. 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 denser and less permeable clay and weathered shale layers in the sub-surface profile. The water table was not encountered during the testing but is expected to sit just above the waterline. As such, it is expected to be below the base of the proposed excavation.

7. Surface Water

No evidence of surface flows were observed on the properties during the inspection. As the properties encompass the crest of a small hill, any surface flows will be generated on the properties and will flow away. This will move down the slope at a relatively high velocity due to the steep slope.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above or beside the properties. The moderate to Very Steeply graded slope that falls across the properties is a potential hazard (**Hazard One**). The proposed inclined lift excavation is a potential hazard until retaining walls are in place (**Hazard Two**). The partial demolition of the sandstone block retaining wall behind the boat shed for No. 31 exposing a 1.5m cut batter is a potential hazard (**Hazard Three**).

RISK ANALYSIS SUMMARY ON THE NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The gently graded to steep slope that rises across the properties and continues above and below failing and impacting on the proposed works.	The excavation to a maximum depth of ~4.7m collapsing onto the work site before retaining walls are in place.	Following the partial demolition of the sandstone block retaining wall (Photo 4), the exposed cut batter failing and impacting on the proposed works before retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (25%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	9.1×10^{-7}/annum	7.8×10^{-5}/annum	4.9×10^{-5}/annum
COMMENTS	This level of risk is 'ACCEPTABLE', provided the recommendations in **Section 17** are followed.	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** 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 and 14** 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

No significant additional stormwater runoff will be created by the proposed development.

11. Excavations

Two excavations will be required for the proposed development:

- An excavation to a maximum depth of ~4.7m is required to construct the proposed inclined lift.
- The partial demolition of the sandstone block retaining wall behind the boat shed for No. 31 (Photo 4) will expose a cut batter ~1.5m high in order to widen the stairs.

The excavations are expected to be through fill, topsoil, and clay, with Extremely Low to Very low Strength Shale expected at depths of between ~0.3m to ~1.2m in the area of the proposed excavation. It is envisaged that excavations through soil, clay, and Extremely Low to Very Low Strength Shale can be carried out with an excavator and toothed bucket.

12. Vibrations

It is expected the proposed excavations will be carried out with an excavator and bucket and the vibrations produced will be below the threshold limit for building or infrastructure damage using a domestic sized excavator up to 16 tonnes.

13. Excavation Support Requirements

As this job is considered technically complex and due to the depth of the excavation, we recommend it be carried out by builders and contractors who are well experienced in similar work and can provide a proven history of completed work. We recommend a pre-construction meeting between the structural engineer, the builder, and the geotechnical consultant to discuss and confirm the excavation plan and to ensure suitable excavation equipment will be on site.

On steep sites such as this one, to help maintain excavation stability, it is critical upslope runoff be diverted from the proposed excavations with temporary or permanent drainage

measures. Temporary measures may be trenches and sandbag mounds and permanent measures could be a wide diameter dish drain or similar. These are to be installed before any excavation work commences.

Bulk Excavation for Inclined Lift

The narrow and deep excavation for the proposed inclined lift is ~ 2.4m wide and will reach a maximum depth of ~4.7m allowing for back wall drainage. The setbacks are as follows:

- ~Flush with the staircase for No. 31 on the E side of the cut (Photo 7)
- ~1.0m from a eucalyptus tree on the uphill side of the cut which is shown on the plans to remain. (Photo 12)
- ~1.1m from the staircase for No.33 on the uphill side of the cut. (Photo 13)

Because of the narrow width of the excavation face, the return cuts on either side will act as buttresses that will partially support the narrow cut. However, this also forms a deep confined working space. As such it is recommended the excavation be supported by a staged top-down sprayed concrete wall supported with anchors. Or a similar such suitable support approved by the geotechnical consultant. Maximum excavation lift depth is 1.5m before the retaining wall is installed in stages. We have supervised the construction of many of these types of walls. Our office can be contacted for more information regarding this process, if desired. The support is to be designed by the structural engineer in consultation with the Geotechnical consultant. All surcharge loads are to be considered in the design (slope and surrounding stairs).

An arborist is to assess the eucalyptus tree to provide advice in regards to its likely stability throughout the works.

