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Victor Comino 22 Ocean Road Palm Beach NSW 2108 (sent by email only to vcomino@kingvest.com.au)

13 January 2020

Coastline Risk Management Report for 22 Ocean Road Palm Beach

1. INTRODUCTION AND BACKGROUND

It is proposed to undertake alterations and additions at 22 Ocean Road Palm Beach, for which a Development Application (DA 2019/1254) has been submitted to Northern Beaches Council.

The property is located within a "wave inundation" area designated on the Coastal Risk Planning Map (Sheet CHZ_015) that is referenced in *Pittwater Local Environmental Plan 2014*. The property is also mapped as being subject to coastal erosion and coastal inundation hazards in the *Pittwater Coastline Hazard Definition and Climate Change Vulnerability Study* and on the *Pittwater 21 Development Control Plan* (DCP)¹ Map MDCP016.

Therefore, the property is subject to Chapter B3.3 of the DCP, and the *Coastline Risk Management Policy for Development in Pittwater* (denoted as the "Coastline Policy" herein, which is Part D and Appendix 6 of the DCP), and a Coastline Risk Management Report must be submitted as part of the DA. Horton Coastal Engineering was engaged to prepare the required Coastline Risk Management Report, as set out herein.

In the report herein, all 11 items (namely a to k) listed in Clause 9.3 of the Coastline Policy are addressed where appropriate. As required, completed Forms 1 and 1(a) as given in the Coastline Policy are also attached.

As the property is potentially affected by coastline hazards, it is subject to Clause 7.5 of *Pittwater Local Environmental Plan 2014* (LEP 2014). *State Environmental Planning Policy (Coastal Management) 2018* also applies at the property. Both of these environmental planning instruments are addressed herein.

The report author, Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER], is a professional Coastal Engineer with 27 years of coastal engineering experience. He has postgraduate qualifications in coastal engineering, and is a Member of Engineers Australia (MIEAust) and Chartered Professional Engineer (CPEng) registered on the National Engineering Register (NER). 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 prepared Coastline Risk Management Reports for numerous properties along Ocean Road at Palm Beach in recent years, and has inspected the area in the vicinity of the subject property on several

¹ The Pittwater 21 DCP up to Amendment No. 25, which came into effect on 1 December 2019, was considered herein.

occasions in the last few years, including a specific recent inspection on 3 January 2020. He was the lead author of the CZMP referred to above.

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

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 3 drawings of the proposed development prepared by David Katon Studio, dated 22 November 2020 and Revision A (Sheet Numbers 00, 36 and 37). A site survey completed by Chadwick Cheng Consulting Surveyors was also provided, Reference 38117/D1-MGA and dated 29 January 2019 (Revision 1).

3. EXISTING SITE DESCRIPTION

The sandy Palm Beach is about 2.3km long, formed between the rocky Barrenjoey Head in the north and Little Head in the south. The subject property is located on the landward (western) side of Ocean Road towards the southern end of the beach (about 400m from the southern end), with an aerial image provided in Figure 1. At this location, the shoreline is somewhat sheltered (by Little Head) from the dominant south to south-east storm swell waves that occur in Sydney, but is fully exposed to waves from the east and north-east. Photographs of the property at the time of the site inspection on 3 January 2020 are provided in Figure 2 to Figure 4.

Based on the site survey provided, ground elevations at the landward edge of Ocean Road are at about 4.3m to 4.5m AHD, increasing moving north, with similar elevations (except at a driveway) at the seaward property boundary. The driveway slopes down into the property to about 3.6m AHD at the seaward property boundary, with a brick retaining wall on each side. Ground elevations reduce further moving landward to about 3.0m AHD (15m landward of the seaward boundary), then increase to about 4.3m and 4.5m AHD at the seaward and landward sides of the dwelling respectively. The finished Ground Floor level of the dwelling is 4.4m AHD. Ground levels on the landward side of the dwelling increase to about 5.5m AHD at the top of a retaining wall, and increase further to about 6.2m AHD at the landward property boundary. Most of the length of the property boundaries has solid retaining walls or solid walls at ground level.

A water main is located in the area between the property and Ocean Road. Seaward of Ocean Road, there is an area of lawn about 5m wide cross-shore at an elevation of about 4.7m AHD (based on May 2011 Airborne Laser Scanning data held by Horton Coastal Engineering), with levels then generally falling over the sandy beach. Dunal vegetation adjacent to the sandy beach is limited, with only patchy clumps of ground cover vegetation. Based on review of photogrammetric data in the NSW Beach Profile Database collected near the property from 1941 to 2018, the distance to the shoreline at mean sea level, seaward of the property, is typically about 90m (reducing after coastal storms that cause erosion of Palm Beach).



