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Estuarine Risk Management Report on Marina at Lot 295 DP 820302 and on Crown Land Licence No 460612 (adjacent to 122 Crescent Road and 57 The Avenue Newport)

1. INTRODUCTION AND BACKGROUND

It is proposed to convert an existing commercial 43 berth marina (Sirsi Marina), which is located adjacent to 122 Crescent Road and 57 The Avenue Newport, to a residential 8 berth marina. Two boatsheds are also proposed as part of these works, as well as incidental works to an existing seawall. The legal description of the subject site where the marina and boatsheds are to be located is Lot 295 DP 820302 and Crown Land Licence No 460612. A Development Application (DA) is to be submitted to Northern Beaches Council for these works.

As the development is potentially affected by estuarine hazards, it is subject to the *Pittwater 21 Development Control Plan* (DCP)[1], in particular Chapter B3.9. It also subject to the *Estuarine Risk Management Policy for Development in Pittwater* (Estuarine Policy, which is Appendix 7 of the DCP).

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 32 years of coastal engineering experience, including numerous studies along the Pittwater shoreline and particularly at Newport.

Peter is a Member of Engineers Australia and Chartered Professional Engineer (CPEng) registered on the National Engineering Register. He is also a member of the National Committee on Coastal and Ocean Engineering (NCCOE) and NSW Coastal, Ocean and Port Engineering Panel (COPEP) of Engineers Australia. Peter has inspected the area in the vicinity of the site on several occasions in the last two decades or so, including a specific recent inspection of the site on 12 August 2022.

All levels given herein are to Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level at present in the ocean immediately adjacent to the NSW mainland.

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

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 6 architectural drawings prepared by Scott Carver, Ref 20220005, Dwg Nos LD-DA600, 605, 610-612 and 620 (all Revision 3 dated 11 April 2024, except DA605 and 612 were dated 9 April 2024, and DA605 was Revision 2). A site survey (Drawing No. 11369-001-A dated 5 May 2022) and plan of proposed marina subdivision (Drawing No. 11369-003, Revision E dated 8 April 2024) by Boxall Surveyors were also provided.

3. EXISTING SITE DESCRIPTION

The proposed development area is located at the SE end of the Pittwater waterway, within Winji Jimmi Bay, with a zoomed aerial view in Figure 1.

Figure 1: Zoomed aerial view of site on 5 April 2022, with Lot 295 DP 820302 depicted in red, and Crown Land Licence No 46061 depicted in yellow (boundaries are approximate)

A broad aerial view of the site is provided in Figure 2, with an oblique aerial view in Figure 3. The site is most exposed to a wind-wave fetch from the NW from the vicinity of Scotland Island (fetch length of about 3km), although the sand spit extending east from Rowland Reserve would limit the penetration of wind-waves towards the site.

Based on the site survey, a concrete and steel sheet pile seawall is generally located along the foreshore, with a crest level of about 2.47m AHD. There are gaps in the seawall at a boat ramp and slipway (both with a crest elevation of about 2.4m AHD). The hardstand area associated with the marina has a surface level of about 2.4m AHD. Photographs of the site are provided in Figure 4 and Figure 5.

