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Coastal Engineering Advice on 2 Tourmaline Street Narrabeen

1. INTRODUCTION AND BACKGROUND

Horton Coastal Engineering prepared a coastal engineering report dated 15 February 2018, that was submitted as part of Development Application DA2018/1290 for alterations and additions at 2 Tourmaline Street Narrabeen. The previous dwelling on the site at that time has now been demolished, as discussed in a Horton Coastal Engineering letter dated 9 November 2020. A recent inspection of the property was carried out by Peter Horton of Horton Coastal Engineering on 16 September 2021, with a view of the property at that time shown in Figure 1.



Figure 1: View of subject property on 16 September 2021, looking west

It is understood that it is now proposed to submit a new DA for alterations and additions, which is generally similar to the previous proposal.

2. PROPOSED DEVELOPMENT

Horton Coastal Engineering was provided with 5 drawings of the proposed development prepared by Micris Design (Drawings A101 to A105), all Revision A and supplied on 7 September 2021 (A101), 26 October 2021 (A104 & A105), and 29 October 2021 (A102).

From review of these drawings, it is understood that the dwelling setback from the seaward boundary is the same as previous. The lower ground floor level is proposed to be at 6.33m AHD (it was previously at 7.63m AHD), with the ground floor at 9.72m AHD (previously at 9.87m AHD), and first floor at 12.91m AHD (previously at 13.02m AHD).

3. COASTAL INUNDATION (WAVE RUNUP) COASTLINE HAZARDS

Based on recommendations from Horton Coastal Engineering:

- the seaward edge of the lower ground floor deck has a retaining wall 0.5m high (crest elevation of 8.31m AHD, adjacent to a lawn level of 7.81m AHD) to reduce the risk of wave runup entering the lower ground floor (a glass balustrade extending 0.5m above the retaining wall, to 8.81m AHD, would reduce the risk further);
- the lower ground floor dwelling (at 6.33m AHD) sits 0.3m above the lower ground floor deck (at 6.03m AHD) to provide some storage volume for wave runup on the deck if it enters this area;
- natural ground levels will be contoured to direct wave runup away from the top of stairs that lead to the lower ground floor (see Drawing A102); and
- steps that were previously proposed down to the lower ground floor on the southern side of the property were removed due to the risk of wave runup entering the stairs.

The lower ground floor deck is to have a concrete base with a stone paver finish, so will be tolerant of inundation. In the unlikely event that wave runup enters the lower ground floor deck area, drainage under the deck and the fact that it sits 0.3m below the dwelling means that the lower ground floor dwelling is even more unlikely to be inundated. The lower ground floor dwelling itself also comprises materials tolerant of inundation, namely a concrete slab with stone tile finish, and a cavity brick wall with a cement render finish on the internal face.

With the features described above, the proposed development would have an acceptably low risk of being damaged due to wave runup and inundation over its design life of 60 years.

4. FOUNDATION DESIGN REQUIREMENTS

The foundation design requirements in the 15 February 2018 report generally remain the same, namely that the proposed development shall be founded on piles as outlined in Section 6 of that report. If piled as required, the proposed development would have an acceptably low risk of being damaged due to undermining from erosion/recession over its design life of 60 years.

Specifically, the requirements are as follows:

- piling is required seaward of the minimum setback for development on conventional foundations depicted in the 2018 report, with this setback located about 23.5m

landward of the seaward property boundary along the northern boundary, and 24.3m along the southern boundary¹;

- a minimum depth of piling shall be adopted based on the distance seaward of the minimum setback for development on conventional foundations (with this distance denoted as X herein). That is, pile depths would need to be devised based on ignoring the upper Z metres of soil, where Z is equal to $X \tan(33^\circ)$ based on an angle of repose (Φ) for sand of 33° . That is, the upper 6.7m of soil should be ignored in defining the depth of piles at the seaward edge of the proposed development²;
- as part of detailed design, the structural engineer should allow for sand slumping forces in the seaward direction and wave forces in the landward direction on the piles, as advised by a coastal engineer; and
- the decks and stairs on the seaward side of the development should be piled, as well as the dwelling itself.

5. MERIT ASSESSMENT FROM A COASTAL ENGINEERING PERSPECTIVE

5.1 Preamble

The merit assessment in the 15 February 2018 report had to be revised as Clause 5.5 of *Warringah Local Environmental Plan 2011* no longer applies, and *State Environmental Planning Policy No 71 – Coastal Protection* no longer applies but *State Environmental Planning Policy (Coastal Management) 2018* applies now. A revised merit assessment of the proposed development is set out below.

5.2 Warringah Local Environmental Plan 2011

Clause 6.5 of *Warringah Local Environmental Plan 2011* (LEP) applies to the proposed development. Based on Clause 6.5(3) of the LEP, development consent must not be granted “unless the consent authority is satisfied that the development:

- (a) will not significantly adversely affect coastal hazards, and
- (b) will not result in significant detrimental increases in coastal risks to other development or properties, and
- (c) will not significantly alter coastal hazards to the detriment of the environment, and
- (d) incorporates appropriate measures to manage risk to life from coastal risks, and
- (e) avoids or minimises exposure to coastal hazards, and
- (f) makes provision for relocation, modification or removal of the development to adapt to coastal hazards and NSW sea level rise planning benchmarks”.