Figure 1: Aerial view of subject property on 30 August 2018



Figure 2: View of subject property (dwelling at arrow) to WSW from Ocean Road on 3 January 2020



Figure 3: View of subject property (dwelling at arrow) to WSW from seaward property boundary on 3 January 2020



Figure 4: View of subject property (dwelling at arrow) to SW from Palm Beach on 3 January 2020

4. PROPOSED DEVELOPMENT

It is understood that the seaward portion of the subject property is a low point at which rainfall runoff (overland flow) can regularly become trapped and pond. Properties to the north and south respectively have adjacent ground levels that have been raised at some time since 2005, such that these properties now sit about 1.2m to 1.5m above the subject property low point.

To prevent this trapped ponding and allow overland flow to discharge from the property towards Ocean Road without impacting on the existing dwelling and adjacent properties (Australian Consulting Engineers, 2019), it is proposed to undertake the following works:

- a new retaining wall around the seaward portion of the dwelling with a top of wall level of 5.4m to 5.7m AHD, with a new deck adjacent to the dwelling at 4.4m AHD (and steps up to the wall);
- raising ground levels seaward of this retaining wall to about 5.1m AHD, reducing to 4.5m AHD at the seaward property boundary (thus creating a flow path towards this boundary);
- a new driveway that falls towards Ocean Road (thus creating a flow path out of the property);
- new walls along the northern and southern boundaries with top of wall levels from 5.5m to 6.2m AHD; and
- raising the retaining wall on the landward side of the dwelling.

5. **DESIGN LIFE**

In the Coastline Policy, it is noted that a planning period (design project life) of 100 years should be adopted unless otherwise justified. A 60-year planning period has been considered

herein, and this can be justified as this is the same planning period adopted in the *Coastal Zone Management Plan for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)* (CZMP), which was certified by the Minister for the Environment on 30 June 2016 and gazetted on 14 July 2017². 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 at a similar open coast beach.

6. EROSION/RECESSION COASTLINE HAZARDS

6.1 Generic Explanation of Hazard Zones

Nielsen et al (1992) has delineated various coastline hazard zones as discussed below and depicted in Figure 5, assuming an entirely sandy (erodible) subsurface above -1m AHD.

The *Zone of Wave Impact* (ZWI) delineates an area where any structure or its foundations would suffer direct wave attack during a severe coastal storm. It is that part of the beach which is seaward of the beach erosion escarpment.

A *Zone of Slope Adjustment* is delineated to encompass that portion of the seaward face of the beach that would slump to the natural angle of repose of the beach sand following removal by wave erosion of the design storm demand. It represents the steepest stable beach profile under the conditions specified.

A Zone of Reduced Foundation Capacity (ZRFC) for building foundations is delineated to take account of the reduced bearing capacity of the sand adjacent to the storm erosion escarpment. Nielsen et al (1992) recommended that structural loads should only be transmitted to soil foundations outside of this zone (ie landward or below), as the factor of safety within the zone is less than 1.5 during extreme scour conditions at the face of the escarpment. In general (without the protection of a terminal structure such as a seawall), dwellings/structures not piled and located within the ZRFC would be considered to have an inadequate factor of safety.



Figure 5: Schematic representation of coastline hazard zones (after Nielsen et al, 1992)

² A detailed justification of the suitability of a 60-year design life for infill residential development is provided in the CZMP. In summary, a design life of 40 to 60 years is used in numerous Australian Standards relevant to residential construction, and the cost of new residential development is amortised for tax purposes over 40 years based on Subdivision 43-25 of the *Income Tax Assessment Act 1997*, so a 60-year design life is considered to be reasonable and conservative (particularly given the relative frequency at which beachfront property at Palm Beach is redeveloped).

6.2 Existing Council Hazard Lines

Based on the draft "Coastline Hazard Definition and Climate Change Vulnerability Study" prepared for Pittwater Council and dated 3 July 2012 (denoted as the "Hazard Study" herein), coastline hazard lines in the vicinity of the subject property for Immediate, 2050 and 2100 planning periods are as depicted in Figure 6, for lines at the landward edge of the ZSA (solid lines) and ZRFC (dashed lines).



