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

Development Application for	______________________ Name of Applicant
Address of site	29 Calvert Parade, Newport

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 8/1/25 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 **29 Calvert Parade, Newport**

Report Date: 8/1/25

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 **29 Calvert Parade, Newport**

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 **29 Calvert Parade, Newport**

Report Date: 8/1/25

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted 24/10/24
(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 24/10/24

☒ 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**

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

GEOTECHNICAL INVESTIGATION:

Alterations and Additions and New Pool at **29 Calvert Parade, Newport**

1. Proposed Development

1.1 Install a new pool between the house and the edge of the sea cliff by excavating to a maximum depth of ~1.2m.

1.2 Construct a new driveway and parking area on the downhill side of the house by excavating to a maximum depth of ~1.3m.

1.3 Various other minor internal and external additions and alterations.

1.4 Details of the proposed development are shown on 9 drawings prepared by Andy Lehman Design, drawings numbered 08 to 16, Issue DA, dated September 2024.

1.5 The Coastal Engineering Assessment Report was prepared by Horton Coastal Engineering dated 23.12.24.

2. Site Description

2.1 The site was inspected on the 24th September, 2024.

2.2 This residential property is on the high side of the road and has a W aspect. The block is located on the gentle to moderately graded upper reaches and crest of a hillslope that rises to the top of a ~40m high near-vertical sea cliff. The cliff falls to the rock platform below. The slope rises across the site to the top of the cliff at an average angle of ~7°. The slope below the property (to the W) continues at similar gentle angles.

2.3 At the road frontage, an asphalt driveway (Photo 1) runs to a garage on the lower floor of the house. A cut for the driveway and fill for landscaping between the road frontage and the house is supported by stable low mortared sandstone retaining walls. The part two-story rendered brick house is supported on brick walls. A cut for the lower floor of the house is supported by a ~1.5m high mortared sandstone retaining wall (Photo 2) as well as the brick walls of the house. Thin cracking was visible in the supporting walls of the house as well as in the mortared sandstone wall. This cracking is typical in houses of this age and construction. The house walls and the sandstone retaining wall are considered stable. A low brick wall (Photo 3) supports a cut for a level area on the uphill side of the house. The wall was measured to be cracked up to ~4mm in width. However, no deflection was observed and the wall is considered stable. A timber deck has been constructed in this location. The brick piers for the deck stand vertical (Photo 4).

2.4 A ~40m high sea cliff (Photo 5) falls from the top of the property ~2.3m E of the low retaining wall to the rock platform below. The cliff was observed from the rock platform below as well as from drone footage taken previously. The top section of the cliff immediately below the property consists of highly weathered sandstone. This section of cliff contains little undercutting over the top 3.0m and only minor undercutting below that to ~26m. The average grade is ~ 82° from horizontal. This overlies the central portion of the cliff that consists of interbedded siltstone and sandstone that extend 30m. Some instances of undercutting are present, but nothing critical, with the slope at an average grade of 70° from horizontal. The lower 10m of the cliff consists of Bald Hill Claystone that slopes at an average grade of 44° to the rock platform. We refer to the attached Coastal Engineering Report by Horton noting that cliff grades mentioned above are from this report. He nominates a conservative maximum erosion rate accounting for sea level rise of 1.7m/ 100 years. The following advice accounts for this erosion rate but also considers it against the localised cliff geology, joint spacing and potential failure mechanisms within the properties extent.

3. Geology

The Sydney 1:100 000 Geological Sheet indicates the site is underlain by the Newport Formation of the Narrabeen Group. There is a band of sandstone underlying the entire uphill side of the property that extends through the otherwise shale-dominated profile.

4. Subsurface Investigation

One hand Auger Hole (AH) was put down to identify the soil materials. Five Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. 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 (~RL34.3) **–** AH1 (Photo 6)

Depth (m)	**Material Encountered**
0.0 to 0.3	**TOPSOIL**, brown, Dense, dry, fine to coarse grained, weathered sandstone fragments included.
0.3 to 0.5	**RESIDUAL CLAY**, sandy clay, maroon, Very Stiff, dry, fine to medium grained, rock fragments up to ~1cm diameter throughout.
0.5 to 0.8	**RESIDUAL CLAY**, mottled maroon and orange, Very Stiff, dry, fine grained.
0.8 to 0.9	**WEATHERED SANDSTONE**, mottled maroon and orange, Very Stiff, dry, fine to coarse, sugary texture.

End of Hole @ 0.9m in weathered sandstone. 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** (~RL39.3)	**DCP 2** (~RL39.3)	**DCP 3** (~RL39.0)	**DCP 4** (~RL36.5)	**DCP 5** (~RL34.3)
0.0 to 0.3	6	8	25	6	15
0.3 to 0.6	#	23	24	2F	16
0.6 to 0.9		#	15	10	17
0.9 to 1.2			12	20	24
1.2 to 1.5			#	17	#
1.5 to 1.8				23	
1.8 to 2.1				26	
2.1 to 2.4				#	
	Refusal on Rock @ 0.3m	Refusal on Rock @ 0.6m	Refusal on Rock @ 1.0m	Refusal on Rock @ 2.0m	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 @ 0.3m, DCP bouncing off rock surface, maroon impact dust on dry tip.

DCP2 – Refusal on Rock @ 0.6m, DCP bouncing off rock surface, clean dry tip, orange sandy clay in collar above tip.

DCP3 – Refusal on Rock @ 1.0m, DCP bouncing off rock surface, white impact dust on dry tip.

DCP4 – Refusal on Rock @ 2.0m, DCP bouncing off rock surface, yellow impact dust on dry tip, mottled yellow, grey and maroon sandy clay in collar above tip.

DCP5 – Refusal on Rock @ 1.2m, DCP bouncing off rock surface, maroon sand clay on dry tip and in collar above tip.

5. Geological Observations/Interpretation

The site is underlain by topsoil and clay over highly weathered sandstone bedrock. We note this is a relatively thick band of sandstone within the shale-dominated Narrabeen Group. These bands of sandstone are commonly present in the sea cliffs. The vertical extent of the band was estimated from drone footage to be approximately ~26m. Fill has been laid across the property for landscaping in the location of the proposed parking area excavation. In the test locations, the rock was encountered at depths of between 0.3 to 2.0m below the current surface, being deeper due to the presence of fill. The sandstone underlying the property is estimated to be medium strength or better as the DCP bounced at the end of every test. Similar strength rock is expected to underlie the entire site. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of the proposed excavation.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. As the property encompasses the crest of the hill, any surface flows will be generated on the property and will flow away from the property.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside or below (W) of the property. The vibrations from the proposed excavations are a potential hazard (**Hazard One**). The proposed excavations are a potential hazard until the retaining walls / pool structure are in place (**Hazard Two**). The sea cliff face that falls from the top of the property 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 vibrations produced during the proposed excavations impacting on the surrounding structures.	The excavations (to a maximum depth of ~1.3m) collapsing onto the work site before retaining structures are in place.	The long-term stability of the sea cliff impacting the developed portion of the property taking into consideration the likely maximum erosion rate of 1.7m/100 yrs – Horton (Photo 5).
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})	'Rare' (10^{-5})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)	'Major' (50%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})	'Low' (6×10^{-6})
RISK TO LIFE	5.3×10^{-7}/annum	8.3×10^{-6}/annum	9.96×10^{-6}/annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12** are to be followed.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** are to be followed.	At RL 3 the base of the cliff is ~16m seaward of the cliff top. Taking into account the localised cliff geology, joint spacing and potential failure mechanisms within the property boundaries and considering the maximum conservative erosion rate, it is likely the top of the cliff will not be impacted over 100 yr period. This level of risk is 'ACCEPTABLE'.

(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 Calvert Parade. 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

Two excavations are required for the proposed development:

- An excavation to a maximum depth of ~1.2m for the proposed pool E of the house near the sea cliff.
- An excavation to a maximum depth of ~1.3m for the parking area on the downhill side of the house.

