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Estuarine Risk Management Report on 214 Hudson Parade Clareville

1. INTRODUCTION AND BACKGROUND

It is proposed to demolish and rebuild a boatshed, and construct a new ramp and tidal landing over an existing slipway, at 214 Hudson Parade Clareville. A Development Application (DA) is to be submitted to Northern Beaches Council for these works. As the property is potentially affected by estuarine hazards, it is subject to the *Pittwater 21 Development Control Plan (DCP)*¹, in particular Chapter B3.9, as well as Chapter D15.15 as a boatshed is proposed. It is also subject to the *Estuarine Risk Management Policy for Development in Pittwater (Estuarine Policy)*, which is Appendix 7 of Part D of the DCP. *State Environmental Planning Policy (Resilience and Hazards) 2021 (SEPP Resilience)* should also be considered.

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 30 years of coastal engineering experience, including numerous studies along the Pittwater shoreline and particularly at Clareville. 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 subject property on several occasions in the last two decades or so, including a specific recent inspection of the property on 8 September 2022.

Note that all levels given herein are to Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level at present.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with an architectural drawing of the proposed works prepared by Utz Sanby (Drawing No. DA-01, provided on 28 November 2022). A site survey by CMS Surveyors (Drawing 20064detail, Issue 2 and dated 16 April 2021) was also provided.

¹ The version up to Amendment 27 (effective from 18 January 2021) was considered herein.

3. EXISTING SITE DESCRIPTION

The subject property is located at the SW corner of Taylors Point adjacent to the Pittwater waterway, with a broad aerial view depicted in Figure 1, zoomed aerial view in Figure 2, and oblique aerial view in Figure 3. A photograph of the property is provided in Figure 4.



Figure 1: Aerial view of subject property (red outline) on 30 August 2018



Figure 2: Zoomed aerial view of subject property (approximate red outline) on 5 April 2022



Figure 3: Oblique aerial view of subject property (at arrow) on 25 January 2021, facing NE



Figure 4: View of foreshore at subject property (between arrows) on 8 September 2022, facing NNE

The property is most exposed to wind-wave fetches from the NW (towards Morning Bay, although oblique) and SW (towards Location A in Figure 1), with fetch lengths of about 2.3km.

Based on the survey, the sandstone (east) and concrete block (west) seawalls at the property have a crest level of about 1.4m to 1.5m AHD, with levels at the base of the seawalls at the time of the survey at about 0m AHD (east) and -0.1m to -0.5m AHD (west), making the visible part of the seawalls about 1.5m to 2m high.

The existing concrete block boatshed has a sloping concrete floor over its seaward portion that extends as a ramp seaward of the boatshed. The base of the ramp has a level of about 0.6m AHD, increasing to 1.1m AHD at the seaward face of the boatshed and 1.5m AHD midway into the boatshed. Based on review of aerial photography, slipway rails extend about 20m seaward of the concrete ramp.

Ground levels increase moving landward in the property, to about 19m AHD at Hudson Parade.

4. PROPOSED DEVELOPMENT

It is proposed to demolish and rebuild the boatshed at the subject property over its existing footprint, and to construct a new ramp and stepped tidal landing over part of the existing slipway located seaward of the boatshed (over a distance extending about 7.3m offshore of the seawall). A total of 4 piles will be required to support the ramp and landing. It is expected that the piles will be timber, with the ramp and landing constructed from FRP (fibre-reinforced plastic) grating.

The boatshed is to have a finished floor level of 1.75m AHD, with a pergola supported on two posts extending seaward of the boatshed. No changes to the existing seawall are proposed, but it is proposed to construct decking over the existing concrete apron landward of the seawall.

The seaward (southern) face of the boatshed is to comprise glass louvres and a garage-style fold-up two-panel door with glass inserts. The eastern face of the boatshed is to be mostly glass, with the western face solid. A storage loft is proposed at the top of the boatshed.

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 subject property, 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 appropriate for infill residential development as it is consistent with the design life used in various Australian Standards (eg *AS 3600 – Concrete structures*), tax legislation, and community expectations. It is a conservative design life to adopt for a boatshed, ramp and tidal landing².

