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## **Estuarine Risk Management Report for 78 Hudson Parade Clareville**

### **1. INTRODUCTION AND BACKGROUND**

At 78 Hudson Parade Clareville, it is proposed to undertake demolition works and construct a new dwelling house and swimming pool, along with landscaping, and undertake refurbishment of an existing boatshed and seawall. A Development Application (DA2019/0152) has been 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)<sup>1</sup>, in particular Chapter B3.7 and Chapter D15, and the *Estuarine Risk Management Policy for Development in Pittwater* (Estuarine Policy, which is Appendix 7 of Part D of the DCP). The *Coastal Management Act 2016* (in particular Section 27, as modifications to a seawall are proposed) and *State Environmental Planning Policy (Coastal Management) 2018* (SEPP Coastal) should also be considered.

Horton Coastal Engineering was engaged to prepare an Estuarine Risk Management Report to meet Council's requirements, 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 27 years of coastal engineering experience, including numerous studies along the Pittwater shoreline and specifically along Hudson Parade. 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 few years, including a specific recent inspection of the property on 30 May 2019.

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

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<sup>1</sup> The version up to Amendment 24 (effective from 20 October 2018) was considered herein.

## **2. INFORMATION PROVIDED**

Horton Coastal Engineering was provided with 20 drawings of the proposed development prepared by Marker Architecture & Design Pty Ltd, namely DA00 to DA19, all dated 19 February 2019. A site survey by Veris was also provided, Job Number 173850 and Drawing Number DETL-001 (Issue B, dated 19 December 2017).

## **3. EXISTING SITE DESCRIPTION**

The subject property is located adjacent to the Pittwater waterway on its eastern foreshore, north of Clareville Beach, with a broad aerial view depicted in Figure 1. The property is most exposed to a wind-wave fetch from the north (fetch length exceeding 5km), with lesser exposure towards the west at Lovett Bay (fetch length of 3.4km) and WNW at Morning Bay (fetch length of 2.8km). Photographs of the property are provided in Figure 2 and Figure 3 (both photographs taken on 30 May 2019).

Based on the survey, the existing seawall at the property has a crest level of about 1.7m AHD, with adjacent sand levels at the bottom of the wall at about 1.1m AHD. The boatshed, which is founded on a concrete slab (slab-on-grade), has a floor level of 1.5m AHD.

Adjacent properties also have seawalls, including No. 76, 74 and 72 to the north, and No. 80, 82, 84, 86 and 90 (plus 36 Delecta Avenue) to the south (that is, at all 6 properties along the foreshore north of Delecta Avenue and south of the subject property, and at least the 3 properties immediately north of the subject property). A total of 7 of these 9 adjacent properties have boatsheds.

The seaward property boundary (a Mean High Water Mark boundary) is located about 6m seaward of the seawall over most of the width of the property, increasing to 9m at the northern end (with the beach sloping at about 1:12 vertical:horizontal). Seaward of the seawall, it is expected that there is only a veneer of sand overlying bedrock, given that inferred bedrock is exposed over parts of the beach area (Figure 2).

Based on the hydrographic chart AUS 215, offshore seabed levels reduce to about -2.9m AHD at 100m offshore, then -5.9m AHD at 150m offshore, and -10.9m AHD at 200m offshore (average slope of 1:18 seaward of the property to -10.9m AHD).

## **4. PROPOSED DEVELOPMENT**

Alterations and additions are proposed to the existing boatshed, with timber doors proposed on the seaward side, and a new timber door opening on the northern side. The floor level of the boatshed is to remain unchanged at 1.5m AHD.

The seawall is to be extended to the north by about 2.4m, realigned to be slightly further seaward (up to about 2.3m), and lowered slightly to have a crest level of 1.5m AHD. The new alignment of the seawall is depicted in Figure 4.

The existing dwelling at the property is to be demolished and rebuilt with a minimum habitable floor level of 5.5m AHD, and a new pool is proposed with a coping level of about 5.5m AHD. A level of 5.5m AHD is well above extreme estuarine water levels for a barely credible storm over a design life of hundreds of years. Therefore, only the boatshed and seawall works need to be considered herein.