The excavations are expected to be through fill, soil, clay, and weathered sandstone, with Medium Strength Sandstone, expected at depths of between 0.3 to 1.0m below the surface in the area of the proposed pool, and between 1.2 to 2.0m in the area of the proposed parking area excavation.

It is envisaged that excavations through fill, soil, clay, and weathered sandstone can be carried out with an excavator and toothed bucket, and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through fill, soil, clay, and weathered sandstone will be below the threshold limit for building damage utilising a domestic-sized excavator up to 16 tonnes. It is expected that the excavation for the pool will be through Medium Strength Sandstone or better.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the subject and S neighbouring houses, as well as the sea cliff. The setbacks from the proposed pool excavation to the existing structures are as follows:

- ~1.5m from the supporting walls of the subject house.
- ~2.4m from the edge of the sea cliff.
- ~8.2m from the supporting walls of the S neighbouring house.

Dilapidation reporting carried out on the S neighbouring property is recommended prior to the excavation works commencing to minimise the potential for spurious building damage claims.

Close controls by the contractor over rock excavation are recommended so excessive vibrations are not generated.

Excavation methods are to be used that limit peak particle velocity to 5mm/sec at the house walls and sea cliff. Vibration monitoring will be required to verify this is achieved. Vibration monitoring must include a light/alarm so the operator knows if vibration limits have been exceeded. The equipment is to log and record vibrations throughout the excavation works.

In Medium Strength Rock or better techniques to minimise vibration transmission will be required. These include:

- Rock sawing the excavation perimeter to at least 1.0m deep prior to any rock breaking with hammers, keeping the saw cuts below the rock to be broken throughout the excavation process.
- Limiting rock hammer size.
- Rock hammering in short bursts so vibrations do not amplify.

- Rock breaking with the hammer angled away from the nearby sensitive structures.
- Creating additional saw breaks in the rock where vibration limits are exceeded, as well as reducing hammer size as necessary.
- Use of rock grinders (milling head).

Should excavation induced vibrations exceed vibration limits after the recommendations above have been implemented, excavation works are to cease immediately and our office is to be contacted.

It is worth noting that vibrations that are below thresholds for building damage may be felt by the occupants of the subject and neighbouring houses.

13. Excavation Support Requirements

Bulk Excavation for the Pool

The excavation for the proposed pool will reach a maximum depth of ~1.2m and will come close to flush with a low brick retaining wall (Photo 3) that is shown on the plans to remain. If this is the case and the wall is found to not be supported on Medium Strength sandstone or better, it will need to be propped or underpinned or otherwise supported in a suitable manner until the pool structure is in place.

During the excavation process, the geotechnical consultant is to inspect the excavations as they approach no less than 0.5m horizontally from the foundations of the wall/underpins to confirm the stability of the cut to go flush with the footings.

The remaining fill, soil, and clay, portions of the proposed pool excavation are expected to stand at near-vertical angles for short periods of time until the pool structure is installed, provided the cut batters are kept from becoming saturated. If the cut batters through fill, soil, and clay remain unsupported for more than a day before pool construction commences, they are to be supported with typical pool shoring until the pool structure is in place. Excavations through Medium Strength Rock or better are expected to stand at vertical angles unsupported subject to approval by the geotechnical consultant.

Bulk Excavation for the Parking Area

The excavation for the proposed parking area will reach a maximum depth of ~1.3m. Allowing 0.5m for back wall drainage, the setbacks are as follows:

- ~1.3m from the rendered masonry wall which approximates the S common boundary.
- ~1.1m from the concrete path on the downhill side of the house.
- ~1.5m from the downhill supporting wall of the subject house.

Assuming minimum typical foundation depths (0.4m), the supporting wall of the house and S boundary wall are expected to be outside the zone of influence of the proposed excavation. As such, only the concrete path will be within the Zone of Influence of the proposed excavation.

Where room permits, the fill and soil portions of the excavation are expected to stand temporarily at batter angles of 30^{o} (1.0 Vertical to 1.7 Horizontal). Where there is not room for these batters, such as along the uphill (E) side of the excavation, the cut will need to be temporarily or permanently supported prior to the commencement of the excavation, or during the excavation process in a staged manner, to ensure the integrity of the path, and 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.

Excavations through natural clay and weathered sandstone are expected to stand unsupported for a short period of time at near vertical angles until the retaining walls are in place, provided they are kept from becoming saturated.

Advice Applying to Both Excavations

All unsupported cut batters through fill, soil, clay, and weathered sandstone 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 cannot blow off in a storm. The materials and labour to construct the pool structure/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 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 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 and Topsoil	20	0.40	0.55
Residual Clays	20	0.35	0.45
Medium Strength Rock	24	0.00	0.01

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 pool is proposed to be set back ~2.4m from the edge of the sea cliff. As such, the pool is expected to be mostly seated in the jointed and cracked sandstone that forms the crest of the cliff. To ensure the stability of the pool and of the sea cliff, it is to be supported on piles embedded into the underlying sandstone to depths of at least 3.0m from the base of the pool excavation. As such, a mini piling rig capable of drilling through Medium Strength Rock is required for this job. It is to be noted that a standard domestic excavator is not able to drill through Medium Strength Sandstone and is not suitable for this job. We can provide names of local excavation contractors with suitable domestic piling rigs upon request.

A maximum allowable bearing pressure of 500kPa can be assumed for footings embedded into the sandstone below the pool footprint.

If the piers for the existing deck are to be repurposed and extended for the new deck, a certificate of structural adequacy will be required from the structural engineer to ensure their stability into the future.

Any new footings for the house and decking can be supported on Medium Strength Sandstone. This material is expected at depths of between 0.3m and 2.0m below the current surface.

The foundations supporting the existing house are currently unknown. Ideally, footings should be founded on the same footing material across the old and new portions of 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 in accordance with a 'Class S' site.

The proposed driveway and parking area can be supported off the natural surface after any organic matter has been stripped. A maximum allowable bearing pressure of 100kPa can be assumed for soil of the natural surface. Where the driveway is cut into the slope, it can be supported directly off the exposed clay and weathered sandstone. A maximum allowable bearing pressure of 200kPa can be assumed for footings on clays. Where the foundation material across the driveway structure changes, construction joints are to be installed to separate the different foundation materials and to accommodate minor differential movement. Alternatively, the entire driveway can be supported on sandstone bedrock.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if, with the approval of the structural engineer, the joint can be spanned or, alternatively, the footing can be repositioned so it does not fall over the joint.

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

REQUIRED INSPECTIONS ON THE NEXT PAGE

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

- During the excavation process for the pool, the geotechnical consultant is to inspect the excavations as they approach no less than 0.5m horizontally from the foundations of the wall/underpins to confirm the stability of the cut to go flush with the footings.

- 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:

Ben White M.Sc. Geol.,
AIG., RPGeo Geotechnical & Engineering.
No. 10306
Engineering Geologist.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5 – approximate portion of cliff within property boundaries in red

Photo 6 – downhole is 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.