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 subject property 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 property.

Cardno (2015) estimated a 2050 Estuarine Planning Level (EPL) of 2.78m AHD, and 3.28m AHD at 2100, at the foreshore, assuming that the seawall has a crest level of 1.5m AHD³. These EPL's include wave runup and overtopping effects and a freeboard of 0.3m⁴, and do not include any reduction with distance landward of the foreshore.

At present at the subject property, 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 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).

² A 25 year design life would typically be adopted for a boatshed, ramp and tidal landing. This is consistent with *Australian Standard AS 4997 - Guidelines for the Design of Maritime Structures*, in which the recommended design life for a small craft facility is 25 years.

³ The subject property is actually at the transition between two calculation locations in Cardno (2015). The results reported herein are for the more conservative Taylors Point (Location 9 in Cardno [2015]), but could have also been reported for Refuge Bay (Location 10). Equivalent EPL's at Location 10 were 2.63m and 3.13m AHD at 2050 and 2100 respectively.

⁴ Use of a freeboard is not necessarily considered to be appropriate in a wave runup scenario.

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 benchmarks 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 benchmarks. However, given the non-linear rate of sea level rise, 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)* prepared by the author for Council in 2017, 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's⁵) considered in IPCC (2021)⁶.

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: Mean 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.

Therefore, the design 100 year ARI estuarine still water level at 2083 is 1.91m AHD. This still water level is about 0.4m above the seawall crest, and 0.16m above the boatshed floor.

⁵ Known as representative concentration pathways in the previous IPCC (2013) assessment.

⁶ The five illustrative scenarios represent varying projected greenhouse gas emissions, land use changes and air pollutant controls in the future.

6.2 Wave Action

Cardno (2015) estimated that the 100 year ARI wave climate in the region covering the subject property was a significant wave height of 1.12m (average of the highest one-third of waves) and mean wave period of 2.6s (or peak spectral wave period of 3.6s assuming a 1.4 multiplier).

In the design event, waves would break at and overtop the crest of the seawall, or runup and break on the ramp, propagating landward. The waves would run into the face (and partially the sides) of the boatshed.

Using the methodology outlined in Cardno (2015) with the adopted still water level of 1.91m AHD, the design wave runup level is 2.47m AHD at the foreshore. However, it is considered that due to wave non-linearity, wave reflection, and the proximity of the boatshed to the foreshore, it is reasonable to adopt an Estuarine Planning Level (EPL) of 3.03m AHD (taken as the design still water level plus the wave height⁷) at the foreshore and in the boatshed.

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

7.1 Boatshed and Decking

The main risks of damage to the boatshed from estuarine processes for the design event would be from wave runup:

- damaging or removing the glass louvres and/or two-panel door on its southern face;
- damaging the concrete walls (which may cause structural damage to other portions of the boatshed);
- damaging the timber floor due to wave uplift forces; and/or
- inundating the lower portion of the boatshed, and then causing damage to boatshed components and/or causing damage to items within the boatshed.

The boatshed concrete structure should be structurally designed to resist hydrostatic and wave forces up to the EPL of 3.03m AHD. These forces should be provided by a coastal engineer as part of detailed design⁸.

The boatshed structure should comprise materials that are tolerant of inundation up to the EPL.

Inundation (a floor level below the EPL) may be accepted for the boatshed, as long as the following requirements are adopted:

- an edging such as a concrete upturn, with weepholes as required to allow inundation drainage in a seaward (southern) direction, resistant to hydrostatic and wave forces as

⁷ The full quantum of the wave height is unlikely to overtop the seawall, but there will be runup on the internal faces of the boatshed if the glass on the seaward face of the boatshed breaks, that would increase the elevation that wave action reaches.