Figure 6: Coastline hazard lines in vicinity of subject property from Hazard Study (aerial photograph taken on 30 August 2018)

It is evident that the subject property is entirely landward of the 2050 ZSA. Based on the Coastline Policy, it is required to define a Coastline Hazard Line (CHL) and Coastline Management Line (CML)³. For a 60 year design life (at 2080) and defining the CHL and CML to be at the landward edge of the ZSA, and linearly interpolating between the 2050 and 2100 ZSA positions, the CHL/CML can be defined at the position shown in Figure 6.

Some of the proposed works are seaward of the CHL/CML, such as the driveway relocation, part of the filling and part of the boundary walls. This is acceptable based on variation (iii) in Chapter 8.1 of the Coastline Policy, namely:

"Relocatable or sacrificial, ancillary, non-habitable, detached, light weight structures associated with landscaping, storage or outdoor living areas may be permitted seaward of the 100 year Coastline Management Line where their destruction by coastal processes is unlikely to exacerbate property damage during a storm event".

³ In the Coastline Policy it is recommended that the CML be defined to be 10m landward of the CHL, unless otherwise justified, to allow for a buffer zone. The concept of a buffer zone landward of the CHL typically applies in areas with vegetated dunes (particularly for new subdivisions), where it is desired to retain dune vegetation after a severe storm. There is no such requirement at the subject property. The CML and CHL have thus been defined to be coincident herein.

The proposed works are indeed of a sacrificial nature and associated with landscaping, and their destruction by coastal processes would be unlikely to exacerbate property damage during a storm event.

6.3 Foundation Requirements

Given that the proposed works are not habitable, and are of a sacrificial nature and associated with landscaping, there are no particular foundation requirements for the proposed development from a coastal engineering perspective. That is, foundation design can be undertaken based on conventional structural and geotechnical engineering considerations.

7. COASTAL INUNDATION AND WAVE RUNUP

Wave runup levels at Palm Beach in a severe storm may exceed 8m AHD, particularly taking sea level rise into account over the next 60 years, and assuming an infinite height foreshore. In reality, any waves that overtopped the foreshore seaward of the subject property (at a level of about 4.5m AHD) would 'fold over' the crest and travel as a sheet flow at shallow depth, spreading out and infiltrating over landward areas⁴. There is the expectation of a significant reduction in the velocity and depth of the runup within the order of 10m from the foreshore crest.

Wave runup extents at the subject property from the Hazard Study are depicted in Figure 7. These extents were derived without consideration of the effects of the solid boundary wall and existing driveway dip into the property.

In reality, the proposed works (in particular the filling of the land) and the retention of a solid eastern boundary wall would reduce the impact of wave runup on the property compared to the existing situation, without exacerbating any impacts of wave runup on adjacent properties. The additional retaining wall on the seaward side of the proposed development would reduce the risk of wave runup impacting on the dwelling compared to the existing situation. It is beneficial that the proposed works allow a flow pathway for any wave runup that enters the property (that does not infiltrate into the sandy surface) to flow back out to Ocean Road. The proposed works would not be expected to be adversely impacted by wave runup.

For the purpose of the report herein, a Coastline Planning Level of 5.4m AHD has been adopted, which represents wave runup being 'tripped' by the retaining wall seaward of the dwelling. Note that a freeboard does not need to be added to this. This Coastline Planning Level does not apply to the dwelling itself, as wave runup would not be expected to reach the dwelling in the design event. This level includes consideration of sea level rise over the design life as per Intergovernmental Panel on Climate Change (2013).

To reduce the risk of wave runup impacting the proposed development, it is recommended that:

- all structures (that is, retaining walls) below the Coastline Planning Level are constructed from flood compatible materials;
- ground levels are contoured to direct wave runup seaward (this has essentially been depicted on the Drawings);

⁴ Although there would be limited infiltration into the Ocean Road surface.

- any electrical equipment, wiring, and any other service pipes and connections in the yard seaward of the retaining wall that is seaward of the dwelling that could be damaged by inundation are located at or below the Coastline Planning Level, or waterproofed if below this; and
- items that are stored seaward of the retaining wall that is seaward of the dwelling are able to withstand periodic inundation if below the Coastline Planning Level (also applying to fuels and other chemicals or potentially toxic materials, unless they are stored in watertight containers).

Figure 7: Wave runup extents in vicinity of subject property from Hazard Study (aerial photograph taken on 30 August 2018)

8. MERIT ASSESSMENT

8.1 State Environmental Planning Policy (Coastal Management) 2018

8.1.1 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" (only its eastern one-third) and "coastal use area".