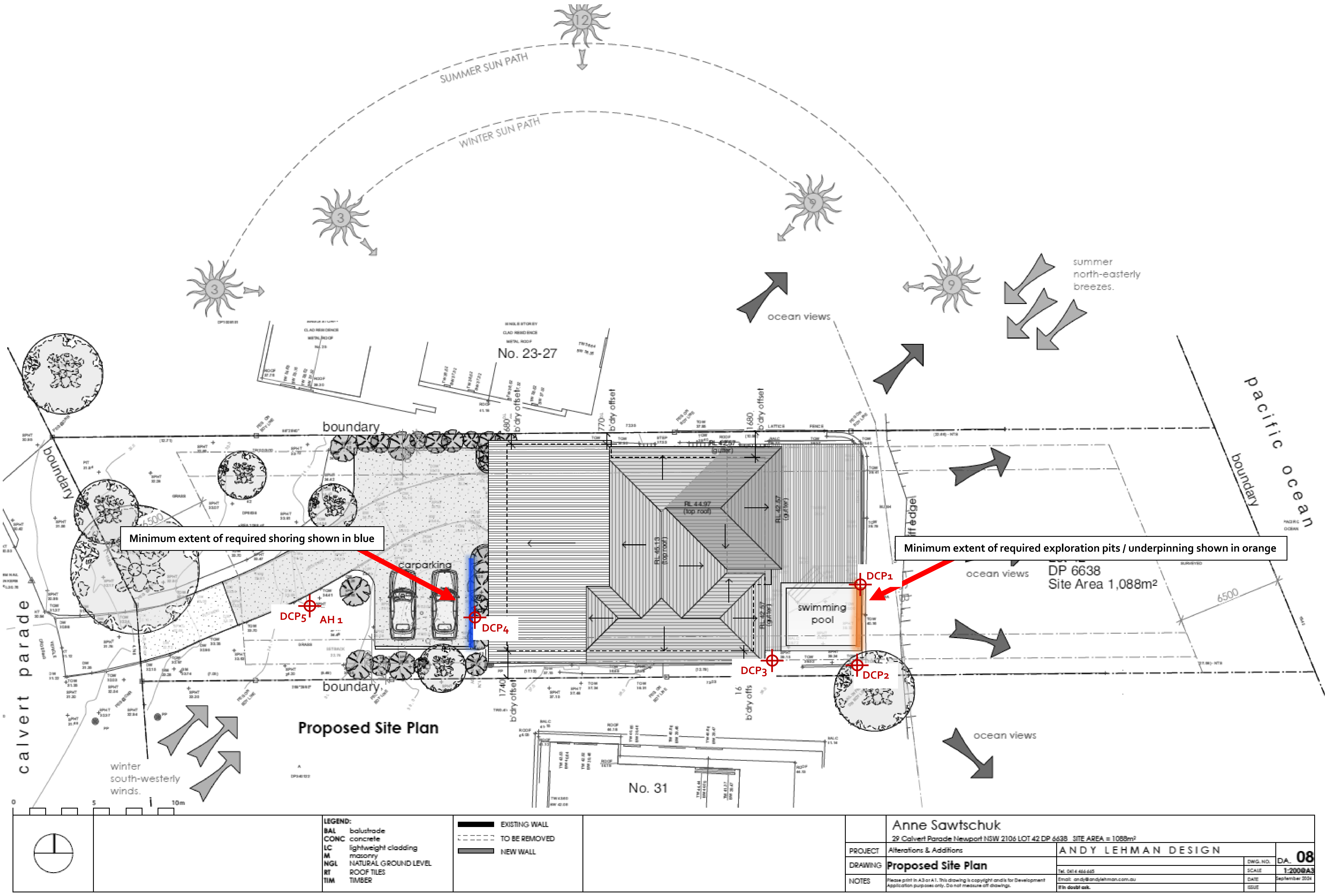
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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.

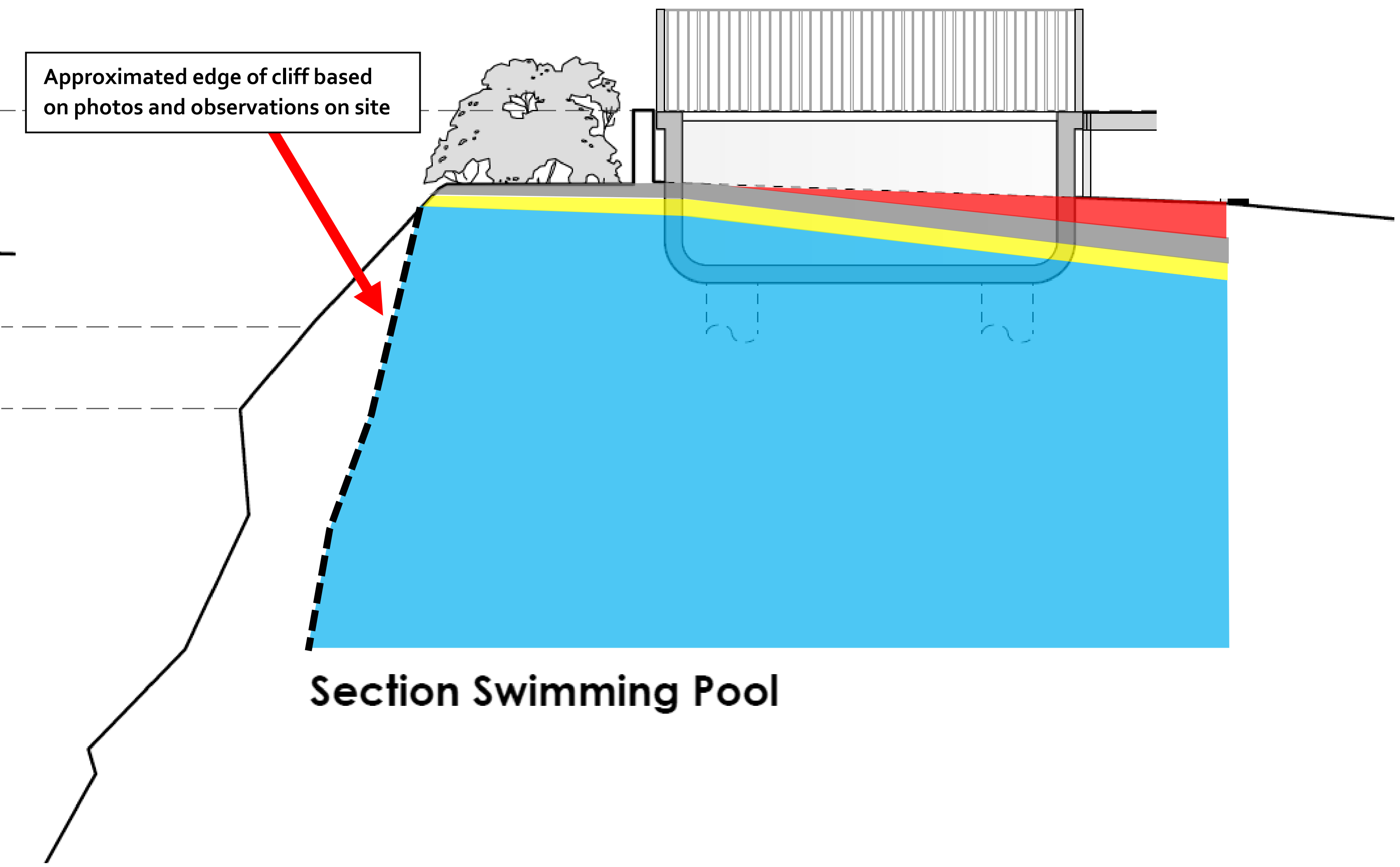
SITE PLAN – showing test locations and minimum extent of required shoring