**Figure 1: Aerial view of subject property at Clareville**



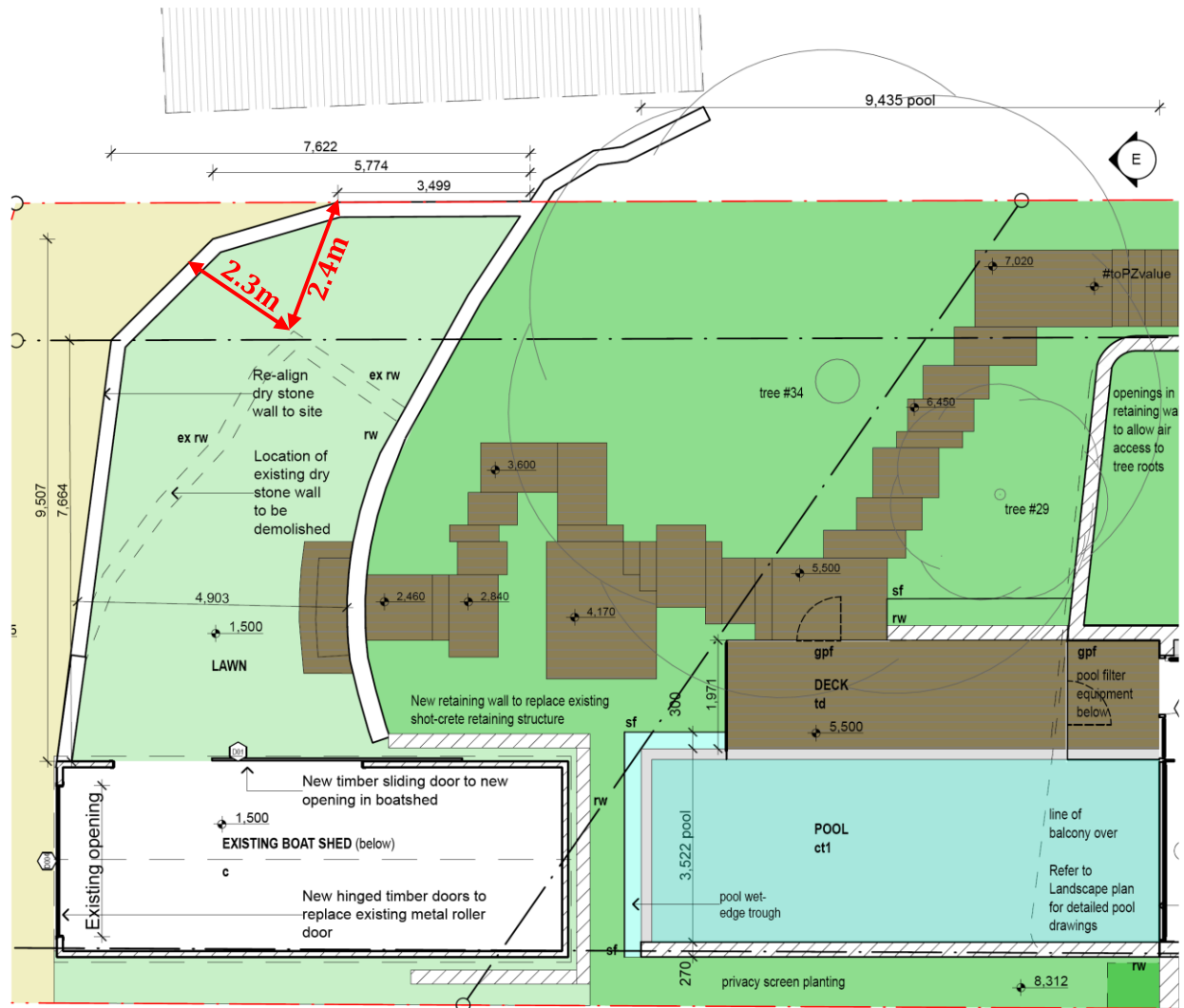


**Figure 2: View of subject property from foreshore, looking ENE, with existing boatshed and seawall evident and inferred bedrock exposed above arrows (boatshed on left of image is part of adjacent property at No. 76)**



**Figure 3: View of subject property from foreshore, looking ESE, with northern face of existing boatshed and seawall evident (boatshed on left of image is part of adjacent property at No. 76)**





**Figure 4: Alignment of new seawall compared to existing (modified from Drawing DA04 with addition of dimensions in red)**

## 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 2079) has been adopted for the seawall. This is considered to be a conservative design life for an estuarine seawall with limited adverse consequences if it failed. 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 gazetted on 14 July 2017, which is a location where the consequences of coastline hazards being realised are far greater than at the subject property. 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.