With regard to 6.5(3)(a), the proposed development is to be suspended on piles above coastal processes (well above typical wave action) in the design event, and therefore will not adversely affect coastal hazards such as beach erosion, shoreline recession and coastal inundation, nor alter coastal hazards to the detriment of the environment as per 6.5(3)(c).

For 6.5(3)(b), the proposed development would not cause increases in coastal risks to adjacent areas, as the land at and seaward of the development is not constrained from eroding or receding, with the proposed development being suspended on piles above coastal processes in the design event.

¹ Based on geotechnical and structural engineering advice, it may be necessary to also found the landward portion of the proposed development on piles, eg to minimise the risk of differential settlement.

² That is, the soil above -0.7m AHD should be assumed to have been removed at this location, so the piles would need to extend well below -0.7m AHD.

For 6.5(3)(d), the proposed development is at an acceptably low risk of damage for a sufficiently long life. Risk to life is not considered to be insignificant, as coastal storms are foreseeable.

For 6.5(3)(e), the proposed development is at an acceptably low risk of damage for a sufficiently long life, so exposure to coastal hazards has been acceptably minimised.

For 6.5(3)(f), the proposed development is at an acceptably low risk of damage for a sufficiently long life. On this basis there is no need to design the building to be relocatable.

Based on Clause 6.5(4), development consent must not be granted “unless the consent authority is satisfied that the foundations of the development have been designed to be constructed having regard to coastal risk”. These foundation design requirements were described in Section 4.

The proposed development is thus consistent with Clause 6.5 of the LEP.

5.3 Warringah Development Control Plan 2011

Part E9 of *Warringah Development Control Plan 2011*³ (DCP) has discussion on “Coastline Hazard”, and applies at the subject property.

Based on Part E9 of the DCP, requirements are as follows:

1. “The risk of damage from coastal processes is to be reduced through having appropriate setbacks and foundations, as detailed in Criteria for the Siting and Design of Foundations for Residential Development.
2. For development in the area affected by the certified Coastal Zone Management Plan for Collaroy-Narrabeen Beach and Fishermans Beach (Coastal Zone Management Plan), the applicant must demonstrate compliance with the Northern Beaches Coastal Erosion Policy, the Coastal Zone Management Plan and the Collaroy-Narrabeen Protection Works Design Specifications (as amended from time to time)”.

For Item 1, the risk of damage to the proposed development from coastal processes is to be reduced by founding it on deep piled foundations as outlined in Section 4. With the features described in Section 3, the proposed development would have an acceptably low risk of being damaged due to wave runup and inundation over its design life.

For Item 2, the focus of the *Northern Beaches Coastal Erosion Policy* is mostly on the construction of coastal protection works at Collaroy-Narrabeen Beach. However, it can be noted that the four principles in Section 2 of that policy are as follows:

- (a) “the maintenance of public beach amenity and surf quality in the future as the highest priority.
- (b) property owners are primarily responsible for carrying out new development on beachfront and near beachfront land adjacent to Collaroy-Narrabeen Beach and Fishermans Beach provided that the risk of damage from coastal processes can be demonstrated to be acceptably low.

³ Amendment 20 of the DCP was reviewed, which commenced on 18 January 2021.

- (c) the preservation of the public beachfront, beachfront assets and near beachfront assets where the risk of damage from coastal processes can be demonstrated to be acceptably low.
- (d) property owners (including government) are responsible for protecting their property from the impacts of coastal processes, and are responsible for ensuring their property does not adversely impact on adjoining properties or coastal processes”.

Applying the above to the proposed development, for Item (a) the development would not be expected to affect public beach amenity (from a coastal engineering perspective) nor surf quality over its design life. Item (b) is satisfied as the proposed development is at an acceptably low risk of damage from coastal processes. Item (c) is not applicable as the proposed development is not a public asset. For Item (d), the proposed development would not adversely impact on adjoining properties or coastal processes, as discussed in Section 5.2. Therefore, the proposed development complies with the principles of the *Northern Beaches Coastal Erosion Policy*.

Also on Item 2, the *Coastal Zone Management Plan for Collaroy-Narrabeen Beach and Fishermans Beach* (CZMP) envisages beachfront development being maintained at Narrabeen Beach as long as it is at an acceptably low risk of damage, with this achieved through appropriate beachfront setbacks and piled development as required. The proposed development is essentially landward of the minimum setback for piled development, and has foundation design requirements as described in Section 4. The proposed development thus complies with the CZMP.

Further on Item 2, the *Collaroy-Narrabeen Protection Works Design Specifications* are not applicable to the proposed development as no coastal protection works are proposed.