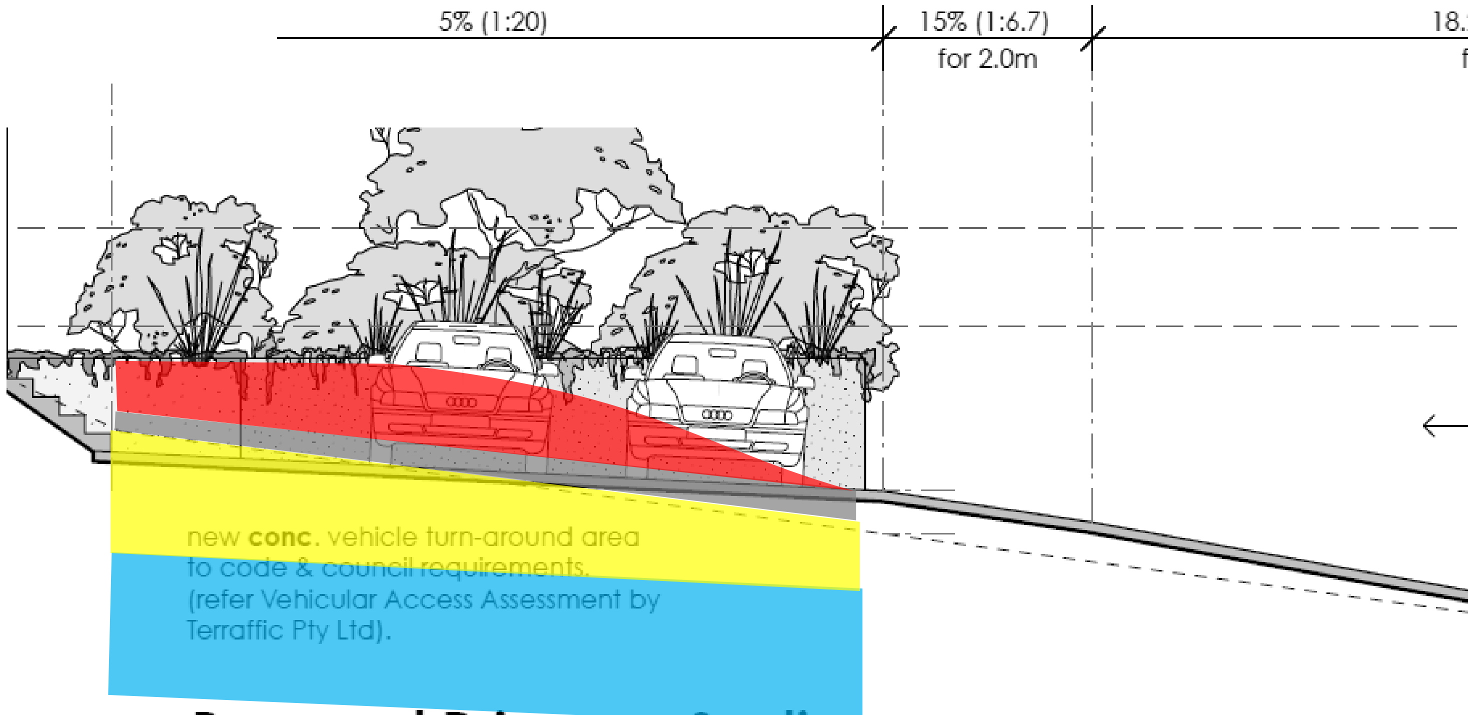
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Expected Ground Materials

- Fill (red)
- Topsoil (grey)
- Clay (yellow)
- Narrabeen Group Rocks – Medium Strength Sandstone. (blue)