A 25 year design life (that is, at 2044) has been adopted for the boatshed. 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. Furthermore, in AS 4997 it is noted that generally timber would not be used as the principal structural medium for a facility with a design life greater than 25 years, and at the subject property timber has been proposed as the principal structural medium for the boatshed.

## 6. ESTUARINE PROCESSES

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), and local wind setup (0.08m AHD). Wave action can temporarily and periodically increase water levels above this level in a severe storm.

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).

In Cardno (2015), sea level rise values of 0.4m at 2050 and 0.9m at 2100 were applied relative to the present, 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 2079), 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 IPCC (2013a, b), which is widely accepted by competent scientific opinion.

Using the same methodology as applied in the acceptable risk assessment in the Bilgola/Basin CZMP referred to in Section 5, with a base year of 2010 as Cardno (2015) water levels were derived at 2010, the sea level rise values presented in Table 1 (at 2079) were determined for various emissions scenarios.

**Table 1: Global mean sea level rise (m) from 2010 to 2079 derived from IPCC (2013b)**

Emissions Scenario	Exceedance Probability		
	95% exceedance	Median	5% exceedance
SRES A1B	0.28	0.39	0.52
RCP2.6	0.21	0.31	0.42
RCP4.5	0.25	0.36	0.48
RCP6.0	0.25	0.35	0.47
RCP8.5	0.33	0.46	0.61
Average	0.26	0.38	0.50

Taking the median exceedance probability, and average of the 5 emissions scenarios, and adding 15% for local sea level rise variation based on IPCC (2013b), a sea level rise value of 0.43m at 2079 (relative to 2010) was derived. Therefore, the 100 year ARI still water level at 2079 is 1.95m AHD. This means that the seawall would be inundated by still water to a depth of 0.45m in the design event at 2079. Allowing for the 0.43m of sea level rise, the still water level of 1.5m AHD to overtop the seawall would have an approximate 0.4% exceedance probability in 2079 based on Manly Hydraulics Laboratory [MHL] (2014).

Cardno (2015) estimated that the 100 year ARI wave climate in the region covering the subject property was a significant wave height of 0.98m (average of the highest one-third of waves) and mean wave period of 2.4s (or peak spectral wave period of 3.4s assuming a 1.4 multiplier).

Based on stream function wave theory, at the seawall crest (for a design still water level of 1.95m AHD, local depth of 1.2m<sup>2</sup>, and peak spectral wave period of 3.4s) the 100 year ARI wave height of 0.98m would have a crest elevation of 0.81m above the still water level, that is to 2.76m AHD. This level of 2.8m AHD can be adopted as the Estuarine Planning Level (EPL) for the purpose of seawall design for the report herein. It is not appropriate to add 0.3m of freeboard as per Cardno (2015)<sup>3</sup>.

For the boatshed with a 25 year design life, using the same methodology outlined above, a sea level rise value of 0.18m at 2044 (relative to 2010) was derived. Therefore, the 100 year ARI still water level at 2044 is 1.70m AHD. This means that the boatshed would be inundated by still water to a depth of 0.2m in the design event at 2044. Allowing for the 0.18m of sea level rise, the still water level of 1.5m AHD to inundate the boatshed would have an approximate 0.01% exceedance probability in 2044 based on MHL (2014).

Based on stream function wave theory, at the face of the boatshed, the 100 year ARI wave height of 0.98m would have a crest elevation of 0.81m above the still water level, that is to 2.51m AHD. This level of 2.5m AHD can be adopted as the EPL for the purpose of boatshed design for the report herein (again noting that it is not appropriate to add freeboard).

