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13 February 2025

Coastal Engineering Advice on 16 Hillcrest Avenue Mona Vale

1. INTRODUCTION AND BACKGROUND

It is proposed to undertake alterations and additions to a dwelling, and to demolish and rebuild a pool, at 16 Hillcrest Avenue Mona Vale (the 'site'). A Development Application is to be submitted to Northern Beaches Council for these works.

The site is located within a "Bluff/Cliff Instability" area designated on the *Coastal Risk Planning Map* (Sheet CHZ_018) 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)[1], 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 over the last few decades, including along Hillcrest Avenue. He has undertaken specific inspections of the site (on 12 January 2025) and the cliff face and rock platform seaward of the site (on 3 and 5 October 2024).

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

[1] The Pittwater 21 DCP up to Amendment No. 27, which came into effect on 18 January 2021, was considered herein.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 20 drawings of the proposed works prepared by Smith & Tzannes (Drawings A-001, 010 to 014, 020, 100 to 103, 200 to 203, 800, 850 and 851), all dated 13 December 2024 and Revision A. A site survey by Ramsay Surveyors was also provided, reference 9620 and dated 2 October 2024.

3. EXISTING SITE DESCRIPTION

The site is located at the northern end of Mona Vale Headland and immediately south and landward of Bungan Beach, with a property to the north and east at 18 Hillcrest Avenue being located adjacent to the cliff line (that is, the site is not directly adjacent to the cliff). An oblique aerial view of the site is provided in Figure 1, with a vertical aerial view of the site in Figure 2[2]. A section through the site (denoted as Section A) approximately perpendicular to the top of the cliff (and through the proposed pool) is also depicted in Figure 2. A view of the site from Bungan Beach is in Figure 3, and a view of the dwelling and pool at the site is provided in Figure 4.

Figure 1: Oblique aerial view of site (at arrow) on 22 July 2024, facing north

[2] Note that the site boundary depicted in Figure 2 is only approximate.

Figure 2: Aerial view of site (approximate red outline), with Section A in yellow and outline of proposed pool in blue (aerial photograph taken 22 September 2024)

Figure 3: View of site (at arrow) on 5 October 2024, facing SSW

Figure 4: View of seaward face of dwelling, and pool, at site (at arrow) on 12 January 2025, facing SW

Coffey & Partners (1987) noted that the cliff/bluff at the northern end of Mona Vale Headland had a stepped profile. This was noted to be primarily due to the rock type, bedding spacing and degree of weathering, with near vertical faces developed in sandstone layers, and slopes of about 45° in units composed predominantly of shale/siltstone.

Based on NSW Government Airborne Laser Scanning (ALS) data that was collected in 2020, elevations versus distance along Section A (from Figure 2) are depicted in Figure 5.