In the DCP, it is noted that “Council will take the following principles into account when it assesses development:

- (i) when applications for development are lodged with Council both the Area of Wave Impact and Slope Adjustment and the Area of Reduced Foundation Capacity are to be marked on the plans submitted to Council;
- (ii) in the Area of Reduced Foundation Capacity, account is made of the reduced bearing capacity of the sand adjacent to the escarpment of a potentially fully eroded Area of Wave Impact and Slope Adjustment. Structures within the Area of Reduced Foundation Capacity should be designed such that loads are transmitted to soil foundations outside it. This would generally be achieved by piling structures within the Area of Reduced Foundation Capacity into the Stable Foundation Area below it as per Criteria for the Siting and Design of Foundations for Residential Development;
- (iii) for development within the Area of Reduced Foundation Capacity, geotechnical/structural design of foundations (including specialist coastal engineering advice) may be required for the whole structure;
- (iv) a suitably qualified engineer must undertake the geotechnical/structural design of the foundations in accordance with coastal engineering considerations and the Criteria for the Siting and Design of Foundations for Residential Development, and the provisions of this part; and
- (v) development must be constructed with a suitable floor level or in a manner that minimises the risk of coastal inundation for severe coastal storms occurring over the next 50 years.”

For Items (i) to (iv), the foundation design requirements provided in Section 4 consider these matters.

For Item (v), with the features described in Section 3, the proposed development would have an acceptably low risk of being damaged due to wave runup and inundation over its design life.

The proposed development is thus consistent with Part E9 of the DCP.

5.4 State Environmental Planning Policy (Coastal Management) 2018

5.4.1 Preamble

Based on *State Environmental Planning Policy (Coastal Management) 2018* (SEPP Coastal) and its associated mapping, the proposed development is within a “coastal environment area” and “coastal use area”.

5.4.2 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 development is in an already developed area, and would not be expected to adversely affect the biophysical, hydrological (surface and groundwater) and ecological environments. The proposed development would not be expected as a source of pollution as long as appropriate construction environmental controls are applied.

With regard to (b), the proposed development would not be expected to adversely affect coastal environmental values or natural coastal processes over its design life, as it is at an acceptably low risk of damage for an acceptably rare storm and over an acceptably long design life, and would be elevated above coastal processes in the design storm.

With regard to (c), the proposed development would not adversely impact on water quality as long as appropriate construction environmental controls are applied. No sensitive coastal lakes identified in Schedule 1 of SEPP Coastal are in the vicinity of the proposed development.

With regard to (d), this is not a coastal engineering matter so is not (necessarily) comprehensively considered herein. That stated, there are no undeveloped headlands or rock

platforms in proximity to the proposed development, no marine vegetation in the area to be developed, and no known native vegetation of significance at the property. No significant impacts on marine fauna and flora would be expected as a result of the proposed development, as the development would not interact with subaqueous areas for an acceptably rare storm and acceptably long life.

With regard to (e), the proposed development would not impact on public open space and access to and along the foreshore, being entirely on private property.

With regard to (f), based on a search of the Office of Environment and Heritage “Aboriginal Heritage Information Management System” (AHIMS) on 31 October 2021, there are no Aboriginal sites recorded nor Aboriginal Places declared within at least 50m of the subject property.

With regard to (g), the proposed development would not interact with the surf zone for an acceptably rare storm occurring over an acceptably long life, so would not impact on use of the surf zone.

Based on Clause 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).

5.4.3 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 development would not adversely impact on foreshore or beach 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, although for (a)(v) it can be noted that the closest heritage item listed in Schedule 5 of the LEP (a stone wall in Ocean Street near Malcolm Street) is some 290m north of the proposed development, and the proposed development would not be expected to impact on this heritage item.

With regard to (a)(iv), there are no Aboriginal sites recorded nor Aboriginal Places declared within at least 50m of the development area, as noted in Section 5.4.2.

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

5.4.4 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 5.2, 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.

5.4.5 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”. The CZMP discussed in Section 5.3 operates as a certified coastal management program at the subject property, and as noted in that Section the proposed development complies with the CZMP.

5.4.6 Synthesis

The proposed development satisfies the requirements of SEPP Coastal for the matters considered herein.

6. CONCLUSIONS

The proposed development at 2 Tourmaline Street Narrabeen shall be founded as described in Section 4, and if so, would have an acceptably low risk of being damaged due to undermining from erosion/recession over its design life of 60 years. With the features described in Section 3, the proposed development would have an acceptably low risk of being damaged due to wave runup and inundation over its design life

The proposed development satisfies Clause 6.5 of *Warringah Local Environmental Plan 2011*, Part E9 of *Warringah Development Control Plan 2011*, and the coastal engineering

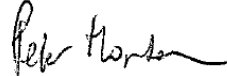
requirements of *State Environmental Planning Policy (Coastal Management) 2018* (Clauses 13, 14, 15 and 16) for the matters considered herein.

7. 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

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