⁸ There is not the expectation that it would be feasible or practical to design the glass or door on the southern face of the boatshed to completely resist wave forces. To reduce wave forces on the door, there could be consideration of having gaps in the door face. If the glass cannot be designed to resist wave forces, it is recommended that the glass items on the boatshed are constructed from toughened/laminated glass with appropriate fracture characteristics that present a low hazard when fractured, or (preferably) such that it holds together when shattered.

provided by a coastal engineer, is constructed to reduce the risk of wave action extending under the timber floor of the boatshed and popping it out upwards due to wave uplift forces (this same requirement should also apply to the timber decking over the seawall apron);

- only boating equipment or items that can withstand periodic inundation should be placed within the boatshed below the EPL of 3.03m AHD;
- all electrical equipment, wiring, and any other service pipes and connections should be placed above the EPL of 3.03m AHD, or able to withstand inundation if below the EPL; and
- potentially polluting or toxic materials should be stored above the EPL of 3.03m AHD.

The timber used in the boatshed and decking should be suitable for the marine environment. Examples of suitable species (NSW Maritime, 2005) include the following:

- headstocks, wales, capwales, girders, joists and braces: grey ironbark, grey gum, white mahogany, tallowwood, grey box, yellow stringybark, white stringybark, woollybutt, forest red gum, mountain grey gum and turpentine;
- decking: brushbox, blackbutt, grey gum, white mahogany, tallowwood, grey box, yellow stringybark, white stringybark, woollybutt, forest red gum and mountain grey gum;
- kerbs: as for decking but with brushbox excluded; and
- handrails: tallowwood, white mahogany and grey box.

Timber of Class 1 or 2 natural durability should be used for all timber structures as per *Australian Standard AS4997 - Guidelines for the Design of Maritime Structures*. Timber structures should generally be designed in accordance with the requirements of *Australian Standard AS1720.1 - Timber Structures*.

7.2 Pergola

The pergola supports should be structurally designed to resist hydrostatic and wave forces up to the EPL of 3.03m AHD. These forces should be provided by a coastal engineer as part of detailed design.

The timber requirements provided in Section 7.1 should also be considered.

7.3 Ramp and Tidal Landing

NSW Maritime (2005) recommended that turpentine was used for timber piles. The piles and solid components in the ramp and tidal landing should be structurally designed to resist hydrostatic and wave forces up to the EPL of 3.03m AHD, along with allowing for reduced forces on the FRP items due to their open mesh. These forces should be provided by a coastal engineer as part of detailed design.

In a geotechnical report by Douglas Partners to be submitted with the DA, they recommended that the new piled foundations be taken down to and socketed or dowelled into the underlying, in situ bedrock, which is likely to be at a level of around -0.75m AHD to -1.6m AHD close to the seawall face seaward of the boatshed (getting lower moving east).

7.4 Other Items

Any other items along the foreshore not specifically mentioned above should be designed to withstand inundation below the EPL of 3.03m AHD.

7.5 Overall Statement

If the requirements within this Section 7 are followed, 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.

8. MERIT ASSESSMENT

8.1 Chapter B3.9 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 and landward of the seawall would not be significantly altered. The boatshed and decking are landward of a seawall that is not to be altered. The open mesh of the ramp and tidal landing would generally allow wave action to flow through the structure, rather than reflect.

If the recommendations in Section 7 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 Section 7 adopted. Therefore, Item 1 is satisfied.

Item 2 is satisfied with the measures outlined in Section 7 adopted.

As noted in Section 7, the proposed development should be structurally designed to resist hydrostatic and wave forces up to the EPL of 3.03m AHD, and these forces should be provided by a coastal engineer as part of detailed design. If so, Item 3 would be satisfied.

Items 4 and 5 were noted as being required in Section 7.

Item 6 has not been applied.

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).

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).

8.2 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 B3.9 of the Pittwater 21 DCP in Section 8.1.

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 filled in, as provided at the end of the document herein.

