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Councils Planning officer
Northern Beaches Council,
725 Pittwater Road
Dee Why

20th November 2023

APPROVED DEVELOPMENT APPLICATION ----DA no. 2023/1210 – Proposed alts
and adds at 33 John Street - Lot 11 DP251931

Dear Planning officer

Re: section 4.55 for approved DA2023/1210's Estuarine Risk Management Report.

The proposed modification to DA2023/1210 includes changes to four windows, all above the existing ground floor level, as well as no changes to the approved driveway crossover works on councils' land. These minor changes will not affect the Estuarine Risk Management or harm the ecological integrity of the adjacent coastal wetland/rainforest.

A Estuarine Risk Management Report was prepared by Horton Coastal Engineering Pty Ltd for the proposed development at 33 John Street, Avalon Beach in October 2023, which was submitted and approved by Northern Beaches council (DA 2023/1210). The proposed modifications to this DA remain relevant to the recommendations made within the report. It would be greatly appreciated that this be considered and that an amended Estuarine Risk Management Report not be required.

Yours Sincerely
Jitka Jankovec
(Director) JJDrafting Australia Pty Ltd.

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Ian Brooks
C/- JJ Drafting Australia Pty Ltd
Attention: Hannah Fisher
(sent by email only to hannah@jjdrafting.com.au)

24 October 2023

Estuarine Risk Management Report on 33 John Street Avalon Beach

1. INTRODUCTION AND BACKGROUND

It is proposed to undertake alterations and additions to a dwelling house at 33 John Street Avalon Beach, hereafter denoted as the 'site'. A Development Application (DA2023/1210) has been submitted to Northern Beaches Council for these works. As the site is potentially affected by estuarine hazards, it is subject to the *Pittwater 21 Development Control Plan* (DCP), in particular Chapter B3.7, and an estuarine risk management report is required for the DA¹. It is also subject to the *Estuarine Risk Management Policy for Development in Pittwater* (Estuarine Policy, which is Appendix 7 of the DCP). *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP Resilience) is also considered herein.

Horton Coastal Engineering Pty Ltd was engaged to complete the estuarine risk management report required by Council, as set out herein. The report author is Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER]. Peter has postgraduate qualifications in coastal engineering and 31 years of coastal engineering experience, and has completed numerous studies along the Pittwater shoreline, including at Avalon Beach. He is a Member of Engineers Australia and Chartered Professional Engineer (CPEng) registered on the National Engineering Register. Peter 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. He has inspected the area in the vicinity of the site on several occasions in the last few decades, including a specific recent inspection of the site on 15 September 2023.

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, and also within Pittwater.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 18 drawings of the proposed works prepared by JJ Drafting Australia Pty Ltd (a cover sheet and Drawing Nos DA.01 to DA.017), all dated 10 July 2023 and Revision C. A site survey by CMS Surveyors (Drawing 22416detail, dated 19 May 2023) was also provided.

¹ The DCP version up to Amendment 27 (effective from 18 January 2021) was considered herein. The site is actually not mapped as being affected by 'wave action and tidal inundation' on the Estuarine Hazard Map in the DCP, but Council requested that an estuarine risk management report be prepared.

3. EXISTING SITE DESCRIPTION

The site is located landward of the southern end of Careel Bay, with a broad aerial view depicted in Figure 1, zoomed aerial view in Figure 2, and oblique aerial view in Figure 3. The site is most exposed to a wind-wave fetch from the NNW, with a fetch length of about 4.7km, although the extensive mangrove tidal flats (extending about 300m offshore) and development (extending a further 60m) north of the site would limit the height of waves that could reach site. A photograph of the site is provided in Figure 4.



Figure 1: Broad aerial view of site (approximate red outline) on 30 August 2018



Figure 2: Zoomed aerial view of site (approximate red outline) on 30 August 2023



Figure 3: Oblique aerial view of site (at arrow) on 1 May 2023, facing north



Figure 4: View of site (at arrow) on 15 September 2023, facing NW

Based on the survey, ground elevations over the site vary from about 1.8m AHD in the NW corner, to about 2.1m AHD in the SE corner. The finished ground floor level is 2.13m AHD, with a garage floor level of 2.01m AHD.