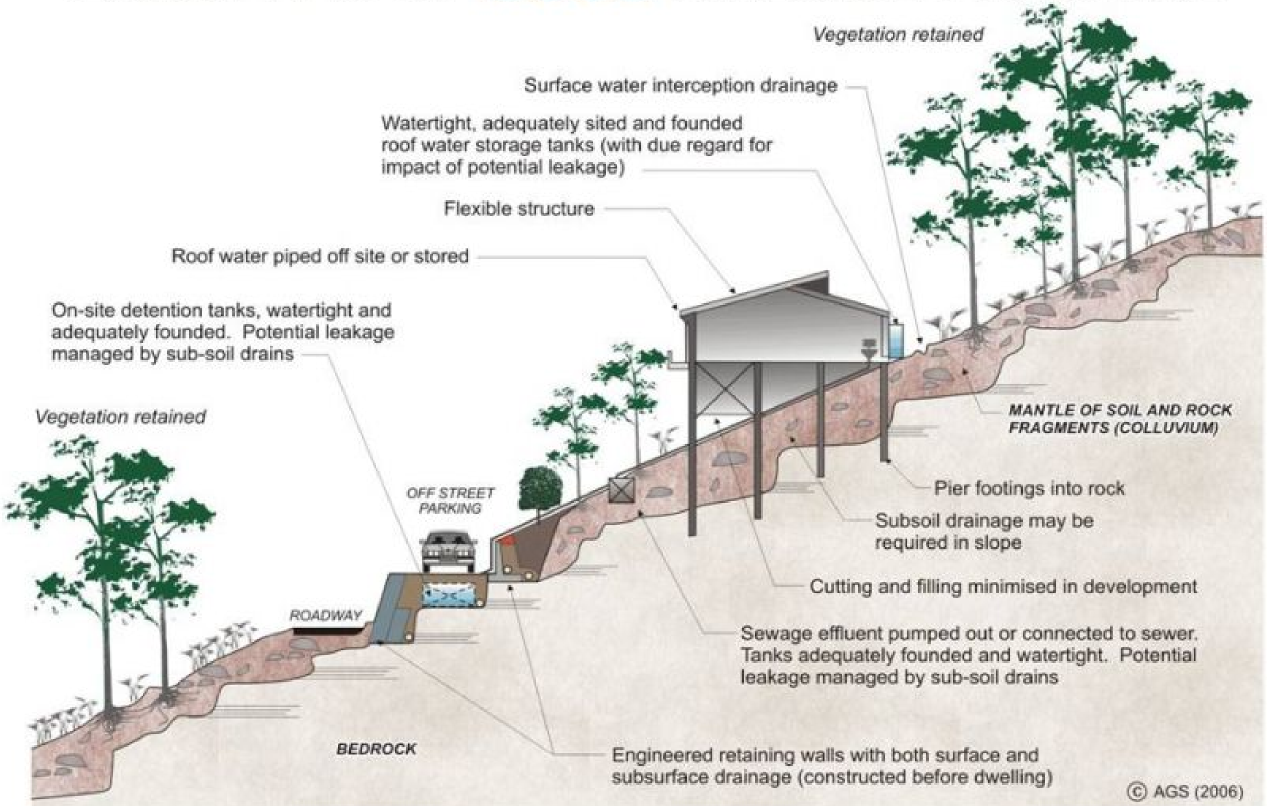


Section Swimming Pool

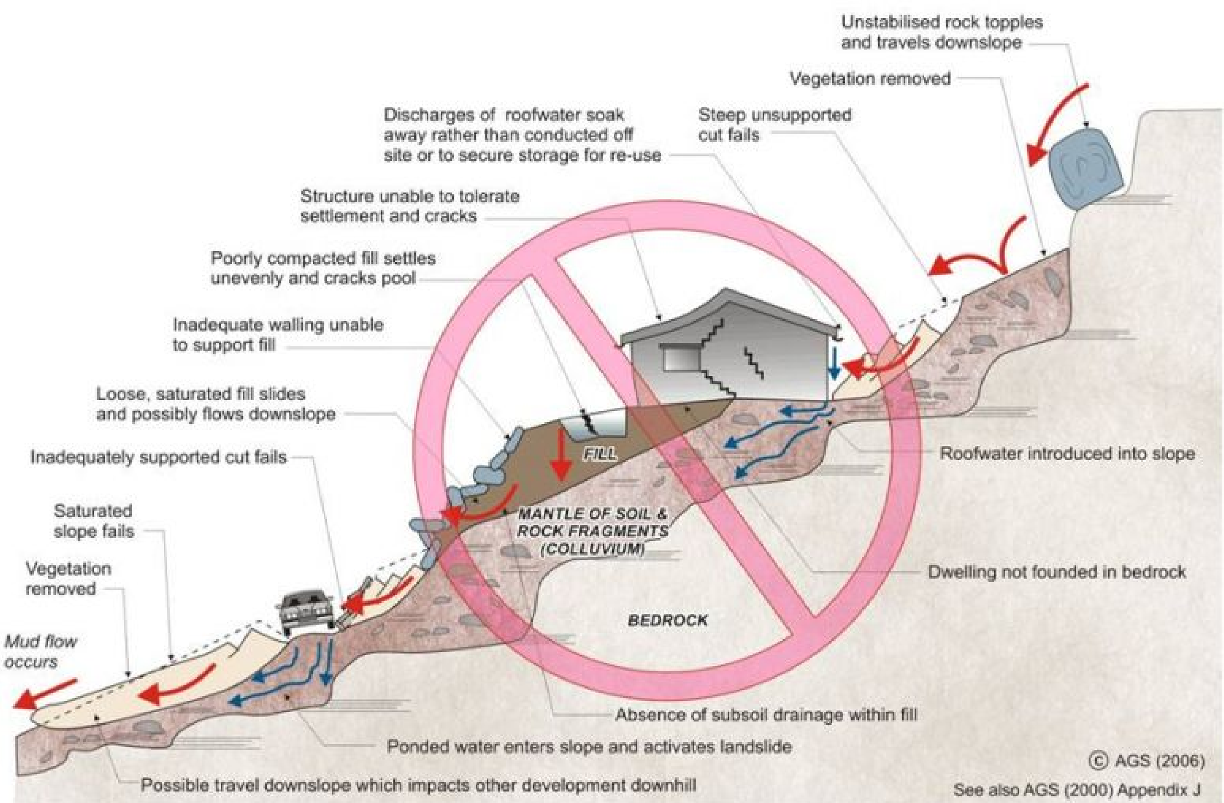


Proposed Driveway Section

EXAMPLES OF GOOD HILLSIDE PRACTICE



EXAMPLES OF POOR HILLSIDE PRACTICE



HORTON COASTAL ENGINEERING PTY LTD
18 Reynolds Cres
Beacon Hill NSW 2100
+61 (0)407 012 538
peter@hortoncoastal.com.au
www.hortoncoastal.com.au
ABN 31 612 198 731
ACN 612 198 731

Anne Sawtschuk
C/- Andy Lehman Design
(sent by email only to andy@andylehman.com.au)

23 December 2024

Coastal Engineering Advice on 29 Calvert Parade Newport

1. INTRODUCTION AND BACKGROUND

It is proposed to undertake alterations and additions at 29 Calvert Parade Newport, hereafter denoted as the 'site', for which a Development Application is to be submitted to Northern Beaches Council.

The site is located within a "Bluff/Cliff Instability" area designated on the *Coastal Risk Planning Map* (Sheet CHZ_017) that is referenced in *Pittwater Local Environmental Plan 2014*. Therefore, the site is subject to Chapter B3.4 of the *Pittwater 21 Development Control Plan* (DCP), and the *Geotechnical Risk Management Policy for Development in Pittwater*. Based on Chapter 6.5(i) of this policy, "a coastal engineer's report on the impact of coastal processes on the site and the coastal forces prevailing on the bluff must be incorporated into the geotechnical assessment as an appendix and the Coastal Engineer's assessment must be addressed through the Geotechnical Report and structural specification". Accordingly, this coastal engineering report is set out herein.

The report author, Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER], is a professional Coastal Engineer with 33 years of coastal engineering experience. He has postgraduate qualifications in coastal engineering, and is a Member of Engineers Australia and Chartered Professional Engineer (CPEng) registered on the National Engineering Register. He is also a member of the National Committee on Coastal and Ocean Engineering (NCCOE) and NSW Coastal, Ocean and Port Engineering Panel (COPEP) of Engineers Australia. Peter has prepared coastal engineering reports for numerous cliff/bluff properties in the former Pittwater Local Government Area in recent years, including at Newport. He undertook a specific inspection of the site and adjacent rock platform on 3 October 2024.

All levels given herein are to Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level in the ocean adjacent to the NSW mainland at present. Completed Form No. 1 as given in the *Geotechnical Risk Management Policy for Pittwater* is attached at the end of the report herein.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with a total of 23 drawings prepared by Andy Lehman Design (namely Drawings DA00 to 22), issued on 20 December 2024.

A site survey by True North Surveys was also provided, Drawing No 1978TN, Revision 2 and dated 6 February 2024.

3. EXISTING SITE DESCRIPTION

The upper portion of the site is located landward of a rock platform and rocky cliff. This cliff, Bungan Head, extends between the sandy Bungan Beach in the south and sandy Newport Beach in the north. A vertical aerial view of the site is provided in Figure 1, with a section location (Section A) also depicted in Figure 1.

An oblique aerial view of the site (including the cliff and adjacent rock platform) is provided in Figure 2, with a photograph of the cliff at the site (taken from the adjacent rock platform) provided in Figure 3.

Coffey & Partners (1987) noted that the top section of the cliff at the site was predominantly sandstone (highly weathered) and close to vertical (with overhangs due to undercutting), with the central section comprising interbedded siltstone and sandstone at a slope of about 65° to 75° to the horizontal. This interbedding was noted to lead to undercutting in highly weathered siltstone and toppling of sandstone slabs defined by joint sets and bedding planes. The lower section of cliff was noted to be red siltstone of the Bald Hill Claystone with a slope of about 35° to the horizontal.

Based on NSW Government LiDAR and reflectance data that was collected in 2020, elevations versus distance along Section A (from Figure 1) perpendicular to the cliff face are depicted in Figure 4. Based on Figure 4 and the site survey, key elevations and slopes along Section A are as follows:

- area in vicinity of proposed pool at about 39m AHD;
- top of cliff at 40.3m AHD, located about 3m seaward of the proposed pool;
- average slope of about 82° from the top of cliff down to a narrow ledge at 26.5m AHD;
- average slope of about 70° from this ledge down to 10.8m AHD; and
- average slope of about 44° from10.8m AHD down to the top of a near vertical ledge at the cliff toe at 3.2m AHD.

A relatively flat rock platform is located seaward of the cliff, and is about 50m wide at low tide, and about 70m wide at the ocean pool to the NE of the site. The rock platform cycles between being covered in sand and having the underlying rock exposed (the latter applying in Figure 1).

Little Reef extends offshore of the rock platform about 270m to the SE of the site. Waves tend to converge in its lee, due to diffraction processes.