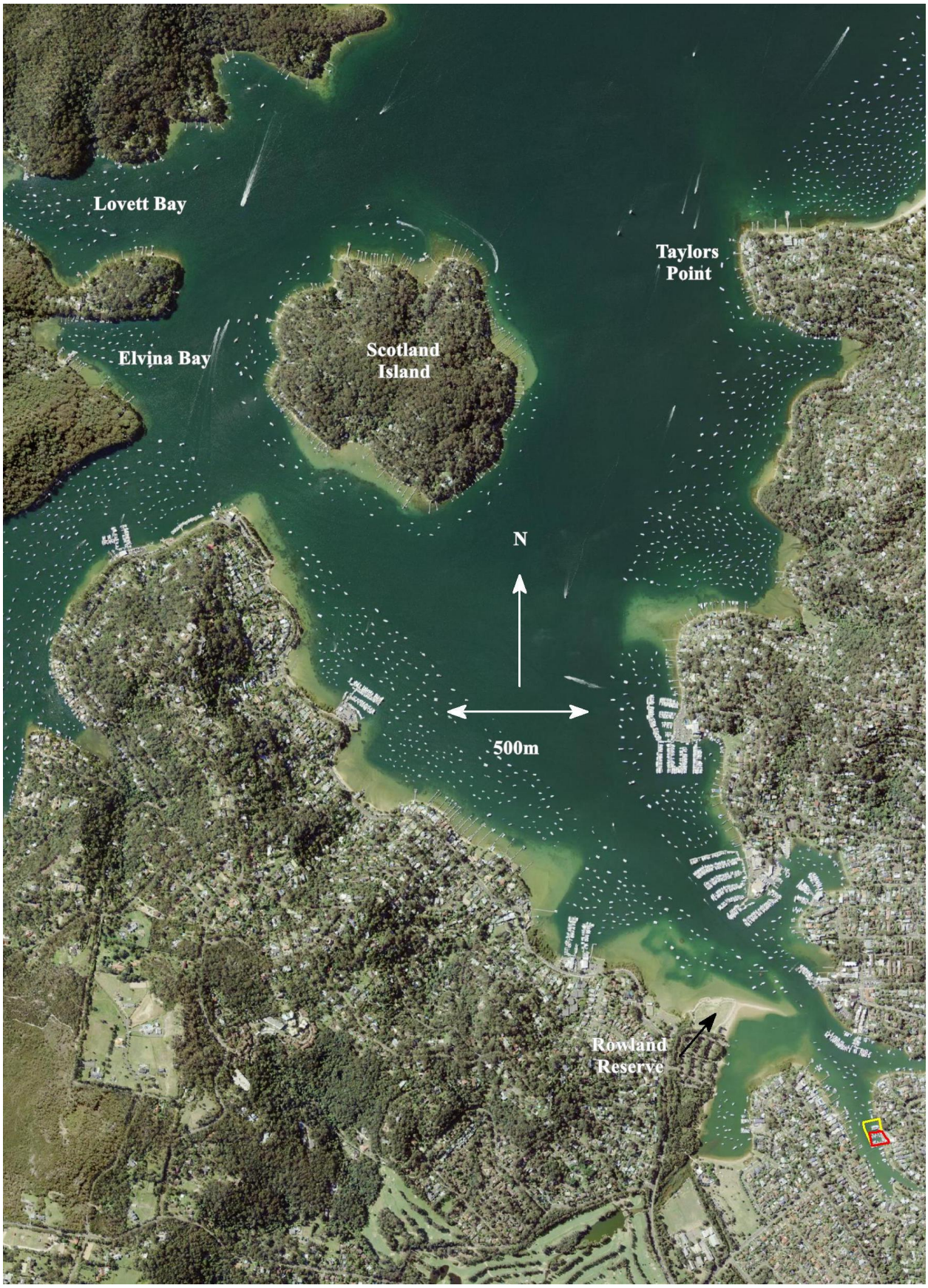


Figure 2: Aerial view of site (in red and yellow as per Figure 1) on 30 August 2018

Figure 3: Oblique aerial view of site (approximate outline in red) on 5 April 2022, facing NE

Figure 4: View of existing marina on 12 August 2022, facing south

Figure 5: View of seawall at site on 12 August 2022, facing SSE

4. PROPOSED DEVELOPMENT

It is proposed to convert an existing commercial 43 berth marina (Sirsi Marina), which is located adjacent to 122 Crescent Road and 57 The Avenue Newport, to a residential 8 berth marina. Two boatsheds are also proposed as part of these works, with finished floor levels of 2.88m and 2.97m AHD respectively.

The construction works for the marina include removal of 46 existing piles and numerous floating pontoons, and construction of 20 new piles and numerous floating pontoons.

Incidental works to an existing seawall are also proposed, to infill the gaps in the seawall at an existing boat ramp and slipway.

The existing seawall crest level of 2.47m AHD is to the retained, with the adjacent concrete extending landward for about 3.1m to an approximately 500mm high proposed retaining wall (top of wall at 2.88m to 2.97m AHD). The area landward of the retaining wall is to be landscaped.