Based on NSW Government LiDAR data captured in 2020, ground elevations are at around 1.7m AHD for about 100m NW of the site to the foreshore. Over the mangrove tidal flats north of the site, elevations are at around an average of 0.8m AHD for about 120m NW of the foreshore, reducing to about 0.5m AHD for the next 60m NW.

4. PROPOSED DEVELOPMENT

It is proposed to undertake alterations and additions to a dwelling house at the site, including extending the garage to the NE and SW, a first-floor extension above the garage, and a roof over a paved area on the SW side of the dwelling. The existing finished floor levels of the garage and ground floor are to remain the same at 2.01m and 2.13m AHD respectively.

5. DESIGN LIFE

In the Estuarine Policy, it is noted that a design project life of 100 years should be adopted, unless otherwise justified. A 60-year design life (that is, at 2083) has been adopted for the proposed development. This is the same design life as adopted in the *Coastal Zone Management Plan [CZMP] for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)* that was prepared by the author for Council and gazetted on 14 July 2017. Although this CZMP does not geographically apply at the site, it is the only gazetted CZMP in the former Pittwater Council area, and hence is relevant to consider in the selection of design life.

As justified in the CZMP, a 60 year life is considered to be conservative for infill residential development as it is consistent with or at the upper end of the design lives used in various Australian Standards (eg *AS 3600 – Concrete structures* and *AS 4678 – Earth-retaining structures*), tax legislation, and community expectations.

6. ESTUARINE PROCESSES

6.1 Design Still Water Level at End of Design Life

In Cardno (2015), the 100-year Average Recurrence Interval (ARI) present day water level in the region covering the site is reported as 1.52m AHD. This includes the effects of astronomical tide and storm surge (combined level of 1.44m AHD), plus local wind setup (0.08m). Wave action can temporarily and periodically increase water levels above this level, particularly in severe storms if they generate wind-waves that propagate towards the site. However, the wave height is likely to be limited near the site due to the extensive mangrove tidal flats and development to the north.

Cardno (2015) estimated a 2050 Estuarine Planning Level (EPL) of 2.59m AHD, and 3.07m AHD at 2100, at the foreshore, assuming a grassed or sandy slope with a crest level of 2.0m AHD. These EPL's include wave runup and overtopping effects and a freeboard of 0.3m², and do not include any reduction with distance landward of the foreshore.

At present at the site, Mean High Water is approximately 0.5m AHD and Mean High Water Springs is about 0.6m AHD. The combined astronomical tide and storm surge level for a

² Use of a freeboard is not necessarily considered to be appropriate in a wave runup scenario.

monthly and bi-annual event is about 1.0m and 1.2m AHD respectively. Corresponding water levels only increase slightly for rarer events, eg 1 year ARI level of 1.24m AHD, 10 year ARI level of 1.34m AHD and 50 year ARI water level of 1.41m AHD (Department of Environment, Climate Change and Water [DECCW] (2010).

In Cardno (2015), sea level rise values of 0.4m at 2050 and 0.9m at 2100 were applied relative to 2010 (based on DECCW, 2010), which is not correct as those values were derived relative to 1990, and historical sea level rise has not been discounted. Appropriate sea level rise values (relative to 2010) with discounting of historical sea level rise would be 0.34m at 2050 and 0.84m at 2100.

For the proposed design life of 60 years (at 2083), it would be possible to interpolate between the 2050 and 2100 sea level rise values noted above. However, given the non-linear rate of sea level rise and to allow for a probabilistic assessment, it is considered to be most appropriate to directly derive sea level rise values from Intergovernmental Panel on Climate Change [IPCC] (2021), which is widely accepted by competent scientific opinion.

Using the same methodology applied in the acceptable risk assessment in the *Coastal Zone Management Plan for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)*, and using a base year of 2010 as Cardno (2015) water levels were derived at 2010, the sea level rise values presented in Table 1 (at 2083) were determined for the five illustrative scenarios (shared socioeconomic pathways, SSP's³) considered in IPCC (2021)⁴.

