Horton Coastal Engineering
Coastal & Water Consulting

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9 August 2019

Flood Management Report for 235 Whale Beach Road Whale Beach (32 The Strand Whale Beach)

1. INTRODUCTION AND BACKGROUND

A Development Application (DA) for demolition and erection of a new dwelling at 235 Whale Beach Road Whale Beach (also known as 32 The Strand Whale Beach) is to be submitted to Northern Beaches Council. Given the potential for the property to be affected by overland flow flooding, a Flood Management Report is required by Council. Horton Coastal Engineering was engaged to prepare this report, as set out herein.

The focus of the report herein is on overland flow flooding related to excess rainfall-runoff. Issues relating to oceanic inundation and wave runup have been considered in a separate coastal engineering report by Horton Coastal Engineering.

Based on the output of a "Flood Information Request – Comprehensive" provided by Council on 3 June 2019, the lower portion of the property (seaward of the proposed development) is in the Medium Risk Flood Precinct, while the central portion (covering the seaward edge of the proposed dwelling) is in the Low Risk Flood Precinct (see Figure 8). Therefore, the property is subject to Chapter B3.11 of the *Pittwater 21 Development Control Plan* (DCP)[1], and the *Flood Risk Management Policy* of Council. Form A/A1 of the *Guidelines for Preparing a Flood Management Report* of Council is attached at the end of the report herein, as required by Council.

The report author, Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER], is a professional water engineer with 27 years of water engineering experience. He has postgraduate qualifications in water engineering, and is a Member of Engineers Australia (MIEAust) and Chartered Professional Engineer (CPEng) registered on the National Engineering Register (NER). Peter has completed numerous flood management studies in the former Pittwater Council area, including at Whale Beach. He has inspected the area in the vicinity of the subject property on several occasions in the last few years, including a specific recent inspection on 30 May 2019.

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

[1] The Pittwater 21 DCP up to Amendment No. 24, which came into effect on 20 October 2018, was considered herein.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 41 drawings of the proposed development prepared by Shaun Lockyer Architects, dated 18 April 2019 (except for Drawings 100.01, 100.10, 210.01, 300.01 & 300.02 dated 26 June 2019, and Drawings 100.08 & 100.09 dated 9 May 2019) and Revision A, B or C. A site survey completed by Stutchbury Jaques was also provided, Reference 10181/18 and dated 25 June 2018.

3. EXISTING SITE DESCRIPTION

The subject property is located adjacent to the central portion of the Whale Beach sandy beach, adjacent to the northern end of the beach car park (The Strand), with the developed area elevated well above and landward of the beach. An aerial view is provided in Figure 1[2]. Photographs of the property at the time of the site inspection on 30 May 2019 are provided in Figure 2 and Figure 3.

Vehicular access to the property is via Whale Beach Road. Based on the site survey, ground elevations vary from about 20m AHD at Whale Beach Road, 17m AHD at the landward edge of the existing dwelling (which has a floor level of 17.2m AHD), and 13m AHD at the seaward edge of the existing dwelling (at a timber retaining wall). Levels then continue to fall towards the beach via three additional retaining walls (down to 9m AHD), then down a grassy slope to the bottom of bank at about 6m AHD. Levels then flatten over the lower portion of the site, reducing to a minimum level of about 5.4m AHD, before rising over the most seaward 5m to 8m of the site to about 7m to 7.5m AHD at the seaward property boundary and 6.9m AHD at the landward edge of The Strand.

Based on 2011 Airborne Laser Scanning data held by Horton Coastal Engineering, The Strand, located seaward of the property, is at a level of about 6.6m AHD at its seaward edge. Levels then generally fall over the sandy beach area to the shoreline at 0m AHD over a typical distance of about 80m at present.

4. PROPOSED DEVELOPMENT

It is proposed to demolish the existing dwelling and erect a new dwelling (over 3 levels), with a pool (with habitable areas under) on the seaward side. The lowest habitable floor level (described as the Lower Ground Floor or Ground Floor on the Drawings) has a finished floor level of 8.5m AHD. At the SE corner of the dwelling, a storage enclosure is proposed with a finished floor level of 6.6m AHD (with a slight fall towards the northern edge to ensure drainage), for the storage of surf craft and the like.

[2] Note that the property boundary depicted in Figure 1 is not survey accurate, being derived from approximate NSW Government GIS cadastral data.