Council advised the Applicant that the EPL reported for the property was 2.71m AHD. The EPL values adopted above (2.8m AHD for the seawall and 2.5m AHD for the boatshed), based on more detailed analysis and consideration of design life, are considered to be more appropriate (and generally consistent with the Council value).

## **7. RISKS OF DAMAGE TO PROPOSED SEAWALL AND MITIGATION OF THOSE RISKS**

It is recommended that detailed structural design of the seawall includes consideration of the hydraulic stability of the wall and wave forces over the design life, as well as standard structural loads, with hydraulic/wave calculations undertaken by a coastal engineer.

Assuming that bedrock is within 1m or so of the beach surface at the seawall location, the base of the seawall should either be keyed into the bedrock (ie a trench should be excavated in the bedrock to provide a flat base and shear resistance for the wall) or a level high-strength grout pad over the bedrock should be provided as the base with starter bars anchored into the rock protruding upwards to tie the wall into the base. In either case, any sand overlying the rock should be washed off prior to wall construction.

If bedrock is not found within 1m or so of the beach surface at the seawall location, the seawall should be designed allowing for beach scour as advised by a coastal engineer.

As the seawall would be inundated by still water or overtopped by waves at times over the design life, and to relieve groundwater pressures, a drainage layer of blue metal or similar (wrapped in geotextile) should be provided landward of the wall, as well as drainage outlets within the seawall (with a geotextile “sock” to prevent soil migration through the outlets). The seawall should be designed considering inundation and wave overtopping surcharge loads as advised by a coastal engineer.

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<sup>2</sup> Increased from 0.85m to prevent wave breaking.

<sup>3</sup> Use of a freeboard is not considered to be necessary. 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 wave crest levels given herein generally take account of the components that (by definition) comprise freeboard.

Given that the seawall may be overtopped by waves at times of severe storms, this may cause erosion of landscaped areas landward of the wall. Reinstatement and repair of these areas may thus be required at times, but this potential damage is not considered to be a concern to overall site stability.

Materials should be selected that are inundation compatible and suitable for the marine environment. Any concrete structures or components should be generally designed in accordance with the requirements of *Australian Standard AS3600 – Concrete Structures* and steel structures or components should be designed to conform with *Australian Standard AS4100 – Steel Structures*. The requirements of *Australian Standard AS4997 - Guidelines for the Design of Maritime Structures* should also be considered.

There should be consideration of wave forces in designing the fixing of any sandstone cladding to the concrete seawall, with grout used to fill the voids between and landward of the cladding units (if possible), and sandstone suitable for the marine environment should be used as advised by a coastal engineer.

If the recommendations within this Section 7 are followed, the risks of damage to the proposed seawall would be suitably mitigated, and it would have an adequately low risk of failure.

The sand levels at the toe of the proposed seawall are at about 1.1m AHD, which is well above higher high tide levels. Based on MHL (2014), this level is exceeded for only about 0.3% of the time at present, and about 9% of the time at 2079 with 0.43m of sea level rise (and still above Mean High Water at 2079). The seawall would thus have limited value as an intertidal fish habitat at present and over the design life. On this basis, a vertical seawall as proposed, without fish friendly features (such as crevices) and generally consistent with surrounding properties, is appropriate.

## **8. RISKS OF DAMAGE TO PROPOSED BOATSHED AND MITIGATION OF THOSE RISKS**

The main risks of damage to the boatshed from estuarine processes for the design event are as follows:

- waves breaking directly on the boatshed seaward face, causing damage to the doors and damage to timber elements; and
- inundation of the boatshed floor causing damage to items within the boatshed.

To reduce the risk of damage to the doors they could be designed for wave forces, although designing to resist these loads may be difficult to achieve in practice. Damage may be accepted for this non-habitable structure, as long as the following recommendations are adopted:

- only boating equipment and related items that can withstand periodic inundation should be placed within the boatshed below the EPL of 2.5m AHD;
- all electrical equipment, wiring, and any other service pipes and connections should be placed above the EPL, or waterproofed if below the EPL; and
- fuels and other chemicals or potentially toxic materials should be stored above the EPL or in watertight containers.