This includes regional sea level rise variations at Sydney as reported by the Physical Oceanography Distributed Active Archive Center (PO.DAAC), a NASA Earth Observing System Data and Information System data centre operated by the Jet Propulsion Laboratory in Pasadena, California. The sea level rise values were determined at 2083, relative to the average sea level from a 1995-2014 baseline (taken to be at 2005).

Table 1: Sea level rise (m) at Sydney from a 1995-2014 average level (taken at 2005) to 2083 derived from IPCC (2021) and PO.DAAC

Emissions Scenario (Shared Socioeconomic Pathway)	Exceedance Probability		
	95% exceedance	Median	5% exceedance
SSP1-1.9	0.12	0.27	0.52
SSP1-2.6	0.16	0.32	0.60
SSP2-4.5	0.24	0.41	0.71
SSP3-7.0	0.30	0.49	0.81
SSP5-8.5	0.35	0.56	0.92
Average	0.23	0.41	0.71

Taking the median exceedance probability and average of the 5 SSP's, a sea level rise value of 0.41m at 2083 (relative to 2005) was derived. Given that Cardno (2015) water levels were derived at 2010, the sea level rise should be determined relative to 2010. Watson (2020) found that the rate of sea level rise from satellite altimetry in the SE Australia region was 3.5mm/year from 1992-2019. Applying this rate from 2005 to 2010, the projected sea level rise from 2010 to 2083 at Sydney is 0.39m.

³ Known as representative concentration pathways in the previous IPCC (2013) assessment.

⁴ The five illustrative scenarios represent varying projected greenhouse gas emissions, land use changes and air pollutant controls in the future.

Therefore, the design 100 year ARI estuarine still water level at 2083 is 1.91m AHD. This still water level is 0.1m below the garage floor level and 0.22m below the ground floor level of the dwelling.

6.2 Wave Action

Cardno (2015) estimated that the 100 year ARI wave climate in the region covering the site, seaward of the mangrove tidal flats, was a significant wave height of 0.69m (average of the highest one-third of waves) and mean wave period of 2.1s (or peak spectral wave period of 2.9s assuming a 1.4 multiplier).

In the design event, wave heights would be attenuated as waves propagate through the mangrove tidal flats, and any remaining waves would break at and potentially overtop the foreshore about 100m NW of the site. It would be expected that any (unlikely) overtopping waves would not reach the site over this 100m distance in the design event, noting that in the methodology outlined in Cardno (2015), wave action is assumed to attenuate to zero within 40m of the foreshore.

To account for 0.3m of turbulence on the water surface at the time of the design event, and the potential for passing cars and the like to generate small waves that propagate into the dwelling and potentially leak under door and other openings, it is considered reasonable to adopt an Estuarine Planning Level (EPL) of 2.21m AHD over the development area. This EPL is 0.2m above the garage floor level and 0.08m above the dwelling ground floor level.

It is not considered necessary to add a freeboard. As defined in the Floodplain Development Manual (NSW Government, 2005), freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels, such as wave action, localised hydraulic behaviour, and other effects such as climate change. Understanding the purpose of freeboard, it is evident that the estimates of still water levels and the EPL given herein generally take account of the components that (by definition) comprise freeboard. It can also be noted that design water levels do not increase significantly for much rarer events. For example, the 10,000 year ARI estuarine still water level⁵ at 2083 is 2.11m AHD, only 0.2m above the 100 year ARI level.

7. RAINFALL-RUNOFF RELATED FLOODING

In a report by NB Consulting Engineers (2023), a Flood Planning Level (FPL) of 2.44m AHD has been adopted at the site. As this is higher than the EPL, the recommendations of NB Consulting Engineers (2023) generally cover off the estuarine risk requirements.