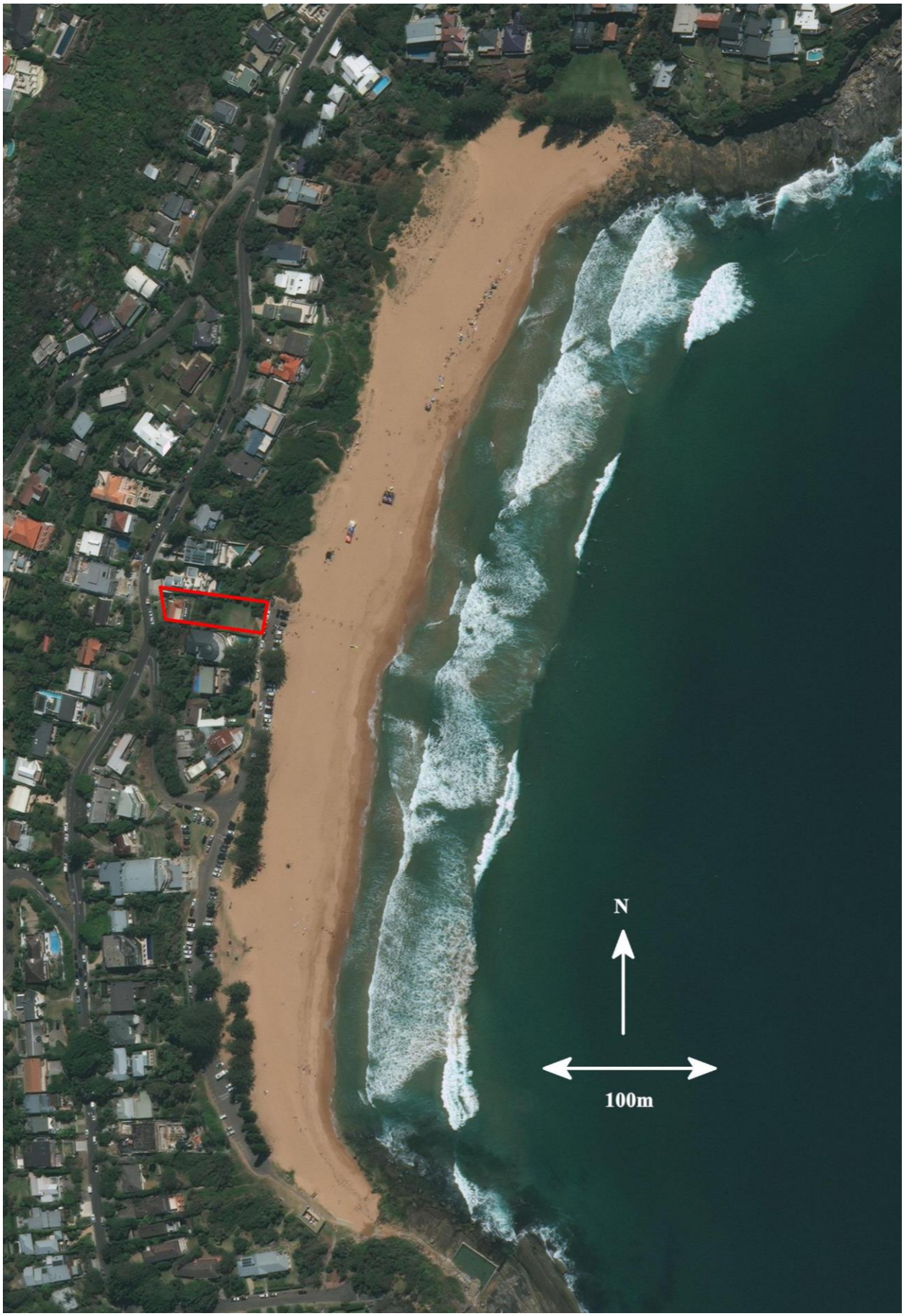


Figure 1: Aerial view of subject property (red outline) at Whale Beach on 29 September 2017

Figure 2: View of subject property (dwelling at arrow) from The Strand, looking west

Figure 3: View of Whale Beach from bottom of slope at subject property, looking ESE

5. FLOODING HAZARDS

The results of the Flood Information Request from Council showed that the following applied at the subject property:

- the 1% Annual Exceedance Probability (AEP) maximum water level was 6.6m AHD (including with climate change), with a maximum Flood Planning Level 0.5m higher at 7.1m AHD (note that the water level and Flood Planning Level varies across the site);
- the extent of the 1% AEP flood is depicted in Figure 4, from which it is evident that the proposed dwelling is not reached by this flood[3];
- the extent of the 1% AEP flood plus climate change scenario (including 30% rainfall intensity increase and 0.9m sea level rise) is depicted in Figure 5, from which it is evident that the proposed dwelling is not reached by this scenario;
- the extent of the 1% AEP flood plus freeboard (the flood planning area extent) is depicted in Figure 6, from which it is evident that the proposed dwelling is not reached by this extent;
- the Probable Maximum Flood (PMF) maximum water level was 9.8m AHD, and the PMF extent is depicted in Figure 7, from which it is evident that the Ground Floor of the dwelling may be inundated by this event[4];
- for the PMF extent, most of the area was classified as Low Hazard, with the central (lowest) portion of this area classified as "transition" (to High Hazard);
- the extent of Flood Risk Precincts is depicted in Figure 8, from which it is evident that the seaward edge of the proposed dwelling is within the Low Flood Risk Precinct; and
- the central portion of the site was classified as a Flood Life Hazard category of H1-H2, while the lower portion was classified as H3-H4 (see Figure 9), with the proposed development just within the H1-H2 area (this means that no flood evacuation controls apply, so Chapter B3.13 of the DCP does not need to be considered).

With a proposed Ground Floor level of 8.5m AHD, the dwelling is above the maximum Flood Planning Level of 7.1m AHD. Therefore, the risk of overland flow impacting habitable floors (the Ground Floor and above) over the design life is acceptably low. It is recommended that ground levels continue to be contoured to fall to the SE, and the Ground Floor is suspended at least 0.5m above natural ground over most of its length, as a relatively simple risk minimisation measure for more severe events than the 1% AEP event (these measures were also recommended in the coastal engineering report).

The storage enclosure, with a floor level of 6.6m AHD, is unlikely to be inundated by the 1% AEP flood, but is below the Flood Planning Level. In the coastal engineering report, it was noted that only items that can withstand periodic inundation should be placed in the enclosure below 7.6m AHD, fuels etc should be stored above 7.6m AHD or in watertight containers, the enclosure floor should be constructed of materials that can tolerate inundation, and electrical items etc should be placed above 7.6m AHD (or waterproofed if below). It is not considered necessary to place the storage enclosure above the Flood Planning Level, considering the low risk of damage to items in the enclosure with adoption of these measures.

[3] Note that this is also the extent of the 1% AEP Low Hazard area. The central (lowest) portion of this area was classified as flood storage, and the remainder as flood fringe.

[4] It is important to understand that the PMF water level varies across the site. For example, if the PMF depth is 0.4m say (which is typical near the seaward edge of the proposed dwelling), this is a water level of 7.9m AHD at a ground level of 7.5m AHD, and a water level of 9.9m AHD at a ground level of 9.5m AHD, for example. With a flow path from west to east and north to south into the site, the design of the proposed dwelling (with a wall along the NE corner, ground levels sloping to the SE, the Ground Floor raised 0.5m above natural ground over most of its length, and a wall at the stairs near the storage enclosure at the SE corner) would contribute to reducing the likelihood of the PMF inundating the dwelling.

Figure 4: Extent of 1% AEP flood at subject property, with proposed ground floor outline shown

Figure 5: Extent of 1% AEP flood with climate change scenario at subject property, with proposed ground floor outline shown

Figure 6: Extent of flood planning area (1% AEP flood plus freeboard) at subject property, with proposed ground floor outline shown

Figure 7: Extent of PMF at subject property, with proposed ground floor outline shown