It is recommended that the timber used in the boatshed is suitable for the marine environment. Examples of suitable species include tallowwood, white mahogany, grey box, blackbutt, yellow stringybark and turpentine (NSW Maritime, 2005). Timber of Class 1 or 2 natural durability



should be used for all marine 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*.

If the recommendations within this Section 8 are followed, the risks of damage to the proposed boatshed would be suitably mitigated, and it would have an adequately low risk of failure.

## **9. CONTROLS IN PITTWATER 21 DCP**

### **9.1 Section B3.7**

Council requested that Section B3.7 of the Pittwater 21 DCP should be addressed. Section B3.7 applies to dwelling house developments and similar. For a seawall, which is “other development”, it could be argued that Section B3.9 of the DCP applies. That stated, there is no material difference in Section B3.7 and B3.9 for the purpose of the investigation reported herein, so Section B3.7 is referred to herein. Based on Section B3.7 of 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 boatshed is to be constructed over the same footprint as the existing boatshed, so would not change estuarine processes nor increase the level of risk in surrounding areas, which is intrinsically low anyhow. The change in alignment of the proposed seawall would not be expected to significantly change or impact on estuarine processes nor surrounding properties. This is because the realigned seawall does not alter the movement of water or waves over the seaward beach (except to reduce oblique wave reflection compared to the existing seawall), and sits well above Mean High Water. If the recommendations in Section 7 and Section 8 are followed, the risks of the proposed seawall and boatshed respectively being adversely affected by estuarine processes would be suitably mitigated.

With regard to Item 2, it has been recommended in Section 7 and Section 8 that materials should be selected that are inundation compatible and suitable for the marine environment.

With regard to Item 3, if the recommendations in Section 7 and Section 8 are followed in design and construction, then the seawall and boatshed respectively would have a low risk of damage and instability due to wave action and tidal inundation.

With regard to Item 4 and Item 5, it was noted in Section 8 that this should apply to the proposed boatshed, with these items not applicable to the proposed seawall.

Item 6 has not been applied to the boatshed for design purposes. Either way, the floor of the boatshed will be below the EPL.

With regard to Item 7, this is not applicable to a non-habitable boatshed and seawall. It can be noted that occupants are not at significant risk of injury on the site for the design 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).

Based on Section B3.7 of the DCP, “developments that propose mitigation works that 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 may be permitted on a merit basis subject to demonstration through an Estuarine Risk Management Report that:

- (a) The wave action or tidal inundation mitigation works do not have an adverse impact on any surrounding property or estuarine processes up to the Estuarine Planning Level; and
- (b) The wave action or tidal inundation mitigation works result in the protection of the existing and the proposed development from inundation up to the Estuarine Planning Level; and
- (c) The wave action or tidal inundation mitigation works do not have an adverse impact on the environment (this includes but is not limited to the altering of natural flow paths and the clearing of vegetation)”.

The above applies, as a realigned seawall with filling landward is proposed.

With regard to Item (a), as noted in regard to Item 1 above, the proposed works would not impact on surrounding properties or estuarine processes.

With regard to Item (b), the seawall may be necessary over the long term to protect the overlying soils on the steep slope landward of the foreshore from undercutting and instability, but is not necessary for protection against inundation. The seawall itself would have low risk of damage and instability due to wave action and tidal inundation as noted in regard to Item 3 above.

With regard to Item (c), the proposed works would not alter natural flow paths, and would be filling in an area that is not vegetated. Only a small amount of sandy habitat will be covered, well within private property, of which there is similar habitat in the immediate vicinity.

In Section B3.7 of the DCP it is stated that “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". If the recommendations in Section 8 are followed, this would be achieved.

## **9.2 Section D15.18**

As a realigned seawall is proposed, Section D15.18 of the Pittwater 21 DCP applies to these works. The DCP is impractical to apply literally along the Pittwater foreshore where seawalls, particularly vertical walls, are prevalent. In D15.18 of the DCP, it is stated that "seawalls shall not be permitted", with a variation that "Council may consider the construction of seawalls where there is potential for erosion from coastal processes and protection of property is necessary".