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 2084) has been adopted for the proposed development. This is the same design life as adopted in the *Coastal Zone Management Plan [CZMP] for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)* that was

prepared by the author for Council and gazetted on 14 July 2017. Although this CZMP does not geographically apply at the site, it is the only gazetted CZMP in the former Pittwater Council area, and hence is relevant to consider in the selection of design life.

As justified in the CZMP, a 60 year life is considered to be 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.

Based on *Australian Standard AS 4997 - Guidelines for the Design of Maritime Structures*, and classifying the works as a 'normal structure', the required design event for a 60 year life is 600 year Average Recurrence Interval (ARI). Therefore, a 600 year ARI design event has been adopted herein, which has a 9.5% probability of occurring over the 60 year life.

6. ESTUARINE PROCESSES

6.1 Design Still Water Level at End of Design Life

In Cardno (2015), the 100-year Average Recurrence Interval (ARI) present day water level in the region covering the site is reported as 1.57m AHD. This includes the effects of astronomical tide and storm surge (combined level of 1.44m AHD), plus local wind setup (0.13m). Wave action can temporarily and periodically increase water levels above this level, particularly in severe storms if they generate wind-waves that propagate towards the site.

Based on Department of Environment, Climate Change and Water [DECCW] (2010) and using linear-log extrapolation, the 600 year ARI elevated still water level at the site is 1.65m AHD, including local wind setup.

At present at the site, Mean High Water is approximately 0.5m AHD and Mean High Water Springs is about 0.6m AHD. The combined astronomical tide and storm surge level for a 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 (DECCW, 2010).

Cardno (2015) estimated a 2050 Estuarine Planning Level (EPL) of 2.52m AHD, and 3.00m AHD at 2100, at the foreshore[2]. These EPL's include wave runup and overtopping effects and a freeboard of 0.3m[3], and do not include any reduction with distance landward of the foreshore.

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 2084), 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

[2] Assuming that the seawall had a crest level of 2.0m AHD.
[3] Use of a freeboard is not necessarily considered to be appropriate in a wave runup scenario.

Intergovernmental Panel on Climate Change [IPCC] (2021), which is widely accepted by competent scientific opinion.

Using the same methodology applied in the acceptable risk assessment in the *Coastal Zone Management Plan for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)*, and using a base year of 2010 as Cardno (2015) water levels were derived at 2010, the sea level rise values presented in Table 1 (at 2084) were determined for the five illustrative scenarios (shared socioeconomic pathways, SSP's[4]) considered in IPCC (2021)[5].

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 2084, 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 2084 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	0.53
SSP1-2.6	0.16	0.32	0.61
SSP2-4.5	0.24	0.42	0.72
SSP3-7.0	0.31	0.50	0.83
SSP5-8.5	0.36	0.57	0.94
Average	0.24	0.41	0.73

Taking the median exceedance probability and average of the 5 SSP's, sea level rise of 0.41m at 2084 (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 2084 at Sydney is 0.39m.

Therefore, the design 600 year ARI estuarine still water level at 2084 is 2.04m AHD. This still water level is about 0.43m below the seawall crest level.

6.2 Wave Action

Cardno (2015) estimated that the 100 year ARI wave climate in the region covering the site was a significant wave height of 0.46m (average of the highest one-third of waves) and mean wave period of 1.8s (or peak spectral wave period of 2.5s assuming a 1.4 multiplier).

In the design event, waves would break at and may overtop the crest of the seawall and propagate landward. Only limited overtopping would be expected, but to be conservative it is considered reasonable to adopt an Estuarine Planning Level (EPL) of 2.8m AHD at the foreshore. Given the proximity of the boatsheds to the foreshore, the same EPL applies at the boatsheds.

[4] Known as representative concentration pathways in the previous IPCC (2013) assessment.
[5] The five illustrative scenarios represent varying projected greenhouse gas emissions, land use changes and air pollutant controls in the future.

The finished floor levels of the boatsheds are 2.88m and 2.97m AHD respectively, so they are above the EPL.