8.1.2 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".

This is not a coastal engineering matter, but it can be noted that with regard to (a), the proposed development would alter overland flow compared to existing situation. This is because runoff that used to pond in the property would be allowed to flow towards Ocean Road. It is not expected that this would have significant environmental impacts. It is recommended that free draining fill is used, if possible. This would mean that infiltration into the ground would occur as at present. The proposed development is thus not expected to adversely affect the biophysical, hydrological (surface and groundwater) and ecological environments. Broader ecological issues are not coastal engineering matters so are not considered herein.

With regard to (b), the proposed development would not be expected to adversely affect coastal environmental values or natural coastal processes any differently to the existing development.

With regard to (c), the proposed development would not be expected to adversely impact on water quality as long as appropriate construction environmental controls are applied, given the residential land use. No sensitive coastal lakes are located in the vicinity of the proposed development.

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, nor marine vegetation, in proximity to the proposed development. No significant impacts on marine fauna and flora would be expected as a result of the proposed development, as the proposed development would generally not be expected to interact with subaqueous areas over its design life. Assuming that there is no native vegetation or fauna or their habitats of significance at the property, this clause has been satisfied.

With regard to (e), it can be noted that the proposed development is entirely within the subject property boundary, and will not alter existing public access arrangements seaward of the property.

With regard to (f), a search of the Office of Environment and Heritage "Aboriginal Heritage Information Management System" (AHIMS) was undertaken on 13 January 2020. It was found that there were no particular Aboriginal sites recorded nor Aboriginal Places declared within at least 200m of the subject property.

With regard to (g), the proposed development would generally not be expected to interact with the surf zone over its design life.

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 any potential adverse impacts referred to in Clause 13(1).

8.1.3 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 Clause (a)(i), the proposed development is entirely on private property and will not affect public foreshore, beach, headland or rock platform access.

Clauses (a)(ii) and a(iii) are not coastal engineering matters so are not definitively considered herein, but it can be noted that any such impacts cannot be conceived for the proposed low-level works.

With regard to (a)(iv), as noted in Section 8.1.2, there are no particular Aboriginal sites recorded nor Aboriginal Places declared within at least 200m of the subject property.

With regard to (a)(v), the nearest environmental heritage items to the subject property listed in Schedule 5 of *Pittwater Local Environmental Plan 2014* are the Norfolk Island Pines within the Ocean Road reserve adjacent to the property. Council has already identified the potential for impact on the trees and requested an arboricultural assessment on this matter, which has

been undertaken by Raintree Consulting (2020), who has provided recommendations for managing potential impacts on these trees. The proposed works would not be expected to impact on the Norfolk Island Pine trees from a coastal engineering perspective.

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

Clause (c) is not a coastal engineering matter so is not considered herein.

8.1.4 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".

The proposed works would not increase the risk of coastal hazards on the subject property (they would be expected to reduce the risk) nor adjacent properties over the design life.

8.1.5 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.

8.1.6 Synthesis

The proposed development satisfies the requirements of *State Environmental Planning Policy* (*Coastal Management*) 2018 for the matters considered herein.

8.2 Pittwater Local Environmental Plan 2014

Clause 7.5 of *Pittwater Local Environmental Plan 2014* (LEP 2014) applies at the subject property, as the property is identified as a "wave inundation" area on the Coastal Risk Planning Map (Sheet CHZ_015). Based on Clause 7.5(3) of LEP 2014, "development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

- (a) is not likely to cause detrimental increases in coastal risks to other development or properties, and
- (b) is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and
- (c) incorporates appropriate measures to manage risk to life from coastal risks, and
- (d) is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, particularly if the development is located seaward of the immediate hazard line, and
- (e) provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and
- (f) has regard to the impacts of sea level rise, and
- (g) will have an acceptable level of risk to both property and life, in relation to all identifiable coastline hazards".

With regard to (a) and (b), the proposed works would not increase coastal risks nor alter coastal processes and the impacts of coastal hazards over its design life.

With regard to (c) and (g), risk to life is not a significant issue in relation to the proposed works, which are not habitable. The proposed works are of a sacrificial nature and associated with landscaping (so there are no foundation requirements from a coastal engineering perspective), and there is an acceptably low risk of damage to the works from wave runup if the recommendations in Section 7 are followed. This means that (d) is also satisfied (noting also that the proposed works are landward of the Immediate Hazard Line).