In response, it can be noted that seawalls are permissible with consent based on NSW legislation, namely Clause 19 of *State Environmental Planning Policy (Coastal Management) 2018*, that prevails over D15.18. At the subject property, there is an existing vertical seawall, with vertical seawalls at all 6 properties along the foreshore north of Delecta Avenue and south of the subject property, and at least the 3 properties immediately north of the subject property. If there was not a seawall, the foreshore would be subject to erosion, undermining the boatshed and access to the dwelling, and ultimately impacting on slope stability that could lead to undermining of the dwelling. A seawall is thus necessary (although it is recognised that the risk of damage to the dwelling is to be reduced by founding it on bedrock<sup>4</sup>, rather than relying on the seawall), along with being an existing use.

The criteria to consider in D15.18 are listed below:

- i. where possible, maintain the curvature of the existing shoreline;
- ii. incorporate low profile walls, battered or stepped back from the foreshore wherever practicable, with a maximum recommended height of 1 metre above mean high water mark. (1.5 metres AHD);
- iii. constructed of or faced in rectangular shaped sandstone, being either dressed or rough-cut in order to promote a uniform treatment along the foreshore. Alternative building materials, such as reconstructed sandstone concrete blocks or similar, which reflect a sandstone character shall also be suitable, particularly where greater structural strength may be required. Materials such as timber, concrete (including nylon mattress structures) gabions or other materials not in keeping with the character of the area shall not be permitted. Concrete/nylon mattress structures may be suitable for public drainage and associated bank stabilisation works where it can be demonstrated that such structures will not detract from the visual amenity of the locality.
- iv. only clean fill is to be used behind sea walls.
- v. where practicable, sandy beach areas should be incorporated in front of seawalls.
- vi. be designed so that the existing footprint is maintained (i.e. does not encroach any further into the intertidal zone) and the seawall is sloped back towards the property. There must be no additional reclamation of water land (requires a permit from the Department of Primary Industries) or replacement of the existing wall with a vertical seawall;
- vii. that there is no mortaring of the seawall and a geotextile fabric is used behind the seawall to prevent loss of sediment through the seawall;
- viii. should be rock rip rap, boulders or similar complex structures, and where possible incorporate further vertical and horizontal complexity.
- ix. maximise the incorporation of native riparian and estuarine vegetation;

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<sup>4</sup> As per Jack Hodgson Consultants Pty Ltd (2019).

- x. create low sloping seawalls and/or incorporate changes of slope; and
- xi. it is recommended that proponents consult with both the Coasts & Estuaries section of the Office of Environment and Heritage, and with the Aquatic Habitat Protection unit of the Department of Primary Industries.
- xii. compliance with Environmentally Friendly Seawalls - A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries (Sydney Metropolitan Catchment Management Authority 2009).

For Item (i), the proposed seawall alignment follows the curvature of the existing shoreline more closely than at present.

For Item (ii), the proposed seawall is low profile (height of only about 0.5m) and has the recommended maximum crest level of 1.5m AHD.

For Item (iii), it is proposed to use sandstone cladding over concrete, consistent with this criterion.

For Item (iv), use of clean imported fill is expected, and could be a condition of consent. As noted in Section 7, a drainage layer is required landward of the wall.

For Item (v), no modification to the existing sandy beach offshore of the seawall is proposed.

For Item (vi), the seawall is entirely within private property, and the realignment (reclamation) is above the intertidal zone (no water land is being reclaimed). The existing seawall is vertical, and it is appropriate to use a vertical wall at this site to tie into the boatshed slab without further reclaiming on the beach area.

For Item (vii), recommendations on use of geotextile fabric have been provided in Section 7. As the seawall is elevated above the intertidal zone, there is no habitat value in any potential crevices between blocks. Therefore, a restriction on the use of mortar is not considered to be necessary.

For Item (viii), as outlined above it is most appropriate to use a vertical wall at this site. The footprint of a boulder revetment would encroach further on to the sandy beach, and being elevated above mean high water would provide limited habitat value.

For Item (ix), the seawall is above the intertidal zone and no estuarine vegetation can be incorporated. It is not strictly forming a riparian zone as it is not adjacent to a river, and with the immediately adjacent waterway dry for most of the time.

For Item (x), see Item (vi).