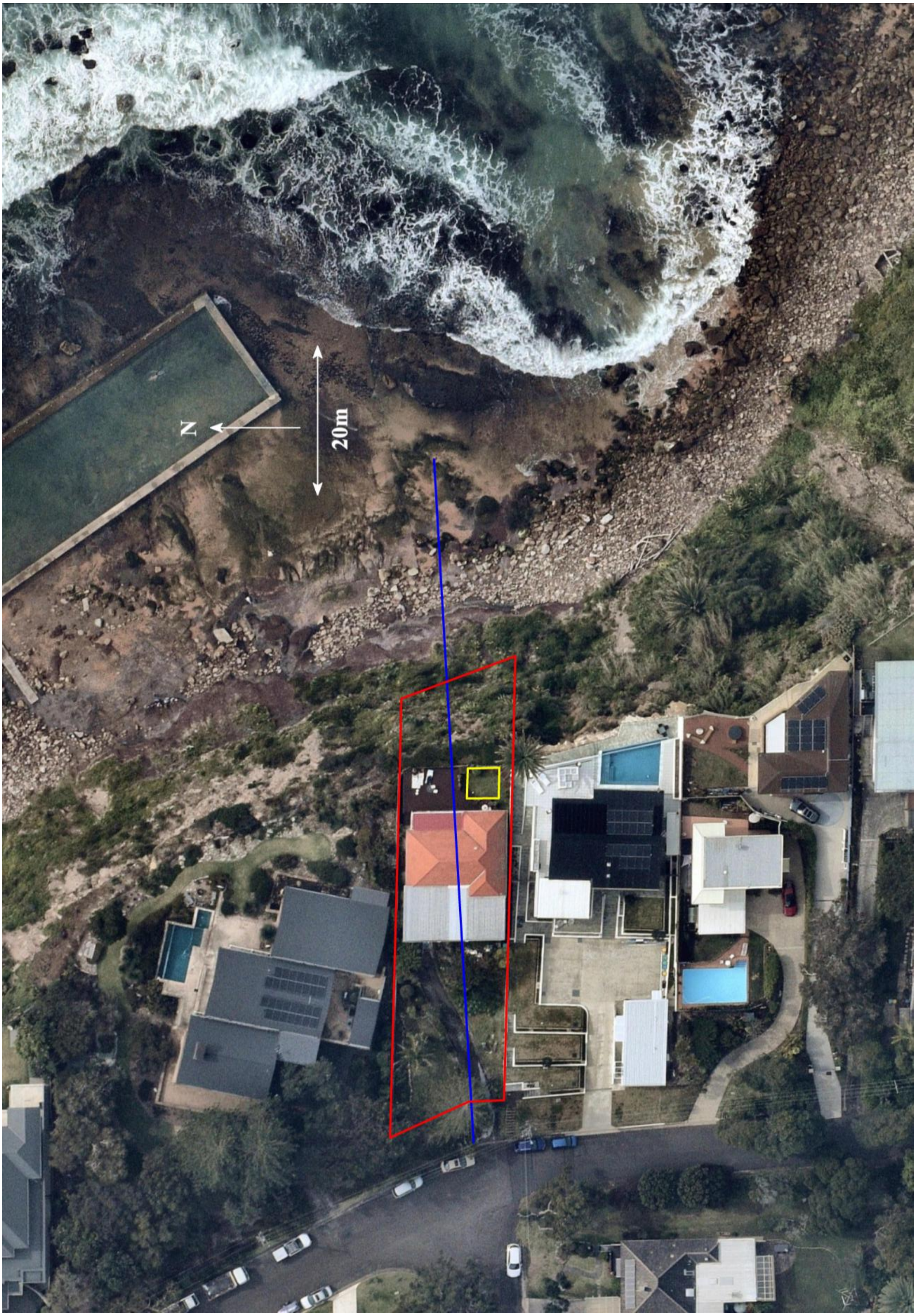


Figure 1: Aerial view of site (approximate red outline), with Section A in blue, approximate proposed pool location in yellow, and aerial photograph taken 4 August 2024

Figure 2: Oblique aerial view of site (at arrow) on 22 July 2024, facing west

Figure 3: View of cliff face at site (approximately between arrows) from rock platform on 3 October 2024, facing SW to WSW

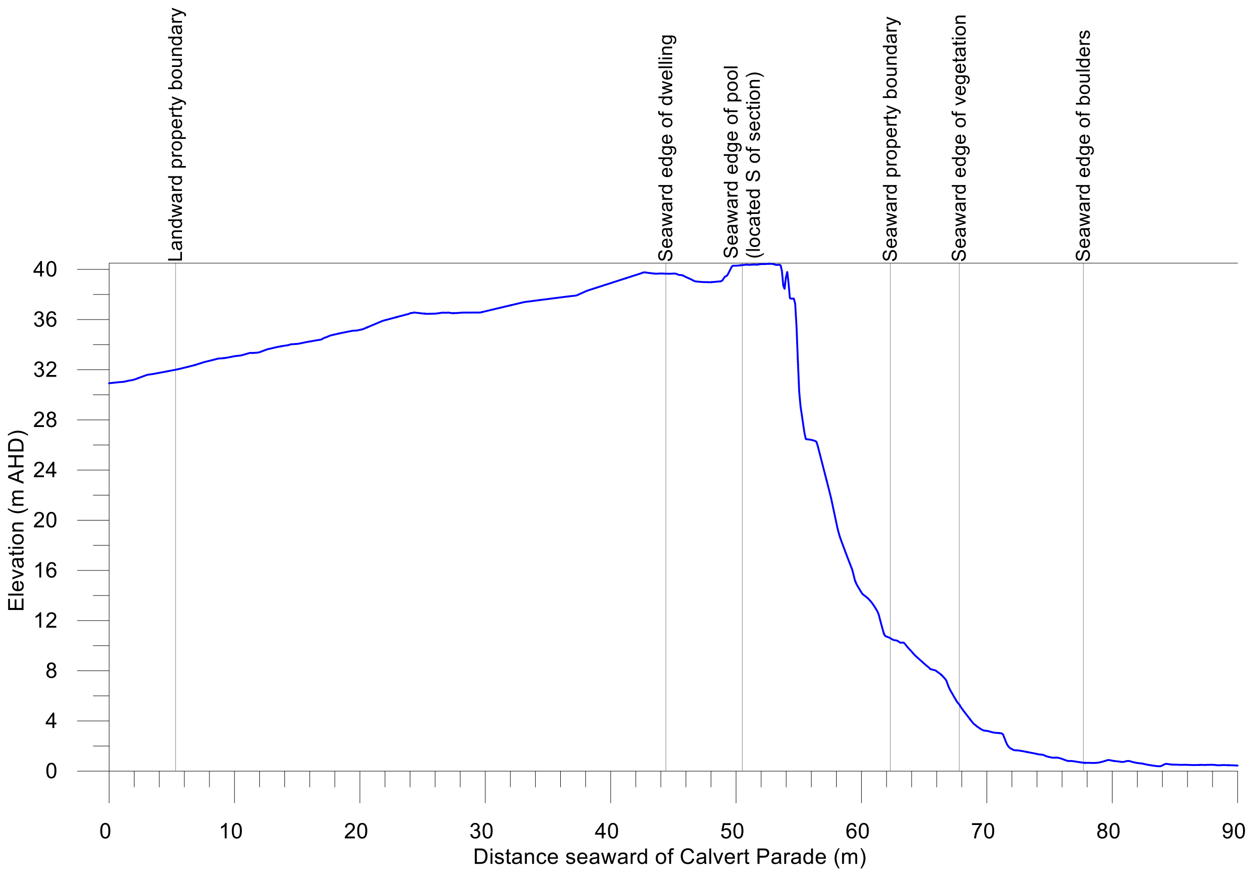


Figure 4: Section A through site (including cliff face) and down to adjacent rock platform

4. PROPOSED DEVELOPMENT

It is proposed to undertake alterations and additions at the site, including a new pool and replacement of decking on the seaward side (with a finished deck level and pool coping level of 40.14m AHD), rebuilt sunroom on the seaward side to provide compliant ceiling height (new floor, walls, windows and roof over the same footprint as existing, with a finished floor level of 40.16m AHD), new driveway and car parking on the landward side, and various other items including a new lift. The location of the proposed pool was depicted in Figure 1.

5. MECHANISMS FOR CLIFF EROSION

5.1 Preamble

Erosion of sheer cliffs can occur in two forms (Public Works Department, 1985), either:

- a slow, relatively gradual attrition of cliff material due to the effects of weathering; or
- relatively infrequent but sudden collapse of large portions of cliff face, due to undercutting, wave impact forces, changed groundwater conditions, rock shattering or increased loadings related to construction, and other processes.

Weathering may induce undercutting and toppling failure of overhanging blocks if the rate of weathering is highest near the base of the cliff or at other levels below the top of the cliff. Overhangs are currently evident in the cliff face, as visible in Figure 3. Erosion of steep slopes tends to occur suddenly in association with heavy rainfall or changes to drainage patterns, slope undercutting, and increases in load on the slope.

5.2 Weathering and Erosion

Both chemical and mechanical weathering can reduce the strength of cliff material (Sunamura, 1983). Chemical weathering includes hydration and solution, caused by the interaction between cliff material and sea water. Mechanical weathering comprises:

- the wetting and drying process in the intertidal zone;
- generation of repeated stresses in cliff material by periodic wave action (particularly waves that break on the cliff); and
- frost effects in cold latitudes.

Mechanical weathering can also be caused by wind.

Historical rates of recession for softer beds of Sydney coastline sandstone cliffs, which include chemical and mechanical weathering, have been determined to be 2mm to 5mm per year by Dragovich (2000). This is consistent with average rates of recession for Sydney Northern Beaches coastline sandstone cliffs of 4mm per year determined by Crozier and Braybrooke (1992).

The width of the rock platform from the toe of the cliff just NE of the site is about 70m, as observed in aerial photography. This apparent approximate 70m of cliff recession seaward of and at the site over the last 6,400 years (since sea levels stabilised around their present levels, and assuming that the cliff was at the seaward edge of the rock platform at that time) represents an average recession rate of 11mm/year, consistent with maximum rates of recession for Sydney Northern Beaches coastline sandstone cliffs of 12mm/year as determined by Crozier and Braybrooke (1992).

The lower portion of the cliff below about 8m AHD (increasing to around 9m AHD in 100 years if projected sea level rise is realised) is subject to occasional wave action (runup), especially during coastal storms with large waves and elevated water levels.