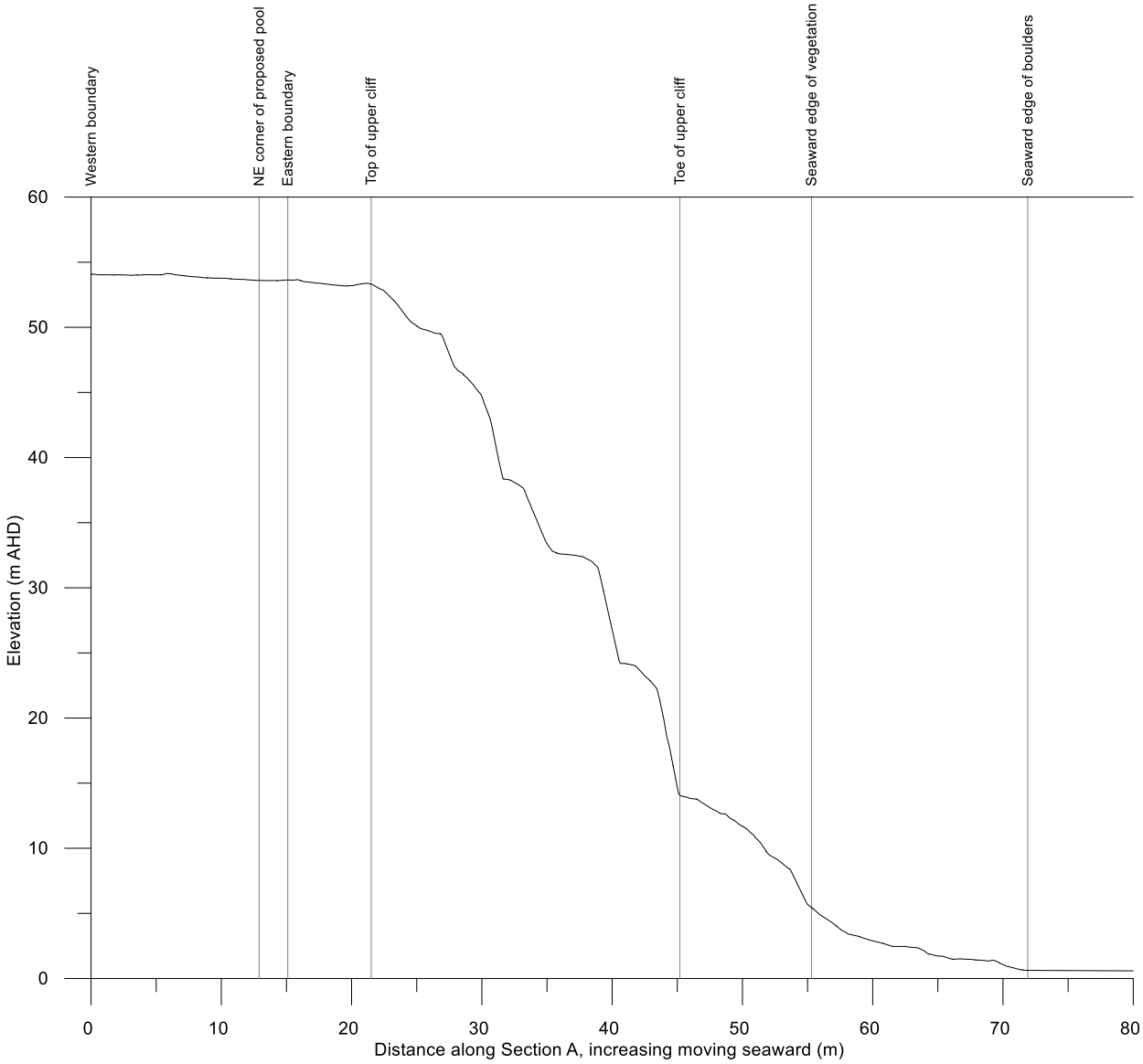


Figure 5: Section A through site, extending seaward through cliff face and rock platform

Ground elevations along Section A approximately vary from about 53m to 54m AHD in the northern part of the site, 53m AHD at the top of the upper cliff, 14.1m AHD at the toe of the upper cliff, 5m AHD at the seaward edge of vegetation, and 0.6m AHD at the seaward edge of the boulders on the rock platform. The existing dwelling has a finished ground floor level of 54.5m AHD. The average slope angle of the upper cliff from 53m AHD down to 14.1m AHD is 59°, but having a stepped profile with steeper (around 75°) and flatter sections.

4. PROPOSED DEVELOPMENT

It is proposed to undertake alterations and additions to a dwelling, and to demolish and rebuild a pool, at the site. An outline of the proposed new pool location is in Figure 2. The alterations and additions to the dwelling include moving the northern face of the dwelling about 1.2m north on the ground floor, demolishing a staircase on the northern side, and various internal changes.

The existing ground floor level of 54.5m AHD on the northern side is to be maintained in the proposed development, with the pool coping at a level of 53.5m AHD.

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 varies along the cliff profile. 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).

An apparent approximate 40m of cliff recession (observed in aerial photography as the distance of the cliff toe from the seaward edge of the rock platform at present) seaward of the site over the last 6,400 years (since sea levels stabilised around their present levels, and assuming that this toe was at the seaward edge of the rock platform at that time) represents an average recession rate of 6mm/year, consistent with the reported rates noted above. Note that

maximum rates of recession for Sydney Northern Beaches coastline sandstone cliffs of 12mm/year were determined by Crozier and Braybrooke (1992).