8.3 Chapter D15.15 of the Pittwater 21 DCP

Based on Chapter D15.15 of the DCP, “boatsheds shall meet the following criteria:

- i) Boatsheds shall be located above mean high water mark on freehold land, where practicable. Where this cannot realistically be achieved, as much of the proposed boatshed as is practical must be located above mean high water mark to minimise encroachment onto the littoral zone below mean high water mark.
- ii) Boatsheds shall be one storey and no greater than 4.5 metres in building height above the platform on which it is built, 4.0 metres in width and 6.0 metres in length, as illustrated in Diagram 4. The use of lofts or similar design concepts shall not be permitted.
- iii) Boatsheds shall not prevent or hinder public foreshore access. Alternative access must be provided where a proposed boatshed is likely to make existing foreshore access below mean high water mark difficult.
- iv) Boatsheds cannot be used for any other purpose than the storage of small boats and/or boating equipment. The incorporation [sic] any internal kitchen facilities, habitable rooms, shower or toilet facilities shall not be permitted. Roof areas of boatsheds shall not be used for recreational or observational purposes.
- v) Boatsheds shall be constructed of low maintenance materials that are of a tone and colour which is sympathetic to the surrounding setting. Structures proposed along the western foreshores, McCarrs Creek, Horseshoe Cove, Salt Pan Cove, Refuge Cove, Clareville and Careel Bay are to have specific regard for the natural landscaped character of the area. Reflective materials and finishes for private boatsheds shall not be permitted.
- vi) The minimum floor level for proposed boatsheds shall be in accordance controls for foreshore development around the Pittwater Waterway.

- vii) Boatsheds shall be able to be entirely enclosed. Boatsheds which either partially or wholly do not incorporate appropriate wall cladding shall not be permitted, as such structures tend to become visually obtrusive when viewed from the waterway.
- viii) All electrical equipment and wiring shall be water tight below the designed flood/tidal inundation level”.

With regard to (i), the boatshed extends seaward of the mean high water mark (as per DP13760) and thus extends seaward of freehold land, but is replacing an existing use. The actual mean high water mark (ie, at a level of 0.55m AHD) permanently follows the alignment of the seawall, so is actually seaward of the boatshed from a physical water level perspective.

With regard to (ii), this is not a coastal engineering matter so is not discussed herein, except it can be noted that the proposed boatshed has the same footprint as the existing boatshed, and the loft area has no impact on estuarine processes and provides storage above the EPL.

With regard to (iii), the proposed boatshed, ramp and tidal landing would not alter public foreshore access compared to the existing situation, with a myriad of existing jetties along this section of foreshore essentially preventing alongshore foreshore access.

With regard to (iv), this was noted in Section 7.1.

With regard to (v), this is not a coastal engineering matter so is not considered further herein.

With regard to (vi), a floor level below the EPL is permissible based on Chapter B3.9 of the DCP, namely “consideration may be given on a merit basis to a floor level of a boat shed at a level lower than the Estuarine Planning Level where it can be demonstrated through an Estuarine Risk Management Report that the boat shed is structurally designed to withstand periodic wave action and tidal inundation up to the Estuarine Planning Level”. As noted in Section 7.1, the boatshed should be structurally designed to resist hydrostatic and wave forces up to the EPL of 3.03m AHD, and these forces should be provided by a coastal engineer as part of detailed design.

With regard to (vii), it is understood that the boatshed is to be completely enclosed.

With regard to (viii), this requirement was noted in Section 7.1.

8.4 Clause 7.8 of Pittwater Local Environmental Plan 2014

8.4.1 Preamble

The proposed development is located in the Foreshore Area as it is located south of the Foreshore Building Line, so Clause 7.8 of *Pittwater Local Environmental Plan 2014* (LEP 2014) should be considered.

8.4.2 Clause 7.8(1)

In Clause 7.8(1) of LEP 2014, it is stated that the “objectives of this clause are as follows:

- (a) to ensure that development in the foreshore area will not impact on natural foreshore processes or affect the significance and amenity of the area,
- (b) to ensure continuous public access along the foreshore area and to the waterway”.

The proposed development does not alter (non-existent) alongshore public access compared to the existing situation. The boatshed and decking are landward of a seawall that is not to be altered, and the ramp and tidal landing would generally allow wave action to flow through the structure rather than reflect, so the proposed works would not significantly impact on physical natural foreshore processes.

A report to be submitted with the DA by Marine Pollution Research Pty Ltd has considered potential impacts of the works on aquatic ecology, and concluded that the project can be constructed and used with no measurable alteration of residual risk for the protection of marine fish habitats of Pittwater and can meet the aims of aquatic ecological conservation of the *Fisheries Management Act 1994* and of Pittwater 21 DCP.