Given this, it should be assumed that both chemical and mechanical weathering would apply over the lower portion of the cliff. A recession/weathering rate of 11mm per year is considered to be appropriate over the lower portion, with sensitivity testing for a rate of 17mm/year as a conservative 1.5 multiple rate increase to account for future sea level rise[1]. These rates should be considered and assessed by the geotechnical engineer. The rates are considered to be reasonable to apply over a design life of 100 years, including allowance for projected sea level rise[2].

It is recognised that the upper cliff at the site is not subject to wave action and may be subject to a lower recession rate than 11 to 17mm/year, but to be conservative these rates can be applied over the entire cliff face. The geotechnical engineer should consider these rates in conjunction with an understanding of the particular nature of the cliff materials at the site, their resistance to erosion/recession, and potential failure planes related to geotechnical issues

[1] There are no established methods to estimate increased recession rates of cliff lines due to sea level rise, but a 1.5 factor on historical rates is considered to be particularly conservative. In the 2011 *Wyong Coastal Zone Management Plan* (CZMP) and 2017 draft Wyong CZMP, a factor of 1.2 was used to 2100.
[2] Note that this does not mean that the cliff toe is predicted to recede at a steady rate of 11 to 17mm/year. In reality, there are likely to be slower rates of weathering over decades or centuries until a significant undercut occurs that detaches a block above, which leads to a sudden loss of an extent of cliff face much larger than the order of 10 to 20mm. However, averaging this slower weathering and block failures over the long term, an average rate of 11mm to 17mm/year (which can also be stated as 1.1m to 1.7m per 100 years) at the cliff toe is expected.

such as the joint spacing[3]. With the cliff toe located about 16m seaward of the top of the cliff at the site, coastal processes are unlikely to have any influence on the recession of the upper cliff over a 100 year design life.

This should be confirmed by the geotechnical engineer, but it is expected that the recession/weathering described above would lead to undercutting and collapse of blocks on the central and upper cliff face over the long term, with failure planes at the joints. That stated, any future failure of the upper slope of the cliff and in the vicinity of the proposed development may be unrelated to coastal processes at the base of the cliff, so other failure mechanisms should be considered by the geotechnical engineer.

6. COASTAL INUNDATION

With the top of the cliff at 40.3m AHD, coastal inundation is not a significant risk for the proposed development over a planning period of well over 100 years, including consideration of projected sea level rise.

7. MERIT ASSESSMENT

7.1 Preamble

The merit assessment herein has been undertaken assuming that the geotechnical engineer finds that the proposed development is at an acceptably low risk of damage from coastal erosion/recession of the cliff seaward of the site, and other processes, for a design life of at least 100 years[4]. The assessment set out below is reliant on this being the case, so this assumption must be confirmed by the geotechnical engineer.

7.2 *State Environmental Planning Policy (Resilience and Hazards) 2021*

7.2.1 Preamble

Based on *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP Resilience)[5] and its associated mapping, the site is partly within a "Coastal Environment" area (see Section 7.2.2), and within a "Coastal Use" area (see Section 7.2.3).

7.2.2 Clause 2.10

Based on Clause 2.10(1) of SEPP Resilience, "development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:

(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,
(b) coastal environmental values and natural coastal processes,

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[3] Coffey & Partners (1987) noted that the controlling feature of interbedded sandstone/siltstone cliffs was the bedding spacing and relative proportion of sandstone/siltstone.
[4] At a location with underlying bedrock such as the site, it is the responsibility of the geotechnical engineer, not the coastal engineer, to determine the risk to the development.
[5] Formerly *State Environmental Planning Policy (Coastal Management) 2018*.

(c) the water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014*), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,
(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,
(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,
(f) Aboriginal cultural heritage, practices and places,
(g) the use of the surf zone".

This is not a coastal engineering matter, but it can be noted that with regard to (a), the proposed development would not be expected to adversely affect the biophysical and hydrological (surface and groundwater) environments, being in an existing developed area and with conventional stormwater management features such as a 5000L onsite detention tank, and piped drainage to the street as at present. The proposed works would not be a source of pollution as long as appropriate construction environmental controls are applied, and note that an Erosion, Sediment & Waste Management Control Plan has been included as part of the architectural drawings.

An Aboricultural Impact Assessment for the site has been completed by Treeism Arboricultural Consultancy, which identified the potential impacts of the proposal on trees at the site and adjacent properties, and provided guidelines for tree protection and maintenance during development. Given this, and assuming that there are no threatened native flora or fauna species and their habitats of significance at the site that would be impacted by the proposed works, the works would not be expected to adversely affect the ecological environment.

With regard to (b), the proposed development would not be expected to adversely affect coastal environmental values or natural coastal processes over an acceptably long design life, as it would be founded on a cliff well above wave action for an acceptably rare storm over an acceptably long life.

With regard to (c), the proposed development would not be expected to adversely impact on water quality, with the residential land use, as long as appropriate construction environmental controls are applied, and again note that an Erosion, Sediment & Waste Management Control Plan has been included as part of the architectural drawings. No sensitive coastal lakes are located in the vicinity of the proposed development.

With regard to (d), the proposed development would not be expected to impact marine vegetation, undeveloped headlands and rock platforms, with none of these items in proximity to the development (being on an already developed headland, and being well above and landward of the rock platform seaward of the site for an acceptably rare storm and acceptably long life). No significant impacts on marine fauna and flora would be expected as a result of the proposed development, as the development would not interact with subaqueous areas for an acceptably rare storm and acceptably long life. Assuming that there are no species of native vegetation and fauna and their habitats of significance that would be impacted at the site, (d) is satisfied.

With regard to (e), it can be noted that the proposed development is entirely within the site boundary and will not alter existing public access arrangements outside of the site.

With regard to (f), a search of the Heritage NSW "Aboriginal Heritage Information Management System" (AHIMS) was undertaken on 5 December 2024. This resulted in no Aboriginal sites nor Aboriginal places being recorded or declared within at least 50m of the site.

With regard to (g), the proposed development would not interact with the surf zone for an acceptably rare storm occurring over an acceptably long life, so would not impact on use of the surf zone.

Based on Clause 2.10(2) of SEPP Resilience, "development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or
(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or
(c) if that impact cannot be minimised—the development will be managed to mitigate that impact".

The proposed development has been designed and sited to avoid any potential adverse impacts referred to in Clause 2.10(1).

7.2.3 Clause 2.11

Based on Clause 2.11(1) of SEPP Resilience, "development consent must not be granted to development on land that is within the coastal use area unless the consent authority:

(a) has considered whether the proposed development is likely to cause an adverse impact on the following:
   (i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,
   (ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,
   (iii) the visual amenity and scenic qualities of the coast, including coastal headlands,
   (iv) Aboriginal cultural heritage, practices and places,
   (v) cultural and built environment heritage, and
(b) is satisfied that:
   (i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or
   (ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or
   (iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and
(c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development".

With regard to Clause (a)(i), the proposed development is entirely on private property and will not affect public foreshore, beach, headland or rock platform access.

Clauses (a)(ii) and a(iii) are not coastal engineering matters so are not considered herein.

With regard to (a)(iv), no Aboriginal sites nor Aboriginal places have been recorded or declared within at least 50m of the site, as noted in Section 7.2.2.

With regard to (a)(v), the nearest environmental heritage items to the site listed in Schedule 5 of *Pittwater Local Environmental Plan 2014* are the ocean rock pool at Newport Beach (located about 40m NE of the site), and 'Fink' house at 153 Queens Parade East Newport (located about 130m south of the site). The proposed development would not be expected to impact on these or more distant heritage items.

With regard to (b), the proposed development has been designed and sited to avoid any potential adverse impacts referred to in Clause 2.11(1) for the matters considered herein. Clause (c) is not a coastal engineering matter so is not considered herein.

7.2.4 Clause 2.12

Based on Clause 2.12 of SEPP Resilience, "development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land".