8. RISKS OF DAMAGE TO PROPOSED STRUCTURES AND MITIGATION OF THOSE RISKS

NB Consulting Engineers (2023) advised that the proposed development shall be designed and constructed to ensure structural integrity up to the FPL. They also advised on measures to reduce the risk of damage to existing timber floors, double brick walls and non-structural components. If this advice is adopted, the risks of damage to the proposed development from estuarine inundation would be suitably mitigated, and it would have an adequately low risk of failure.

⁵ Derived by extrapolating the water levels (linear-log) provided in DECCW (2010).

NB Consulting Engineers (2023) advised that the switchboard and main circuit unit must be fitted above the FPL; all new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the FPL; and conduits must be laid such that they are free draining. They also advised that all existing electrical equipment and power points located below the FPL must have residual current devices installed that turn off all supply of electricity to the site when flood waters are detected. These cover of the estuarine risk requirements in relation to these matters.

Any potentially polluting items should be stored above the EPL, and no items should be stored below the EPL that could float away or be damaged by inundation.

9. MERIT ASSESSMENT

9.1 Chapter B3.7 of the Pittwater 21 DCP

Based on the DCP (numbering added herein for convenience):

1. All development or activities must be designed and constructed such that they will not increase the level of risk from estuarine processes for any people, assets or infrastructure in surrounding properties; they will not adversely affect estuarine processes; they will not be adversely affected by estuarine processes; and
2. All structural elements below the Estuarine Planning Level shall be constructed from flood compatible materials; and
3. All structures must be designed and constructed so that they will have a low risk of damage and instability due to wave action and tidal inundation; and
4. All electrical equipment, wiring, fuel lines or any other service pipes and connections must be waterproofed to the Estuarine Planning Level; and
5. The storage of toxic or potentially polluting goods, materials or other products, which may be hazardous or pollute the waterway, is not permitted to be stored below the Estuarine Planning Level; and
6. For existing structures, a tolerance of up to minus 100mm may be applied to the Estuarine Planning Level in respect of compliance with these controls.
7. To ensure Council's recommended flood evacuation strategy of 'shelter in place' it will need to be demonstrated that there is safe pedestrian access to a 'safe haven' above the Estuarine Planning Level.

With regard to Item 1, the proposed development would not significantly change estuarine processes nor increase the level of risk in surrounding areas for the design event, as the movement of water and waves over the area seaward of the site would not be significantly altered. If the requirements in NB Consulting Engineers (2023) and Section 8 are followed, the risk of the proposed development being adversely affected by estuarine processes would be suitably mitigated. That is, the development is at an acceptably low risk of being adversely affected by estuarine processes with the measures outlined in NB Consulting Engineers (2023) and Section 8 adopted. Therefore, Item 1 is satisfied.

Item 2 is satisfied with the measures outlined in NB Consulting Engineers (2023) and Section 8 adopted.

Item 3 is satisfied with the measures outlined in NB Consulting Engineers (2023) adopted.

Items 4 and 5 were noted as being required in Section 8.

Application of Item 6 herein allows the existing ground floor level of 2.13m AHD to be above the EPL less 100mm, which is equal to 2.11m AHD, satisfying the DCP requirement.

With regard to Item 7, occupants are not at significant risk of injury at the site for the design coastal storm event, and can shelter-in-place in the dwelling without any need for evacuation. It is further noted that the largest component of elevated water level is astronomical tide, which is entirely predictable and independent of the storm event, so early warning is available. The inundation peak would also only have a duration of around 2 hours (at high tide). NB Consulting Engineers (2023) has also specified that a first-floor flood refuge be provided in the development.

With regard to another item in Chapter B3.7 of the DCP, no mitigation works are proposed that would significantly modify the wave action or tidal inundation behaviour within the development site (including the filling of land, the construction of retaining structures and the construction of wave protection walls).

9.2 Estuarine Risk Management Policy for Development in Pittwater

The requirements of the *Estuarine Risk Management Policy for Development in Pittwater* (Estuarine Policy) have been met herein by consideration of:

- estuarine processes and the Estuarine Planning Level in Section 6; and
- the controls in Chapter B3.7 of the Pittwater 21 DCP in Section 9.1.