The exposed upper cliff above 14.1m AHD is above the intertidal zone (above about 1m AHD) and extreme 100 year Average Recurrence Interval (ARI) wave runup levels during coastal storms with large waves and elevated water levels. Wave runup could extend up to levels of about 8m AHD at present in a 100 year ARI storm, increasing to around 9m AHD in 100 years if projected sea level rise is realised. However, mechanical weathering of the upper cliff face can be caused by wind.

A recession/weathering rate of 6mm per year of the cliff face is considered to be appropriate, with sensitivity testing for a rate of 12mm/year as a conservative two multiple rate increase to account for sea level rise[3]. These rates are considered to be reasonable to apply over a design life of 100 years, including allowance for projected sea level rise as noted above.

Therefore, an allowance for recession/weathering of the cliff face of about 6mm to 12mm per year should be considered and assessed by the geotechnical engineer[4].

The geotechnical engineer should consider these estimated 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[5].

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 cliff face over the long term, with failure planes at the joints[6]. 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 development above 53m AHD, coastal inundation is not a significant risk to 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 will find that the proposed development is at an acceptably low risk of damage from coastal

[3] There are no established methods to estimate increased recession rates of cliff lines due to sea level rise, but a 2.0 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.
[4] Note that this does not mean that the cliff face is predicted to recede at a steady rate of 6mm to 12mm/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 10mm. However, averaging this slower weathering and block failures over the long term, an average rate of 6mm to 12mm/year (which can also be stated as 0.6m to 1.2m per 100 years) is expected.
[5] Coffey & Partners (1987) noted that the controlling feature of interbedded sandstone/siltstone cliffs was the bedding spacing and relative proportion of sandstone/siltstone.
[6] Overhangs are currently evident in the cliff face, as visible in Figure 3.

erosion/recession of the cliff at the site, and other processes, for a design life of at least 100 years[7]. 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)[8] 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,
(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 piped drainage to the street and a rainwater tank. The proposed works would not be a source of pollution as long as appropriate construction environmental controls are applied.

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. It is understood that no trees are to be removed as part of the proposed development.

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.

[7] 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.
[8] Formerly *State Environmental Planning Policy (Coastal Management) 2018*.

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. 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 26 November 2024. This resulted in no Aboriginal sites nor Aboriginal places being recorded or declared within at least 200m 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 200m of the site, as noted in Section 7.2.2.

With regard to (a)(v), the nearest environmental heritage item to the site listed in Schedule 5 of *Pittwater Local Environmental Plan 2014* is a house at 26 Grandview Parade Mona Vale. This heritage item is located at least 130m from the site. The proposed development would not be expected to impact on this 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 2.11 of SEPP Resilience in Section 7.2.2 and Section 7.2.3 respectively 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_018. 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 base of the cliff.

Items (c), (d) and (g) are for the geotechnical engineer to assess, with consideration of the findings herein. Assuming that 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) would be 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

There is no Foreshore Building Line or Foreshore Area at the site, so Clause 7.8 of LEP 2014 does not apply 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 6mm/year of the cliff seaward of 16 Hillcrest Avenue Mona Vale, with sensitivity testing up to 12mm/year, should be considered and assessed by the geotechnical engineer. The geotechnical engineer should consider these estimated rates in conjunction with an understanding of the particular nature of the cliff materials at the site, their resistance to erosion, and potential failure planes related to geotechnical issues such as the joint spacing. 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.

Coastal inundation is not a significant risk to 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

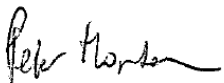
Public Works Department (1985), "Coastal Management Strategy, Warringah Shire, Report to Working Party", *PWD Report 85016*, June, prepared by AD Gordon, JG Hoffman and MT Kelly, for Warringah Shire Council

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
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 MSD Properties Pty Ltd
Name of Applicant
Address of site 16 Hillcrest Avenue Mona Vale

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 13 February 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 $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 16 Hillcrest Avenue Mona Vale
Report Date: 13 February 2025
:
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 ..... 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