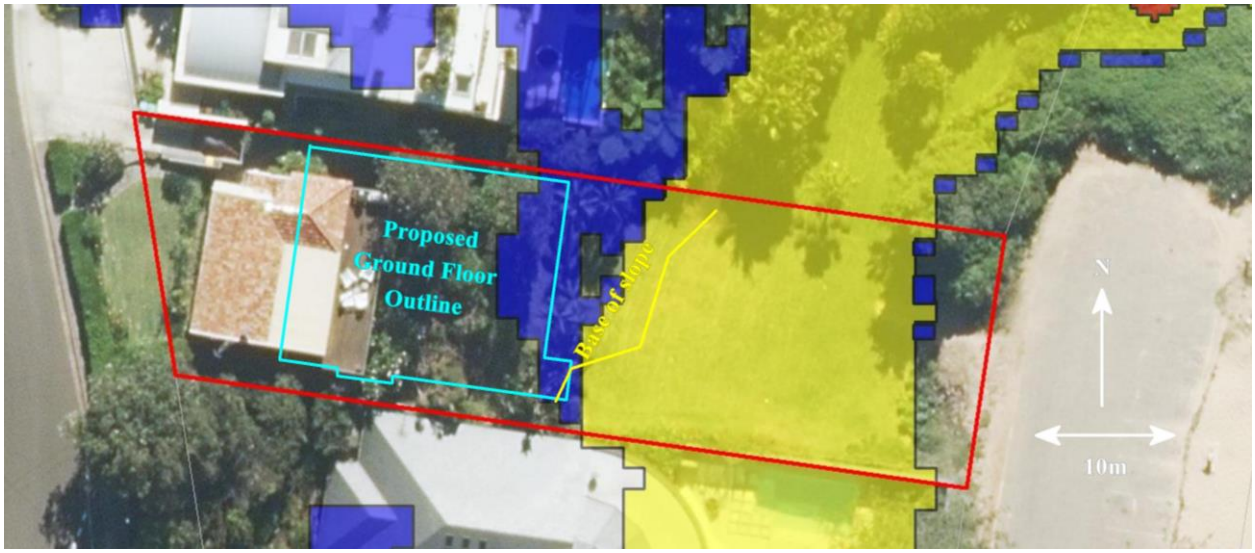


Figure 8: Extent of Flood Risk Precincts at subject property, with proposed ground floor outline shown

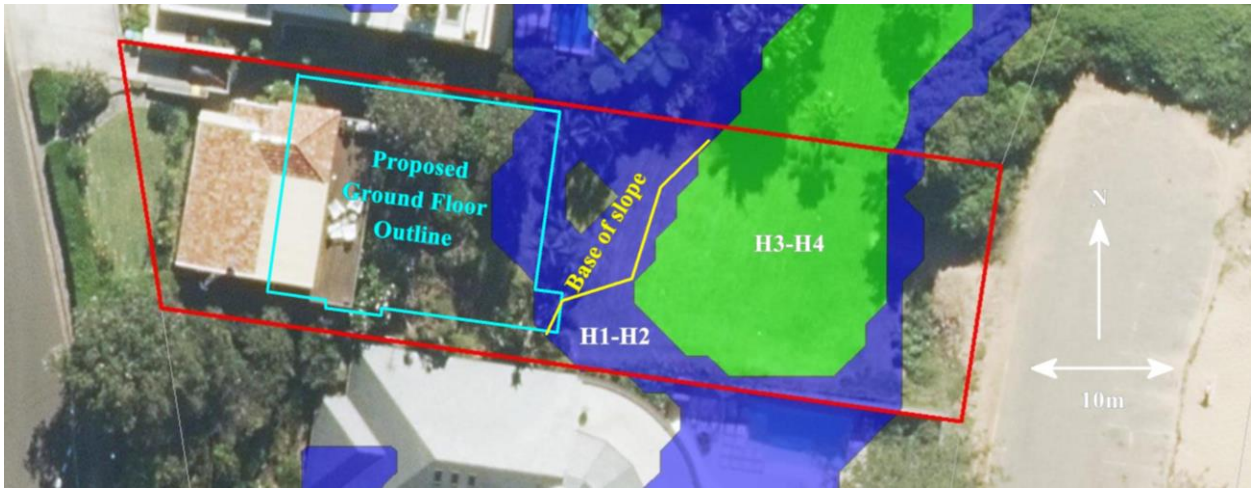


Figure 9: Extent of Flood Life Hazard categories at subject property, with proposed ground floor outline shown

6. MERIT ASSESSMENT

6.1 Pittwater 21 DCP

Based on Chapter B3.11 of the *Pittwater 21 DCP*, with the proposed development in the Low Flood Risk Precinct (Figure 8), there are no prescriptive controls therein that apply to the proposed residential development.