Furthermore, although the current Estuarine Policy does not have a form that is required to be filled in, Council has in the past requested that a form provided in a former Estuarine Policy be completed, as provided at the end of the document herein.

10. STATE ENVIRONMENTAL PLANNING POLICY (RESILIENCE AND HAZARDS) 2021

10.1.1 Preamble

Based on *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP Resilience) and its associated mapping, the site is within a “proximity to Coastal Wetlands” area (see Section 10.1.2), “coastal environment area” (see Section 10.1.3) and a “coastal use area” (see Section 10.1.4).

10.1.2 Clause 2.8

Based on Clause 2.8(1) of SEPP Resilience, “development consent must not be granted to development on land identified as ‘proximity area for coastal wetlands’...unless the consent authority is satisfied that the proposed development will not significantly impact on:

- (a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or
- (b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest”.

The proposed development is in an already developed area. It would not significantly affect existing stormwater drainage arrangements, with new downpipes connected into existing stormwater lines, so would not be expected to impact on biophysical or hydrological matters.

This is not a coastal engineering matter, but there is no obvious reason why the proposed development would impact on ecological integrity matters or be a source of pollution, as long as appropriate construction environmental controls are applied.

10.1.3 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”.

With regard to (a), see Item (a) in Section 10.1.2.

With regard to (b), the proposed works would not be expected to adversely affect estuarine processes in Pittwater, which is located in the order of 100m away.

With regard to (c), the proposed works would not adversely impact on water quality as long as appropriate construction environmental controls are applied.

With regard to (d), this is not a coastal engineering matter so is not definitively considered herein. That stated, there are no undeveloped headlands or rock platforms in proximity to the proposed development, and no marine vegetation in the area to be developed. It can be assumed that there is no native vegetation and fauna and their habitats of significance at the site, and it can be noted that there are proposed to be no changes to the existing vegetation on site.

With regard to (e), the proposed works would not impact on public open space and access to and along the foreshore, being entirely within private property and about 100m from the foreshore.

With regard to (f), a search of the Heritage NSW “Aboriginal Heritage Information Management System” (AHIMS) was undertaken on 23 October 2023. This resulted in no Aboriginal sites nor Aboriginal places being recorded or declared within at least 200m of the site.

With regard to (g), there is no significant or practical surf zone offshore of the site, so this is not applicable. That stated, the proposed works would not be expected to alter wave and water level processes seaward of the site.

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 the adverse impacts referred to in Clause 2.10(1).

10.1.4 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 (a)(i), the proposed works would not impact on foreshore access, as discussed previously.

With regard to (a)(ii), (a)(iii), and (c), these are not coastal engineering matters so are not considered herein.

With regard to (a)(iv), as noted in Section 10.1.3, there are no particular Aboriginal sites recorded nor Aboriginal Places declared within at least 200m of the site.

With regard to (a)(v), there are no environmental heritage items from Schedule 5 of *Pittwater Local Environmental Plan 2014* within about 1km of the site, and these and more distant items would not be expected to be impacted by the proposed development.

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).

10.1.5 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”.

As discussed in Section 9.1, the proposed development is unlikely to have a significant impact on estuarine (coastal) hazards nor increase the risk of estuarine (coastal) hazards in relation to any other land.

10.1.6 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.

11. CONCLUSIONS

It is proposed to undertake alterations and additions to a dwelling house at 33 John Street Avalon Beach. For a design life of 60 years, the adopted Estuarine Planning Level (EPL) is 2.21m AHD. This EPL is 0.2m above the garage floor level and 0.08m above the dwelling ground floor level. The existing ground floor level of 2.13m AHD is above the EPL less 100mm, which complies with Chapter B3.7 of the Pittwater 21 DCP.

In NB Consulting Engineers (2023), a Flood Planning Level (FPL) of 2.44m AHD has been adopted at the site. As this is higher than the EPL, the recommendations of NB Consulting Engineers (2023) generally cover off the estuarine risk requirements.