Assuming that the geotechnical engineer will find that the proposed development is at an acceptably low risk of damage from erosion/recession over a 100 year design life, and given that the proposed development is well above and landward of projected wave runup over 100 years, the proposed development would not even be expected to interact with coastal processes over its design life, let alone affect any other land. That is, the proposed development is unlikely to cause increased risk of coastal hazards on that land or other land over its design life.

7.2.5 Clause 2.13

Based on Clause 2.13 of SEPP Resilience, "development consent must not be granted to development on land within the coastal zone unless the consent authority has taken into consideration the relevant provisions of any certified coastal management program that applies to the land".

No certified coastal management program applies at the site.

7.2.6 Synthesis

The proposed development satisfies the requirements of *State Environmental Planning Policy (Resilience and Hazards) 2021* for the matters considered herein.

7.3 *Coastal Management Act 2016*

The management objectives for the "coastal environment" and "coastal use" coastal management areas are described in Section 8 and Section 9 respectively of the *Coastal Management Act 2016*. By addressing Clause 2.10 and Clause 2.11 of SEPP Resilience in Section 7.2.2 and Section 7.2.3 herein, these management objectives have essentially been addressed. There are no other matters relevant to the subject DA that need to be considered in the *Coastal Management Act 2016*.

7.4 *Pittwater Local Environmental Plan 2014*

7.4.1 Clause 7.5

Clause 7.5 of *Pittwater Local Environmental Plan 2014* (LEP 2014) applies at the site, as the site is identified as "Bluff/Cliff Instability" on the Coastal Risk Planning Map Sheet CHZ_017. Based on Clause 7.5(3) of LEP 2014, "development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) is not likely to cause detrimental increases in coastal risks to other development or properties, and
(b) is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and
(c) incorporates appropriate measures to manage risk to life from coastal risks, and
(d) is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, particularly if the development is located seaward of the immediate hazard line, and
(e) provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and
(f) has regard to the impacts of sea level rise, and
(g) will have an acceptable level of risk to both property and life, in relation to all identifiable coastline hazards".

With regard to (a) and (b), the proposed development would not increase coastal risks nor alter coastal processes and the impacts of coastal hazards, as it would not affect the wave impact process at the toe of the cliff.

Items (c), (d) and (g) are for the geotechnical engineer to assess, with consideration of the findings herein. Assuming they find that the proposed development is at an acceptably low risk of damage over a 100 year planning period with appropriate measures incorporated in design and construction, (c), (d) and (g) have been met. On this basis, (e) should not be necessary, noting that this would be more applicable in a sandy beach environment. With regard to (f), sea level rise has been considered herein.

7.4.2 Clause 7.8

Clause 7.8 of LEP 2014 is not applicable to the proposed development, as the proposed works are landward of the Foreshore Building Line (landward of the Foreshore Area) at the site.

7.5 *Pittwater 21 DCP*

Based on Chapter B3.4 of the DCP, "development must not adversely affect or be adversely affected by geotechnical and coastal processes nor must it increase the level of risk for any people, assets and infrastructure in the vicinity due to geotechnical and coastal processes".

As noted in Section 7.2.4, the proposed development is not expected to increase the level of risk for any people, assets and infrastructure in the vicinity due to coastal processes. This item is satisfied if the geotechnical engineer confirms that the proposed development is at an acceptably low risk if being affected by geotechnical and coastal processes, and unlikely to increase the level of risk for any people, assets and infrastructure in the vicinity due to geotechnical processes.

8. FORM

A completed *Geotechnical Risk Management Policy for Pittwater* Form No. 1 is attached at the end of the document herein. Note that the declaration on Form No. 1 is not appropriate for a coastal report, with the revised declaration below:

> "I am aware that the above Coastal Report, prepared for the abovementioned site is to be submitted to assist with a geotechnical investigation for a Development Application for this site, with that geotechnical investigation relied on by Northern Beaches Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed. No declaration can be made on the geotechnical investigation as this has not been prepared nor reviewed by me, and nor do I have geotechnical engineering expertise".

9. CONCLUSIONS

An allowance for erosion/weathering of 11mm/year of the lower portion of the cliff at and seaward of 29 Calvert Parade Newport, with sensitivity testing up to 17mm/year, should be considered and assessed by the geotechnical engineer. To be conservative, these rates can be applied over the entire cliff face. The geotechnical engineer should consider these rates in conjunction with an understanding of the particular nature of the cliff materials at the site, their resistance to erosion/recession, and potential failure planes related to geotechnical issues such as the joint spacing. With the cliff toe located about 16m seaward of the top of the cliff east of the site, coastal processes are unlikely to have any influence on the recession of the upper cliff over a 100 year design life.

This should be confirmed by the geotechnical engineer, but it is expected that the recession/weathering described above would lead to undercutting and collapse of blocks on the central and upper cliff face over the long term, with failure planes at the joints. Other failure mechanisms should also be considered by the geotechnical engineer.

Coastal inundation is not a significant risk for the proposed development over a planning period of well over 100 years. Given this, and assuming that the geotechnical engineer will find that the development is at an acceptably low risk of damage from erosion/recession over a 100 year design life, the proposed development satisfies the requirements of *State Environmental Planning Policy (Resilience and Hazards) 2021* (Clauses 2.10 to 2.13), the *Coastal Management Act 2016*, Clause 7.5 of *Pittwater Local Environmental Plan 2014*, and Chapter B.4 of the *Pittwater 21 DCP* for the matters considered herein.

10. REFERENCES

Coffey & Partners (1987), "Coastal Management Study, Assessment of Bluff Areas", *Report No. S8002/1-AA*, March, for Warringah Shire Council

Crozier, PJ and JC Braybrooke (1992), "The morphology of Northern Sydney's rocky headlands, their rates and styles of regression and implications for coastal development", *26th Newcastle Symposium on Advances in the Study of the Sydney Basin*, University of Newcastle

Dragovich, Deirdre (2000), "Weathering Mechanisms and Rates of Decay of Sydney Dimension Sandstone", pp. 74-82 in *Sandstone City, Sydney's Dimension Stone and Other Sandstone Geomaterials*, edited by GH McNally and BJ Franklin, Environmental, Engineering and Hydrogeology Specialist Group (EEHSG), Geological Society of Australia, Monograph No. 5

Public Works Department (1985), “Coastal Management Strategy, Warringah Shire, Report to Working Party”, *PWD Report 85016*, June, prepared by AD Gordon, JG Hoffman and MT Kelly, for Warringah Shire Council

Sunamura, Tsuguo (1983), “Processes of Sea Cliff and Platform Erosion”, Chapter 12 in *CRC Handbook of Coastal Processes and Erosion*, editor Paul D Komar, CRC Press Inc, Boca Raton, Florida, ISBN 0-8493-0208-0

11. SALUTATION

If you have any further queries, please do not hesitate to contact Peter Horton via email at peter@hortoncoastal.com.au or via mobile on 0407 012 538.

Yours faithfully
HORTON COASTAL ENGINEERING PTY LTD

Peter Horton
Peter Horton
Director and Principal Coastal Engineer

Geotechnical Risk Management Policy for Pittwater Form No. 1 is attached overleaf

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO. 1 – To be submitted with Development Application

Development Application for Anne Sawtschuk / Andy Lehman Design
Name of Applicant
Address of site 29 Calvert Parade Newport

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Peter Horton *on behalf of* Horton Coastal Engineering Pty Ltd
(Insert Name) (Trading or Company Name)

on this the 23 December 2024 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 $2million.
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

Coastal
~~Geotechnical~~ Report Details:

Report Title: Coastal Engineering Advice on 29 Calvert Parade Newport

Report Date: 23 December 2024

Author: Peter Horton

Author's Company/Organisation: Horton Coastal Engineering Pty Ltd

Documentation which relate to or are relied upon in report preparation:

See Section 2 and Section 10 of coastal report

~~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 Peter Horton ………………………………………… See revised declaration in Section 8 of report

Name Peter Horton ……………………………………………

Chartered Professional Status MIEAust CPEng NER

Membership No. 452980

Company Horton Coastal Engineering Pty Ltd