Bulk Excavation for New Retaining Wall

The sandstone block retaining wall (Photo 4) that supports the cut for the boat shed for No.31 is to be partially demolished on the W end as part of the proposed works. This will expose a

~1.5m cut batter and undercut the timber retaining wall and stairs upslope. The demolition is to be carried out from the top down in an orderly manner. Due to the grade of the slope and proximity to the structures above, the fill, soil, clay and Extremely Low to Very Low Strength Shale behind the wall will need to be permanently supported prior to the excavation/demolition process, or during the demolition/excavation process in a staged manner, so cut batters are not left unsupported. See the site plan attached for the minimum extent of the required shoring. The support will need to be designed/approved by the structural engineer in consultation with the Geotechnical Consultant.

Advice Applying to Both Excavations

During the excavation process, the geotechnical consultant is to inspect the cuts in 1.5m intervals they are lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and that the shoring is adequate.

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 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 distribution of lateral pressures using the parameters shown in Table 1.

TABLE 1 ON THE NEXT PAGE

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**	**Bond Stress**
Fill and Topsoil	20	0.40	0.55	N/A	N/A
Residual Clays	20	0.35	0.45	Kp = 2.0 'ultimate'	20kPa 'ultimate'
Extremely Low Strength Rock	22	0.25	0.38	Kp = 2.5 'ultimate'	70kPa 'ultimate'
Very Low Strength Rock	22	0.22	0.35	400kPa 'ultimate'	70kPa '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 and do not account for any surcharge loads from the very steep slope above, noting that surcharge loads from the structures above will be acting on the wall. It also assumes 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. Ground materials 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 pressure of 4H kPa for soil/clay and 3H kPa for rock up to low strength, where H is the depth of the excavation in metres (or to the top of competent medium strength rock).

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

15. Site Classification

A site classification is not relevant for the proposed works due to the very steep slope over the footprint of the proposal. Where this is necessary due to legislatory requirements we defer to Class P in accordance with AS2870-2011.

16. Foundations

The proposed excavation for the lower landing of the inclined lift is expected to be seated in Extremely Low to Very Low Strength Shale, this is a suitable foundation material. Where this material is not exposed, and for any new footings for the proposed works, piers embedded ~0.8m into the Extremely Low to Very Low Strength Shale will be required due to the very steep grade of the slope, and to maintain a uniform foundation material across the structure. This ground material is expected at depths of between ~0.6m to ~1.2m below the current surface.

A maximum allowable bearing pressure of 600kPa can be assumed for footings embedded in Extremely Low to Very 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 and inspected by the geotechnical consultant.

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.

17. Site Maintenance/Remedial Works

The timber retaining walls below the house for number 33 (Photo 9) are to be monitored by the owners on an annual basis or after heavy and prolonged rainfall events, whichever occurs first. A photographic record of these inspections is to be kept. Should further movement occur the walls are to be remediated so that they meet current engineering standards. We can carry out these inspections upon request.

Where slopes approach or exceed 20°, such as on this site, 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 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.

18. Geotechnical Review

The structural plans are to be checked and certified by the geotechnical engineer as being in accordance with the geotechnical recommendations. On completion, a Form 2B will be issued. This form is required for the Construction Certificate to proceed.

19. 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 Occupation Certificate or the owner if the following inspections have not been carried out during the construction process.

- During the excavation process, the geotechnical consultant is to inspect the cuts in 1.5m intervals they are lowered, while the machine/excavation equipment is on site, to ensure the ground materials are as expected and that the shoring is adequate.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment and contractors are still onsite and before steel reinforcing is placed or concrete is poured.

White Geotechnical Group Pty Ltd.

Nathan Gardner B.Sc. (Geol. & Geophys. & Env. Stud.)
AIG., RPGeo Geotechnical & Engineering.
No. 10307
Engineering Geologist & Environmental Scientist.

Reviewed By:

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AIG., RPGeo Geotechnical & Engineering.
No. 10306
Engineering Geologist.