If the requirements in NB Consulting Engineers (2023) and Section 8 are followed, the risk of the proposed development being adversely affected by estuarine processes would be suitably mitigated. The proposed development satisfies the requirements of Chapter B3.7 of the Pittwater 21 DCP, the *Estuarine Risk Management Policy for Development in Pittwater*, and *State Environmental Planning Policy (Resilience and Hazards) 2021* for the matters outlined herein.

12. REFERENCES

Cardno (2015), *Pittwater Estuary Mapping of Sea Level Rise Impacts*, LJ2882/R2658v7, Revised Draft, for Pittwater Council, February

Department of Environment, Climate Change and Water [DECCW] (2010), *Coastal Risk Management Guide: Incorporating sea level rise benchmarks in coastal risk assessments*, DECCW 2010/760, August, ISBN 978 1 74232 922 2

Intergovernmental Panel on Climate Change [IPCC] (2013), *Climate Change 2013, The Physical Science Basis, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, [Stocker, TF; Qin, D; Plattner, G-K; Tignor, M;

Allen, SK; Boschung, J; Nauels, A; Xia, Y; Bex, V and PM Midgley (editors)], Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA

Intergovernmental Panel on Climate Change [IPCC] (2021), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, [V Masson-Delmotte, P Zhai, A Pirani, SL Connors, C Péan, S Berger, N Caud, Y Chen, L Goldfarb, MI Gomis, M Huang, K Leitzell, E Lonnoy, JBR Matthews, TK Maycock, T Waterfield, O Yelekçi, R Yu and B Zhou (editors)], Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA

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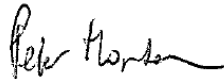
Watson, Phil J (2020), "Updated Mean Sea-Level Analysis: Australia", *Journal of Coastal Research*, Volume 36, Issue 5, September, pp. 915-931

13. 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

This report has been prepared by Horton Coastal Engineering Pty Ltd on behalf of and for the exclusive use of Ian Brooks (the client), and is subject to and issued in accordance with an agreement between the client and Horton Coastal Engineering Pty Ltd. Horton Coastal Engineering Pty Ltd accepts no liability or responsibility whatsoever for the report in respect of any use of or reliance upon it by any third party. Copying this report without the permission of the client or Horton Coastal Engineering Pty Ltd is not permitted.

Estuarine Risk Management Policy for Pittwater Form No. 1 is provided overleaf

FORM NO. 1

To be submitted with Estuarine Risk Management Report

Development Application for JJ Drafting

Name of Applicant

Address of site 33 John Street Avalon Beach

Declaration made by a Coastal Engineer as part of an Estuarine Risk Management Report

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

on this the 24th October 2023 (date)

certify that I am a Coastal Engineer as defined by the Estuarine Risk Management Policy for Development in Pittwater 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 \$2 million.

Please mark appropriate box

- ☒ I have prepared the detailed Estuarine Risk Management Report referenced below in accordance with the Estuarine Risk Management Policy for Development in Pittwater
- ☐ I am willing to technically verify that the detailed Estuarine Risk Management Report referenced below has been prepared in accordance with the Estuarine Risk Management Policy for Development in Pittwater
- ☐ I have examined the site and the proposed development/alteration in detail and, as detailed in my report, am of the opinion that the Development Application only involves Minor Development/Alterations or is sited such that a detailed Estuarine Risk Management Report is not required.

Estuarine Risk Management Report Details:

Report Title:

Estuarine Risk Management Report on 33 John Street Avalon Beach

Report Date:

24 October 2023

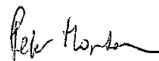
Author: Horton Coastal Engineering Pty Ltd

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

See Section 2 and Section 12 of report

I am aware that the above Estuarine Risk Management Report, prepared for the above mentioned site is to be submitted in support of a Development Application for this site and will be relied on by Northern Beaches Council as the basis for ensuring that the estuarine 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 all reasonable and practical measures have been identified to remove foreseeable risk.

Signature



Name

Peter Horton

Chartered Professional Status

MIEAust CPEng

Membership No.

452980