For Item (xi), this is not applicable, as the works are not in the intertidal area and would not affect aquatic vegetation.

For Item (xii), the proposed seawall is elevated above the intertidal zone, making implementation of measures described in "Environmentally Friendly Seawalls" ineffective, inappropriate and unnecessary. At present, any crevices at the base of the seawall (if created) would only be inundated for about 0.3% of the time.



## **10. 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;
- risks of damage to the proposed seawall and mitigation of those risks in Section 7;
- risks of damage to the proposed boatshed and mitigation of those risks in Section 8; and
- the controls in 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 filled in, as provided at the end of the document herein.

## **11. CLAUSE 7.8 OF PITTWATER LOCAL ENVIRONMENTAL PLAN 2014**

### **11.1 Clause 7.8(1)**

Based on Clause 7.8(1) of *Pittwater Local Environmental Plan 2014*, 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 seawall and boatshed will not significantly impact on natural foreshore processes, and will not affect public access as the works are entirely on private property and in an area where public access is already constrained by numerous jetties projecting into the waterway.

### **11.2 Clause 7.8(2)**

Based on Clause 7.8(2) of *Pittwater Local Environmental Plan 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)”.

The proposed seawall and boatshed satisfy Clause 7.8(2)(b).

### **11.3 Clause 7.8(3)**

Based on Clause 7.8(3) of *Pittwater Local Environmental Plan 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 objectives were listed above (in Section 11.1, in relation to Clause 7.8(1)), where it was noted that the proposed seawall and boatshed satisfied these objectives, and hence Item (a) is satisfied.

For Item (b), the proposed seawall and boatshed would match the appearance and levels of adjacent seawalls and boatsheds respectively. The new boatshed is a renovation of an existing boatshed over the same footprint and with the same floor level.

For Item (c), if properly designed and constructed (including the use of appropriate construction environmental controls), the proposed seawall and boatshed would not cause any significant pollution or siltation of the waterway, nor adversely impact on adjacent areas. No remnant riparian vegetation is to be removed as part of the proposed works.

For Item (d), the proposed works would not affect public use of the foreshore and would not cause any conflict with waterway uses.

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

For Item (f), there is no known historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land on which the development is to be carried out.

Item (g) is not applicable.

For Item (h), sea level rise was considered in Section 6. Issues relating to scour/erosion would be overcome by founding the proposed seawall on bedrock or below estimated scour levels, as outlined in Section 7.



#### **11.4 Clause 7.8(4)**

Based on Clause 7.8(4) of *Pittwater Local Environmental Plan 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 are entirely on private land and would not affect public access along the foreshore.

### **12. STATE ENVIRONMENTAL PLANNING POLICY (COASTAL MANAGEMENT) 2018**

#### **12.1 Preamble**

Based on *State Environmental Planning Policy (Coastal Management) 2018* (SEPP Coastal) and its associated mapping, the subject property is within a “coastal environment area” (see Section 12.2) and “coastal use area” (see Section 12.3).

Based on Clause 19(1) of SEPP Coastal, the proposed seawall (coastal protection works) is permissible with consent at the subject property.

#### **12.2 Clause 13**

Based on Clause 13(1) of SEPP Coastal, “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, with the boatshed a renovation of an existing boatshed and the seawall replacing an existing seawall. The works would not be expected to adversely affect the biophysical, hydrological (surface and

groundwater) and ecological environments, except for covering of a small area of sandy habitat with vegetation (well within private property, and of which there is similar habitat in the immediate vicinity). The proposed works would not be a source of pollution as long as appropriate construction environmental controls are applied.

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 will 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 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.

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.

With regard to (f), based on a search of the Office of Environment and Heritage “Aboriginal Heritage Information Management System” (AHIMS) on 4 July 2019, there are no particular Aboriginal objects or Aboriginal Places within 200m of the subject property.

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 13(2) of SEPP Coastal, “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 13(1).

### **12.3 Clause 14**

Based on Clause 14(1) of SEPP Coastal, “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), (a)(v) and (c), these are not coastal engineering matters so are not considered herein.

With regard to (a)(iv), there are no particular Aboriginal objects or Aboriginal Places in the vicinity of the proposed works, as noted in Section 12.2.