Given that the proposed development is at an acceptably low risk of damage for an acceptably long life, (e) is not necessary.

With regard to (f), sea level rise has been considered herein, with the coastline hazard lines and Coastline Planning Level adopted incorporating sea level rise projections.

8.3 *Pittwater 21 DCP*

Based on Section B3.3 of the DCP:

- "development must be designed and constructed to ensure that every reasonable and practical means available is used to remove risk to an acceptable level for the life of the development; and,
- the development must not adversely affect or be adversely affected by coastal processes nor must it increase the level of risk for any people, assets and infrastructure in the vicinity due to coastal processes".

As discussed in Section 8.1 and 8.2, the proposed works are of a sacrificial nature and associated with landscaping (so there are no foundation requirements from a coastal engineering perspective), and there is an acceptably low risk of damage to the works from wave runup if the recommendations in Section 7 are followed. If so, the proposed development would be at an acceptably low risk of being damaged or adversely affected by coastal processes for a 60 year design life (for both erosion/recession and wave runup), and would not adversely affect nor increase the level of risk to any people, assets or infrastructure in its vicinity.

Based on Section 8.1(i) of the Coastline Policy:

- a) "all structures below the Coastline Planning Level shall be constructed from flood compatible materials;
- b) all development must be designed and constructed so that it will have a low risk of damage and instability due to wave action and/or oceanic inundation hazards;
- c) all development and/or activities must be designed and constructed so that they will not adversely impact on surrounding properties, coastal processes or the amenity of public foreshore lands;
- d) all uncontaminated dune sand excavated during construction operations shall be returned to the active beach zone as approved and as directed by Council;
- e) wherever present, remnant foredune systems shall be appropriately rehabilitated and maintained for the life of the development to stabilise an adequate supply of sand (as determined by a coastal engineer) that is available to buffer erosion processes and/or minimise the likelihood of oceanic inundation;
- f) all vegetated dunes, whether existing or created as part of coastal protection measures shall be managed and maintained so as to protect the dune system from damage both

during construction of the development and as a result of subsequent use during the life of the development;

- g) all electrical equipment, wiring, fuel lines or any other service pipes and connections must be waterproofed to the Coastline Planning Level;
- h) the storage of toxic or potentially polluting goods, materials or other products, which may be hazardous or pollute waters during property inundation, will not be permitted below the Coastline Planning Level;
- i) for existing structures, a tolerance of up to minus 100mm may be applied to the Coastline Planning Level in respect of compliance with these controls;
- j) building heights must not exceed 8.0 metres above the Coastline Planning Level or 8.5 metres above existing ground level, whichever is higher; and,
- k) where land is also subject to the provisions of the Flood Risk Management Policy for Development around Pittwater, the higher of the Coastline Planning Level and Flood Planning Level shall apply".

For Item (a), this was recommended in Section 7.

For Item (b), it has been noted previously that the proposed development has an acceptably low risk of damage and instability due to wave action (erosion/recession) and oceanic inundation (wave runup) hazards over an acceptably long design life.

For Item (c), it has been noted previously that the proposed development would not be expected to adversely impact on surrounding properties or coastal processes.

For Item (d), there would not be any excess suitable excavated sand as a result of the proposed works.

For Item (e), this requirement is noted, but is not applicable at the subject property.

For Item (f), no vegetated dunes would be impacted by the proposed development.

For Items (g) and (h), this was noted in Section 7.

Item (i) is not applicable.

Item (j) has been satisfied for the proposed works, given that only fill and walls are proposed.

For Item (k), flooding matters have been considered by Australian Consulting Engineers (2019).

In conclusion, the proposed development is consistent with the Coastline Policy matters considered above.

9. CONCLUSIONS

The proposed works as per DA 2019/1254 at 22 Ocean Road Palm Beach are of a sacrificial nature and associated with landscaping, and their destruction by coastal processes would be unlikely to exacerbate property damage during a storm event. Therefore, although the works extend seaward of the Coastline Management Line, they are acceptable based on variation (iii) in Chapter 8.1 of the Coastline Policy.

There are no particular foundation requirements for the proposed development from a coastal engineering perspective. There would be an acceptably low risk of damage to the works from wave runup if the recommendations in Section 7 are followed.

The proposed development satisfies the requirements of *State Environmental Planning Policy (Coastal Management) 2018* (Clauses 13, 14 and 15), Clause 7.5 of *Pittwater Local Environmental Plan 2014*, Section B3.3 of the *Pittwater 21 DCP*, and the *Coastline Risk Management Policy for Development in Pittwater* for the matters considered herein.