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No:
10306

Photo 1

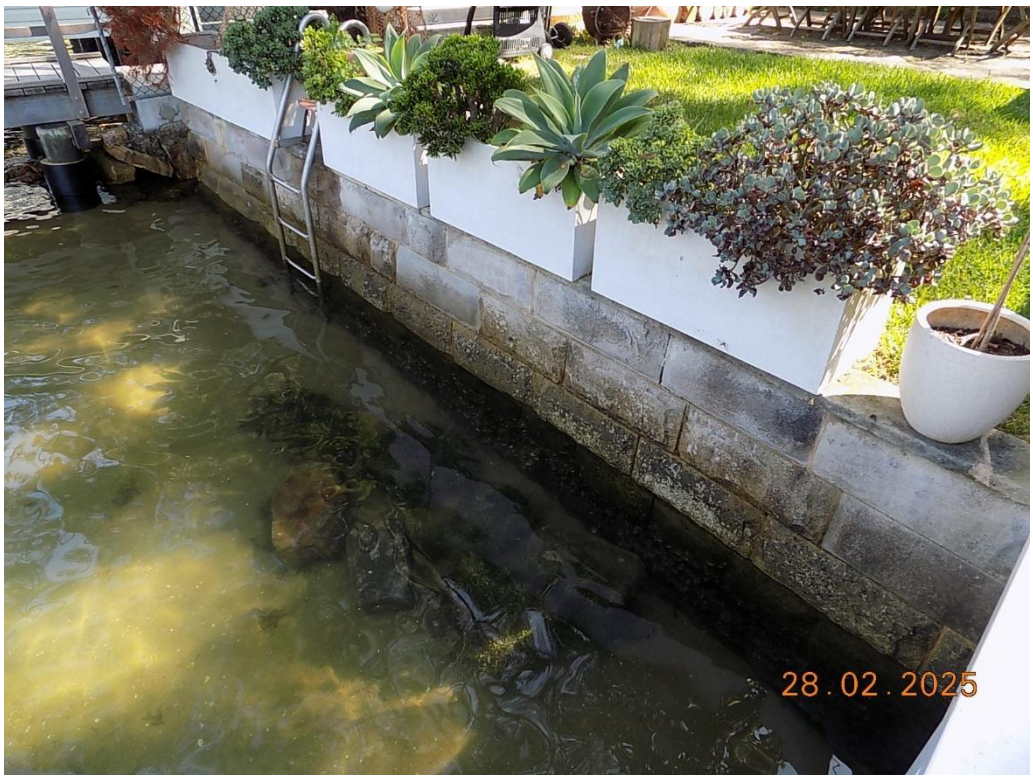


Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

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.

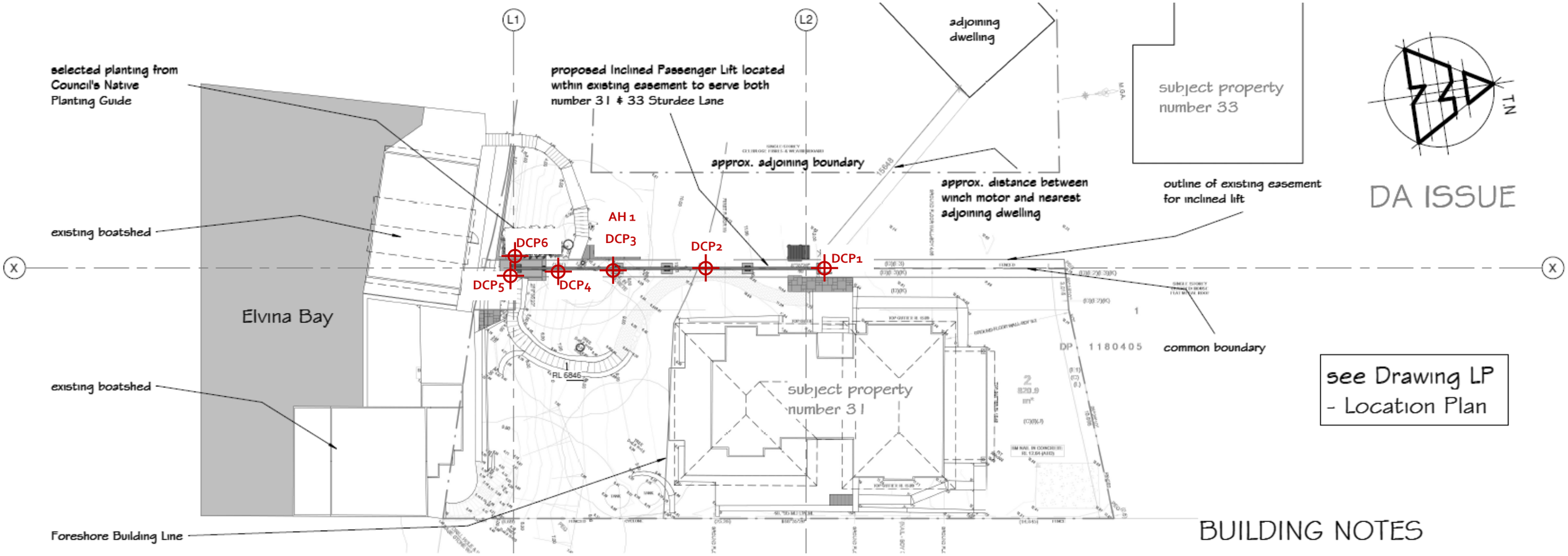
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