To ensure that there is no net loss of flood storage in the 1% AEP event, it would be necessary to ensure that any filling as part of the proposed works is only placed above 6.6m AHD, or if fill is placed below that level then it should be accompanied by compensatory excavation (note that no significant earthworks are proposed below 6.6m AHD).

6.2 *Flood Prone Land Design Standard* of Council

This is not applicable for residential development in the Low Risk Flood Precinct, as applies to the proposed development.

6.3 *Flood Risk Management Policy* of Council

This policy does not introduce any specific controls for the proposed development.

6.4 Flood Emergency Response Planning for Development in Pittwater

This policy does not apply to land in the H1-H2 category, as applies to the proposed development (Figure 9). Land in this category is considered by Council to have a negligible flood risk to life. It is possible to shelter-in-place in the proposed dwelling as there are extensive floor levels at the property above the PMF level, including the entire first floor and second floor.

6.5 *Pittwater Local Environmental Plan 2014*

Clause 7.3 of *Pittwater Local Environmental Plan 2014* (PLEP 2014) applies to land at or below the flood planning level, which therefore applies to the proposed storage enclosure.

In Clause 7.3(3) of PLEP 2014, it is stated that "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 compatible with the flood hazard of the land, and
(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and
(c) incorporates appropriate measures to manage risk to life from flood, and
(d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and
(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding".

The non-habitable storage enclosure has a floor level at the 1% AEP flood level, and is for the storage of surf craft and the like, so is compatible with the flood hazard of the land as per

Item (a). Furthermore, with the measures adopted as outlined in Section 5, items in the enclosure would not be expected to be damaged by flooding in this event.

The proposed development will not significantly adversely affect potential flood affectation of other development or properties as per Item (b).

The proposed floor level is appropriate to manage risk to life from flood as per Item (c). Even if inundated to 0.5m above the 1% AEP flood level, there would be no significant risk to life. The storage enclosure is in a Low Hazard area and Low Flood Risk Precinct.

No significant damage to the proposed development is expected for events up to the 1% AEP event, so:

- it will not significantly adversely affect the environment as per Item (d), noting also that it is not in a riparian area;
- it is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding as per Item (e).

The proposed development therefore complies with Clause 7.3 of PLEP 2014.

Clause 7.4 of PLEP 2014 applies to land between the flood planning level and the level of the PMF, which does apply to the proposed development. However, this Clause does not apply to residential dwelling house development, so the Clause is not applicable.

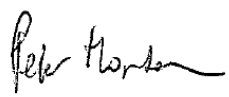
7. CONCLUSIONS

The seaward edge of the proposed development is in the Low Flood Risk Precinct. The proposed Ground Floor Level of 8.5m AHD is well above the Flood Planning Level of 7.1m AHD. The storage enclosure floor level of 6.6m AHD is equal to the 1% AEP flood level, and with implementation of the measures described in Section 5 is considered to be at an acceptably low risk of damage. The proposed development satisfies the requirements of Chapter B3.11 of the *Pittwater 21 DCP* and Clause 7.3 of *Pittwater Local Environmental Plan 2014*.

8. 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

Form A/A1 of "Guidelines for Preparing a Flood Management Report" of Council is attached overleaf

Attachment A

NORTHERN BEACHES COUNCIL
STANDARD HYDRAULIC CERTIFICATION FORM
FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: 235 Whale Beach Road Whale Beach (32 The Strand Whale Beach)

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, Peter Horton on behalf of Horton Coastal Engineering Pty Ltd
(Insert Name) (Trading or Business/ Company Name)

on this the 9th August 2019 certify that I am engineer or a
(Date)
professional consultant specialising in flooding 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.

Flood Management Report **Details:**

Report Title: Flood Management Report for 235 Whale Beach Road Whale Beach (32 The Strand Whale Beach)

Report Date: 9 August 2019

Author: Peter Horton

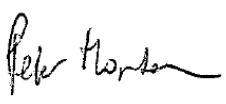
Author's Company/Organisation: Horton Coastal Engineering Pty Ltd

I: Peter Horton
(Insert Name)
Please tick all that are applicable (more than one box can be ticked)

☑ have obtained and included flood information from Council (must be less than 12 months old) (**This is mandatory**)

☑ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature 

Name Peter Horton, Director of Horton Coastal Engineering Pty Ltd