10. REFERENCES

Australian Consulting Engineers (2019), *Flood Impact Assessment, Proposed Alterations, 22 Ocean Road, Palm Beach, 2108*, Issue B, 25 November

Intergovernmental Panel on Climate Change (2013), *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I 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

Nielsen, AF; Lord, DB and HG Poulos (1992), "Dune Stability Considerations for Building Foundations", *Australian Civil Engineering Transactions*, Institution of Engineers Australia, Volume CE34, No. 2, June, pp. 167-173

Raintree Consulting (2020), 22 Ocean Road Palm Beach, NSW, DA2019/1254, Additions & Alterations Arboricultural Impact Assessment & Tree Protection Plan, Ref No- RTC-220, Draft, 9 January

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 +61 407 012 538.

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 Victor Comino (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.

Coastline Risk Management Policy for Pittwater Form No. 1 and Form No. 1(a) are attached overleaf

COASTLINE RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO. 1 – To be submitted with Development Application

Development Applic	ation for
	Name of Applicant
Address of site	22 Ocean Road Palm Beach

Declaration made by a Coastal Engineer as part of a Coastal Risk Management Report					
Peter Horton	on behalf of Horton Coastal Engineering Pty Ltd				
(Insert Name)	(Trading or Company Name)				
on this the	13 January 2020 (date)				

certify that I am a Coastal Engineer as defined by the Coastline Risk Management Policy for 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.

I have:

Please mark appropriate box

- Prepared the detailed Coastal Risk Management Report referenced below in accordance with the Pittwater Council Coastline Risk Management Policy
- Am willing to technically verify that the detailed Coastal Risk Management Report referenced below has been prepared in accordance with the Pittwater Council Coastline Risk Management Policy
- 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 coastal hazard analysis or risk assessment is not required.
- Provided the coastal hazard analysis for inclusion in the Coastal Risk Management Report

Coastal Risk Management Report Details:

Report Title: Coastline Risk Management Report for 22 Ocean Road Palm Beach

Report Date: 13 January 2020

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 Coastal 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 Pittwater Council as the basis for ensuring that the coastal 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 reasonable and practical measures have been identified to remove foreseeable risk.

Signature	_		
Peter Horton			
Chartered Professional Status	MIEAust CPEng NER		
Membership No. 45298	0		

COASTLINE RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO. 1(a) - Checklist of Requirements for Coastal Risk Management Report for Development Application or Part 5 Assessment

Name of Applicant Address of site 22 Ocean Road Palm Beach	Development Application for Victor Comino
Address of site 22 Ocean Road Palm Beach	Name of Applicant
	Address of site 22 Ocean Road Palm Beach

The following checklist covers the minimum requirements to be addressed in a Coastal Risk Management Report. This checklist is to accompany the Coastal Risk Management Report and its certification (Form No. 1).

Coastal Risk Management Report Details:

Report Title:Coastline Risk Management Report for 22 Ocean Road Palm Beach Report Date: 13 January 2020 Author: Horton Coastal Engineering Pty Ltd

Please mark appropriate box

V	Comprehensive site mapping conducted Survey provided as per Section 2
	(date)
	Mapping details presented on contoured site plan to a minimum scale of 1:200 (as appropriate) Figure 6 and Figure 7 are considered to be acceptable
	Subsurface investigation required
	✓ No Justification Not required - sandy subsurface was assumed
	Which is the most conservative, and conclusions ¹ Yes Date conducted would not change if subsurface was found to be different
V	Impact by and upon coastal processes identified
	Coastal hazards identified
	Coastal hazards described and reported
	Risk assessment conducted in accordance with Council's Policy
	Adequacy of existing coastal protection measures assessed and certified (not applicable)
✓ Council's	Opinion has been provided that the design can achieve the risk management criteria in accordance with Policy provided that the specified conditions are achieved.

✓ Design Life Adopted: □ 100 years ✓ Other 60 years (as justified) specify

Development Controls as described in the Pittwater Coastline Risk Management Policy have been specified

Additional actions to remove risk where reasonable and practical have been identified and included in the

Coastal Risk Management Report.

✓

I am aware that Pittwater Council will rely on the Coastal Risk Management Report, to which this checklist applies, as the basis for ensuring that the coastal risk management aspects of the proposal 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 specified, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature	lorto
Name Peter	Horton
Chartered Professional Status	MIEAust CPEng NER
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