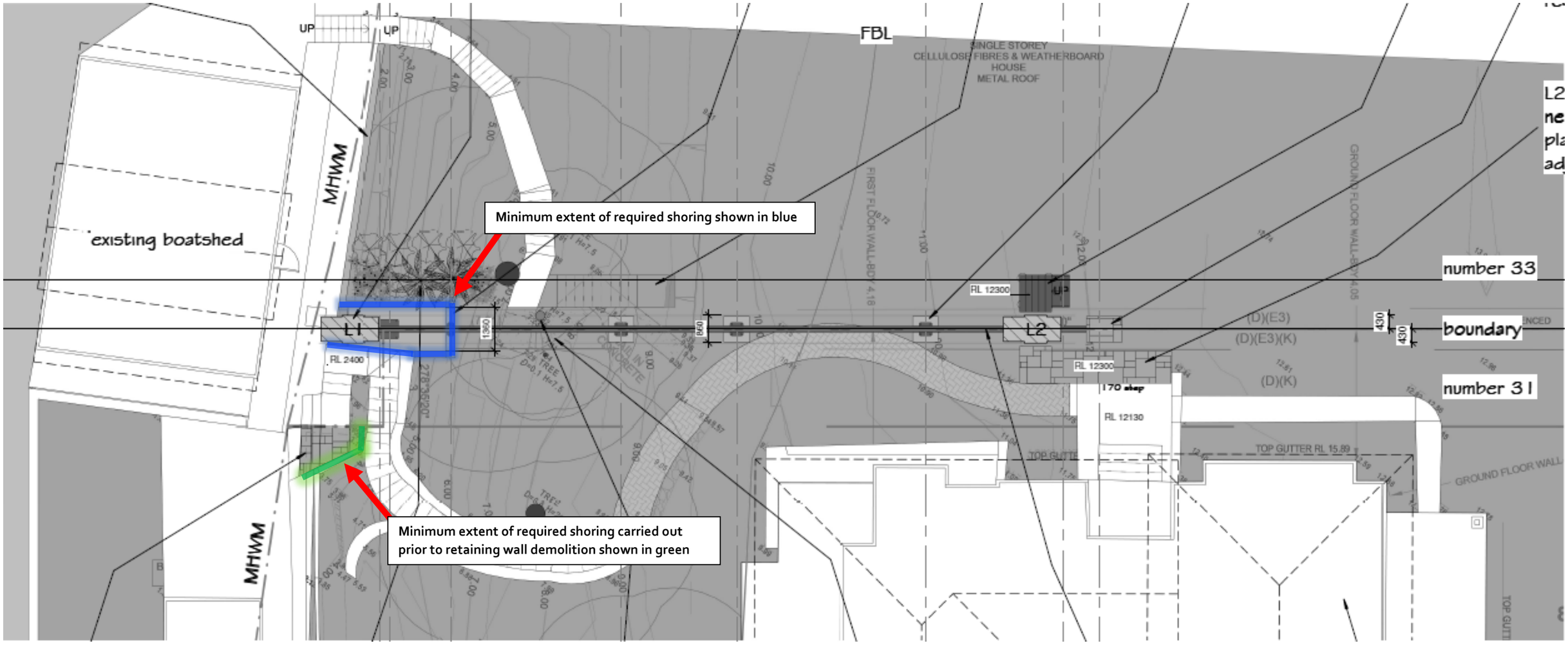
- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar 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