7. RISKS OF DAMAGE TO PROPOSED INFILLED SEAWALL AND MITIGATION OF THOSE RISKS

It will be necessary for the seawall infilling to achieve a good interlock between the existing and new steel sheet piles. As part of detailed design, the structural engineer should check that the condition of the existing seawall is satisfactory and that the proposed sheet pile embedment is satisfactory allowing for scour of the seabed as advised by a coastal engineer, with an appropriate allowance for corrosion of the sheet piles over the design life. There should also be an allowance for drainage through the seawall to relieve groundwater pressures, unless designed assuming fully saturated ground conditions.

Materials for the seawall 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.

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 seawall infilling would not significantly change estuarine processes nor increase the level of risk in surrounding areas for the design event, as these works would simply be continuing the existing alignment of the seawall in areas where there are currently other structures. The boatsheds would not significantly change estuarine processes nor increase the level of risk in surrounding areas for the design event, as the

movement of water and waves over the area seaward of the seawall would not be significantly altered by the boatsheds. Therefore, Item 1 is satisfied.

Items 2-5 do not need to be considered for the proposed boatsheds, as they are above the EPL. To satisfy Items 2 and 3 for the seawall, the requirements outlined in Section 7 should be followed. Items 4 and 5 are not applicable to the seawall.

Item 6 is not applicable to the subject DA.

With regard to Item 7, occupants are not at significant risk of injury at the site for the design coastal storm event, with the boatsheds above the EPL, but noting that these are not habitable. Occupants would be able to shelter-in-place in future dwellings landward of the foreshore area 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).

With regard to another item in Chapter B3.9 of the DCP, no mitigation works are proposed below the EPL 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), as the seawall works are only infilling gaps in the existing seawall.

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 boatsheds are above mean high water mark and on freehold land.

With regard to (ii), the proposed boatsheds have these maximum dimensions.

With regard to (iii), the boatsheds are entirely on private property and therefore would not prevent or hinder public foreshore access.

With regard to (iv), it is noted that the boatsheds shall be for storage of boats and/or boating equipment.

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

With regard to (vi), the proposed boatshed floor levels are above the EPL.

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

With regard to (viii), this is not required as the boatsheds are above the EPL.

8.4 Chapter D15.18 of the Pittwater 21 DCP

As an infilled 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 2.16 of *State Environmental Planning Policy (Resilience and Hazards) 2021*, that prevails over Chapter D15.18. At the site, there is an existing vertical seawall, with vertical seawalls at adjacent properties. If there was not a seawall, the foreshore would be subject to erosion, exacerbated over time due to sea level rise. A seawall of the crest level proposed is thus necessary to match the existing crest level, and also beneficial in reducing the landward extent of wave action into the site, along with being an existing use.

The criteria to consider in Chapter 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;
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 retains the existing alignment of the seawall, simply infilling gaps in the existing alignment.

For Item (ii), the crest level of the proposed seawall is appropriate given projected sea level rise, and to match the existing crest level. A 1.5m AHD crest level is inadequate over the design life with regard to wave overtopping, and would not be consistent with the existing seawall.

For Item (iii), it is proposed to use sheet piling to tie in and link appropriately with the existing seawall.

For Item (iv), use of clean imported fill (if required) is expected, and could be a condition of consent. As noted in Section 7, a drainage layer is required landward of the wall, unless it is designed assuming fully saturated ground conditions.

For Item (v), there is no sandy beach area offshore of the seawall.

For Item (vi), the seawall works are simply infilling gaps that would be created in the existing seawall alignment, and would not encroach any further into the intertidal zone.

Item (vii) and Item (viii) are not applicable for a sheet pile wall.

For Item (ix), incorporation of estuarine vegetation is impractical at this location, as it would require additional reclamation. The site does not currently have a riparian zone. As noted in Section 4, the area landward of the retaining wall is to be landscaped.

For Item (x), the seawall works need to tie-in to existing vertical works, so low sloping seawalls and/or changes of slope are not appropriate.

For Item (xi), this has not been undertaken.

For Item (xii), the proposed seawall works are simply infilling gaps, and implementation of measures described in "Environmentally Friendly Seawalls" are not appropriate given the existing design.

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 site 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 an already developed marina area. The works would not be expected to adversely affect the biophysical and hydrological (surface and groundwater) environments. Based on documentation prepared by BG&E (2024), stormwater on the site will discharge to the Pittwater waterway as it does at present. A drainage easement has been included in the subdivision layout.