With regard to (b), the proposed development has been designed and sited to avoid any potential adverse impacts referred to in Clause 14(1).

#### **12.4 Clause 15**

Based on Clause 15 of SEPP Coastal, “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 coastal hazards or increase the risk of coastal hazards in relation to any other land.

#### **12.5 Clause 16**

Based on Clause 16 of SEPP Coastal, “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.

### **13. COASTAL MANAGEMENT ACT 2016**

Based on Section 27 of the *Coastal Management Act 2016*, “development consent must not be granted under the *Environmental Planning and Assessment Act 1979* to development for the purpose of coastal protection works, unless the consent authority is satisfied that:

- (a) the works will not, over the life of the works:
  - (i) unreasonably limit or be likely to unreasonably limit public access to or the use of a beach or headland, or
  - (ii) pose or be likely to pose a threat to public safety, and
- (b) satisfactory arrangements have been made (by conditions imposed on the consent) for the following for the life of the works:



- (i) the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works,
- (ii) the maintenance of the works”.

For Section 27(a), the works will not ever unreasonably limit public access to or the use of a beach or headland. The proposed works are entirely on private property and will be for the life of the works, and the area seaward of the property is not an area generally used by the public anyhow, with numerous jetties and the like promoting an extension of use of property owners into the waterway. The works have been designed to have an acceptably low risk of damage, and therefore pose an acceptably low threat to public safety. Given the low height of the works (in the order of 0.5m) there can be confidence that the works would never be a threat to public safety, even if they failed.

For Section 27(b), the area seaward of the proposed works is essentially bedrock with a veneer of sand, and would not be affected by the proposed works. It is therefore not relevant to be applying a requirement for beach restoration at the subject property. Given the relatively low value of the proposed works and low consequence of any damage to the works, and the fact that adjacent works do not rely on the proposed works for their integrity (already being in place), it is considered to be unnecessary to be applying a maintenance condition as per Section 27(b)(ii) in this case.

## **14. CONCLUSIONS**

At 78 Hudson Parade Clareville, it is proposed to undertake demolition works and construct a new dwelling house and swimming pool, along with landscaping, and undertake refurbishment of an existing boatshed and seawall. Only the proposed boatshed and seawall have been considered herein, as these are the only works with any significant likelihood of being potentially affected by estuarine processes over their design life.

If the recommendations in Section 7 and Section 8 are followed, the risks of the proposed seawall and boatshed respectively being adversely affected by estuarine processes would be suitably mitigated.

The proposed boatshed and seawall (as relevant) satisfy the requirements of Sections B3.7 and D15.18 of the Pittwater 21 DCP, the *Estuarine Risk Management Policy for Development in Pittwater*, Clause 7.8 of *Pittwater Local Environmental Plan 2014*, *State Environmental Planning Policy (Coastal Management) 2018*, and Section 27 of the *Coastal Management Act 2016*, as outlined herein.

## **15. 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

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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 (2013b), *Climate Change 2013, The Physical Science Basis, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Final Draft, 30 September

Jack Hodgson Consultants Pty Ltd (2019), *Risk Analysis & Management for Proposed New Residence at 78 Hudson Parade Clareville*, 29 January, Reference MT 31606

Manly Hydraulics Laboratory [MHL] (2014), "OEHS NSW Water Level Distribution Analysis", *Report MHL 2100*, March, prepared for NSW Office of Environment and Heritage

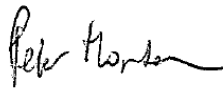
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NSW Maritime (2005), *Engineering Standards & Guidelines for Maritime Structures*, First Edition, March

## **16. SALUTATION**

If you have any further queries, please do not hesitate to contact Peter Horton via email at [peter@hortoncoastal.com.au](mailto: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 Ben Nemeny (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** Ben Nemeny

Name of Applicant

**Address of site** 78 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 4<sup>th</sup> July 2019 (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 for 78 Hudson Parade Clareville

Report Date:

4 July 2019

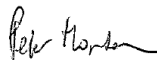
Author: Horton Coastal Engineering Pty Ltd

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

See Section 2 and Section 15 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