BUILDING NOTES

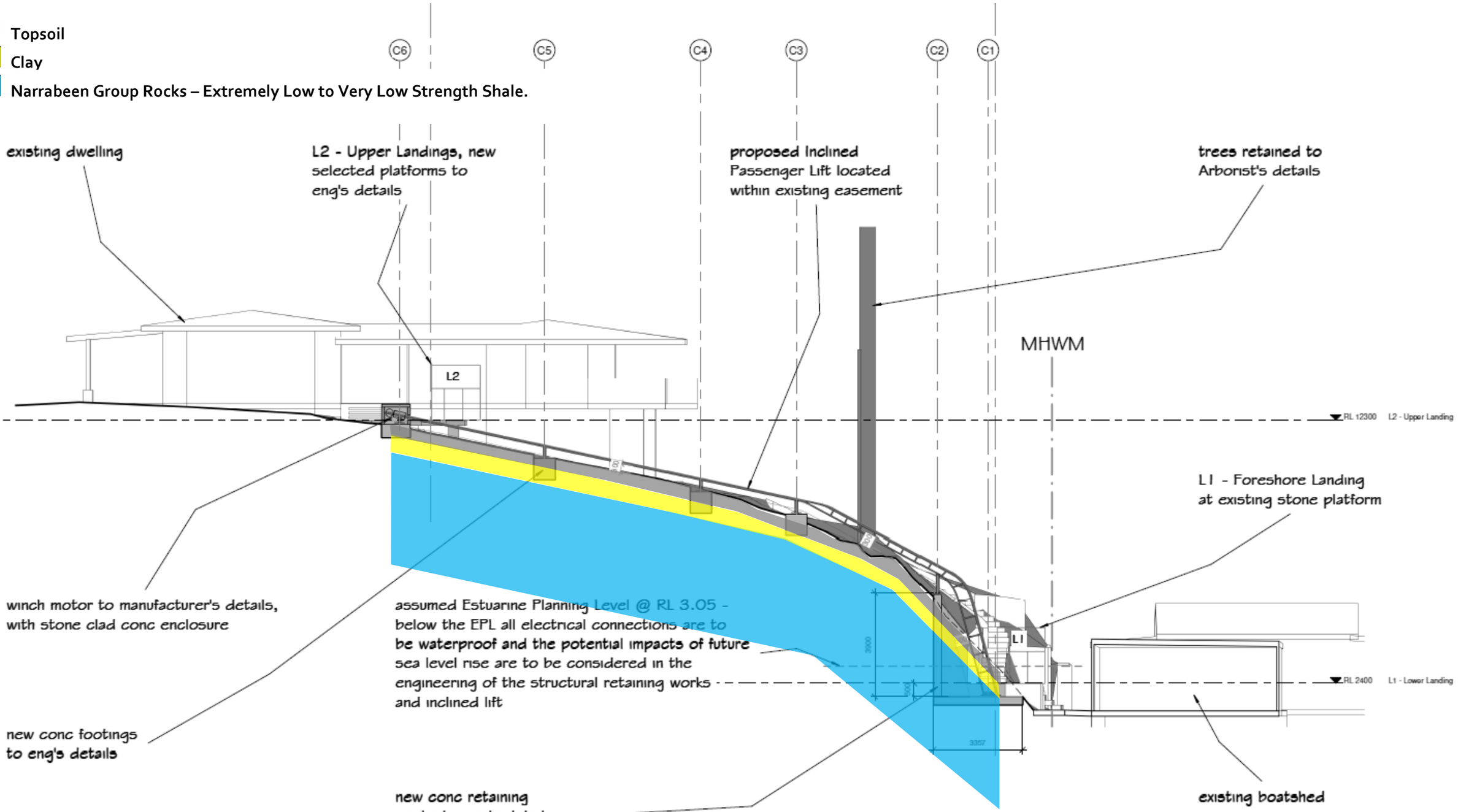
RAIL PLAN – showing minimum extent of required shoring / exploration pits / underpinning



Expected Ground Materials

- Topsoil
- Clay
- Narrabeen Group Rocks – Extremely Low to Very Low Strength Shale.