The proposed works would not be expected to adversely affect the ecological environment. Ocean Environmental (2024) found that the proposed works would not be expected to cause

(with the adoption of appropriate mitigation and management measures during construction) impacts on marine flora or fauna listed under the *Fisheries Management Act 1994*, nor any threatened fauna or Endangered Ecological Communities (EECs) listed under the *Biodiversity Conservation Act 2016*, nor any threatened fauna or EECs listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

Haskoning Australia (2024) found that the proposed marina upgrade would not be expected to significantly alter the tidal flow of water in and out of Winji Jimmi Bay relative to existing conditions, and as such effects on e-folding times would be minimal, with no untoward consequences expected for water quality or marine ecology within the bay. They also found that vessel manoeuvring at the proposed marina would not result in any significant increased impacts to marine vegetation from seabed disturbance when compared to the existing situation.

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. The alteration of the piles for the marina would be inconsequential to estuarine processes.

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

With regard to (d), this is not a coastal engineering matter so is not definitively considered herein. That stated, there are no undeveloped headlands or rock platforms in proximity to the proposed development, and see (a) above with regard to there being no significant impacts on marine flora or fauna, threatened fauna or EECs.

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 or a Crown Land Licence area, and not changing existing land uses nor encroachment into the waterway.

With regard to (f), a search of the Heritage NSW "Aboriginal Heritage Information Management System" (AHIMS) was undertaken on 27 September 2022. This resulted in no Aboriginal sites being recorded nor Aboriginal places being declared within at least 200m of the site.

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

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

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

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

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 are no Aboriginal sites recorded nor Aboriginal places declared within at least 200m of the 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 400m of the site.

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 site.

8.6 *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 would not ever unreasonably limit public access to or the use of a beach or headland, with no such items in proximity. If the measures outlined in Section 7 are implemented, the works would have an acceptably low risk of damage, and therefore pose an acceptably low threat to public safety.

For Section 27(b)(i), the area seaward of the proposed works does not contain a beach. It is therefore not relevant to be applying a requirement for beach restoration at the site.

Future owners have a vested interest to maintain the seawall as per Section 27(b)(ii). It is understood that adjacent seawalls do not rely on the existing/proposed seawalls for their integrity.

9. CONCLUSIONS

It is proposed to convert an existing commercial 43 berth marina (Sirsi Marina), which is located adjacent to 122 Crescent Road and 57 The Avenue Newport, to a residential 8 berth marina. Two boatsheds are also proposed as part of these works, as well as incidental works to an existing seawall.

For a design life of 60 years, the adopted Estuarine Planning Level (EPL) is 2.8m AHD at the foreshore, with the proposed boatsheds above the EPL. If the requirements outlined in Section 7 are followed, the seawall infilling would have an acceptably low risk of damage.

The proposed works satisfy the requirements of Chapters B3.9, D15.15 and D15.18 of the Pittwater 21 DCP, the *Estuarine Risk Management Policy for Development in Pittwater*, *State Environmental Planning Policy (Resilience and Hazards) 2021*, and Section 27 of the *Coastal Management Act 2016* for the matters considered herein.

10. REFERENCES

BG&E (2024), *Sirsi Marina Pontoons Stormwater Report*, Revision B, 26 June, Project Number S22042

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

Haskoning Australia (2024), "Re: Sirsi Marina, Newport - Responses To DPI-Fisheries Matters", 14 June, reference PA3775-RHD-XX-XX-CO-X-0004

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, in press

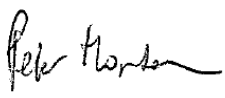
Ocean Environmental (2024), *Sirsi Marina, Newport, Aquatic Ecology and Marine Sediment Assessment*, 4 July

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

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 Essex Develop Pty Ltd

Name of Applicant

Address of site Marina at Lot 295 DP 820302 and on Crown Land Licence No 460612 (adjacent to 122 Crescent Road and 57 The Avenue Newport)

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 26th July 2024 (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 Marina at Lot 295 DP 820302 and on Crown Land Licence No 460612 (adjacent to 122 Crescent Road and 57 The Avenue Newport)

Report Date:

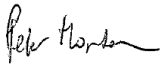
26 July 2024

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
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