A report to be submitted with the DA by Total Earth Care concluded that the proposed works had a low risk of adversely impacting the “coastal environment area” as per SEPP Resilience.

8.4.3 Clause 7.8(2)

Based on Clause 7.8(2) of LEP 2014, “development consent must not be granted for development on land in the foreshore area except for the following purposes:

- (a) the extension, alteration or rebuilding of an existing building wholly or partly in the foreshore area, if the levels, depth or other exceptional features of the site make it appropriate to do so,
- (b) boat sheds, sea retaining walls, wharves, slipways, jetties, waterway access stairs, swimming pools, fences, cycleways, walking trails, picnic facilities or other recreation facilities (outdoors)”.

It is evident that boatsheds are permissible within the Foreshore Area. If wharves, slipways, jetties and waterway access stairs are permissible, there would be the expectation that ramps and tidal landings would also be permissible, noting that the proposed ramp and landing enables access to the foreshore and would not impact on estuarine processes, and are acceptable from a coastal engineering perspective.

8.4.4 Clause 7.8(3)

Based on Clause 7.8(3) of LEP 2014, “development consent must not be granted under this clause unless the consent authority is satisfied that:

- (a) the development will contribute to achieving the objectives for the zone in which the land is located, and
- (b) the appearance of any proposed structure, from both the waterway and adjacent foreshore areas, will be compatible with the surrounding area, and
- (c) the development will not cause environmental harm such as:
 - i) pollution or siltation of the waterway, or
 - ii) an adverse effect on surrounding uses, marine habitat, wetland areas, fauna and flora habitats, or
 - iii) an adverse effect on drainage patterns, or
 - iv) the removal or disturbance of remnant riparian vegetation, and
- (d) the development will not cause congestion or generate conflict between people using open space areas or the waterway, and
- (e) opportunities to provide continuous public access along the foreshore and to the waterway will not be compromised, and

- (f) any historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land on which the development is to be carried out and of surrounding land will be maintained, and
- (g) in the case of development for the alteration or rebuilding of an existing building wholly or partly in the foreshore area, the alteration or rebuilding will not have an adverse impact on the amenity or aesthetic appearance of the foreshore, and
- (h) sea level rise, coastal erosion and recession, or change of flooding patterns as a result of climate change, have been considered”.

For Item (a), the subject property is zoned as C4 Environmental Living, for which the objectives in *Pittwater Local Environmental Plan 2014* are as follows:

- to provide for low-impact residential development in areas with special ecological, scientific or aesthetic values;
- to ensure that residential development does not have an adverse effect on those values;
- to provide for residential development of a low density and scale integrated with the landform and landscape; and
- to encourage development that retains and enhances riparian and foreshore vegetation and wildlife corridors.

The proposed development does not impact on any of these objectives from a coastal engineering perspective.

Items (b), (f) and (g) are not coastal engineering matters so are not considered herein.

For Item (c), the proposed development would not cause any significant pollution or siltation of the waterway and would not adversely impact on adjacent areas, if appropriate construction environmental controls are applied, as discussed in the Marine Pollution Research report to be submitted with the DA. Also, no remnant riparian vegetation is to be removed as part of the proposed works. Therefore, this item is satisfied.

For Item (d), the proposed works would not affect public use of the foreshore and would not cause any conflict with waterway uses, as they are well within the offshore extent of existing foreshore structures.

For Item (e), the proposed works would not affect public access along the foreshore area, as discussed previously.

For Item (h), sea level rise was considered in Section 6.

8.4.5 Clause 7.8(4)

Based on Clause 7.8(4) of LEP 2014, “in deciding whether to grant consent for development in the foreshore area, the consent authority must consider whether and to what extent the development would encourage the following:

- (a) continuous public access to and along the foreshore through or adjacent to the proposed development,
- (b) public access to link with existing or proposed open space,
- (c) public access to be secured by appropriate covenants, agreements or other instruments registered on the title to land,
- (d) public access to be located above mean high water mark,

- (e) the reinforcing of the foreshore character and respect for existing environmental conditions”.

As stated above, the proposed works would not affect public access along the foreshore.

8.5 State Environmental Planning Policy (Resilience and Hazards) 2021

8.5.1 Preamble

Based on *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP Resilience) and its associated mapping, the subject property is within a “coastal environment area” (see Section 8.5.2) and a “coastal use area” (see Section 8.5.3).

8.5.2 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”.

With regard to (a), the proposed works are in a developed residential area. The works would not be expected to adversely affect the biophysical, hydrological (surface and groundwater) and ecological environments, as discussed in a report submitted with the DA by Total Earth Care. Existing stormwater drainage arrangements are not to be significantly altered as part of the proposed works. The proposed works would not be a source of pollution as long as appropriate construction environmental controls are applied, as discussed in the Marine Pollution Research report to be submitted with the DA.

With regard to (b), the proposed works would not be expected to adversely affect estuarine processes in Pittwater.

With regard to (c), the proposed works would not adversely impact on water quality as long as appropriate construction environmental controls are applied as discussed in the Marine Pollution Research report to be submitted with the DA.

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 impacts on marine vegetation have been found to be acceptable in reports by Marine Pollution Research and Total Earth Care to be submitted with the DA.

With regard to (e), the proposed works would not impact on public open space and access to and along the foreshore, as discussed previously.

With regard to (f), a basic search of the Heritage NSW “Aboriginal Heritage Information Management System” (AHIMS) was undertaken on 12 January 2023. This resulted in an Aboriginal site being recorded within 50m of the subject property (note that no Aboriginal places have been being declared within at least 1km of the subject property). Based on a detailed AHIMS search, it is evident that the midden site is at the adjacent property to the east at 216 Hudson Parade, at least 15m from the proposed waterway works, and there would be no expectation of disturbing or impacting on this site (although note that this is not a coastal engineering matter).

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

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).

As noted in Section 8.4.2, Total Earth Care concluded that the proposed works had a low risk of adversely impacting the “coastal environment area” as per SEPP Resilience.

8.5.3 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 (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), there is not the expectation of impacting on the nearby Aboriginal site, as noted in Section 8.5.2.

With regard to (a)(v), there are no environmental heritage items as per Schedule 5 of *Pittwater Local Environmental Plan 2014* within about 610m of the subject property.

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).

8.5.4 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”.

As discussed in Section 8.1, 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.

8.5.5 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 subject property.

9. CONCLUSIONS

It is proposed to demolish and rebuild a boatshed, and construct a new ramp and tidal landing over an existing slipway, at 214 Hudson Parade Clareville. For a design life of 60 years, the adopted Estuarine Planning Level (EPL) is 3.03m AHD.

If the recommendations in Section 7 are followed, the risk of the proposed development being adversely affected by estuarine processes would be suitably mitigated. As noted in Section 7, the proposed development should be structurally designed to resist hydrostatic and wave forces up to the EPL, and these forces should be provided by a coastal engineer as part of detailed design.

The proposed development satisfies the requirements of Chapter B3.9 and Chapter D15.15 of the Pittwater 21 DCP, the *Estuarine Risk Management Policy for Development in Pittwater*, Clause 7.8 of *Pittwater Local Environmental Plan 2014*, and *State Environmental Planning Policy (Resilience and Hazards) 2021* for the matters outlined herein.

10. 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

NSW Maritime (2005), *Engineering Standards & Guidelines for Maritime Structures*, First Edition, March

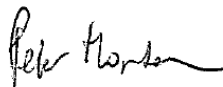
Watson, Phil J (2020), "Updated Mean Sea-Level Analysis: Australia", *Journal of Coastal Research*, Volume 36, Issue 5, September, pp. 915-931

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

This report has been prepared by Horton Coastal Engineering Pty Ltd on behalf of and for the exclusive use of Patrick and Nicole Heller (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 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 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 Patrick and Nicole Heller

Name of Applicant

Address of site 214 Hudson Parade Clareville

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 13th January 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 214 Hudson Parade Clareville

Report Date:

13 January 2023

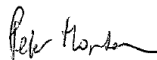
Author: Horton Coastal Engineering Pty Ltd

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

See Section 2 and Section 10 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