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



all work to Geotech, Arborist and Bushfire requirements

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DA ISSUE

REVISION

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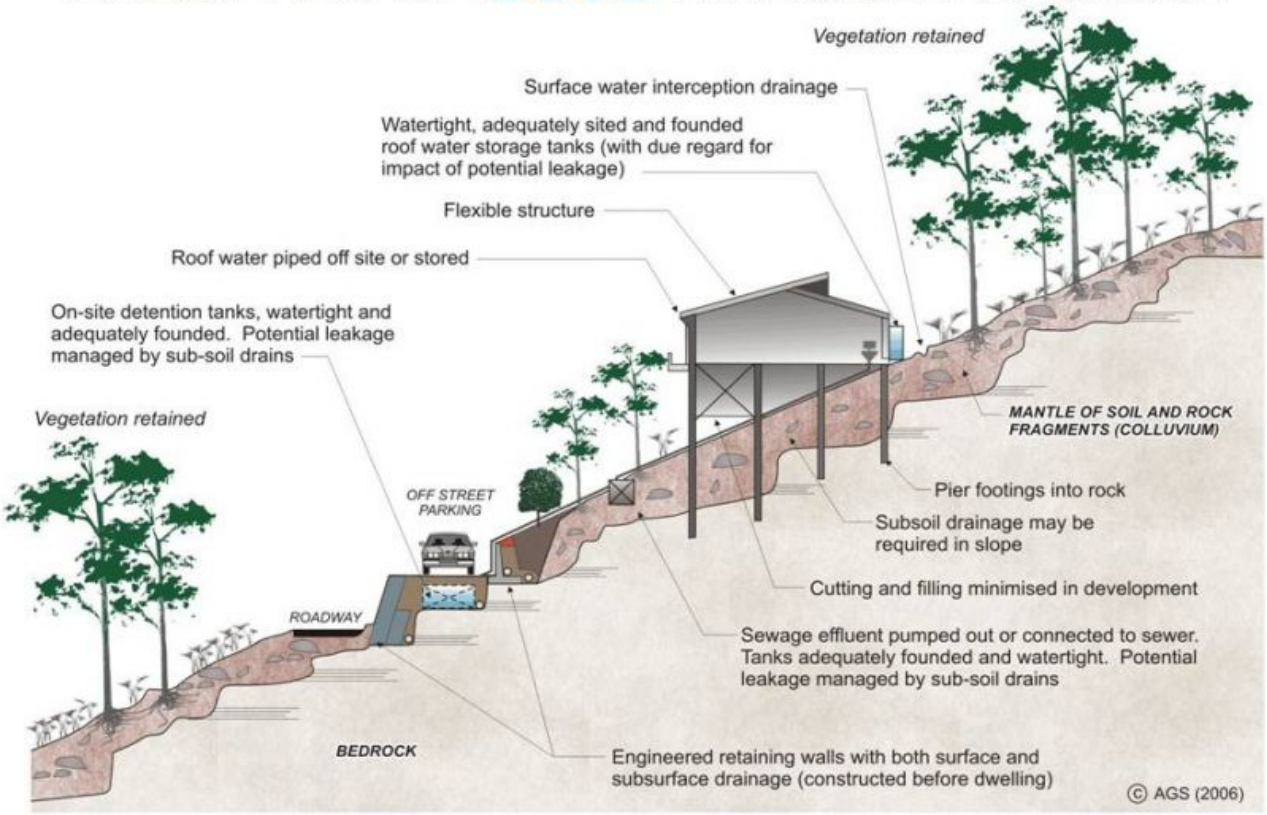
PROJECT	Proposed Inclined Passenger Lift at 31-33 Sturdee Lane Elvina Bay
DRAWING	Section 1
DRAWN	SD
CHECKED	SD
SCALE	1 : 100
DATE	11.7.24
DRG.	A2 2417 03

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE