HORTON COASTAL ENGINEERING PTY LTD 18 Reynolds Cres Beacon Hill NSW 2100 +61 (0)407 012 538 peter@hortoncoastal.com.au www.hortoncoastal.com.au ABN 31 612 198 731 ACN 612 198 731

Deborah & Michael Mills C/- Studio McQualter Attention: Ms Erin Field Studio 3, 94 Oxford Street Darlinghurst NSW 2010 (sent by email only to erin@studiomcqualter.com)

11 December 2017

Estuarine Risk Management Report Relating to 1167 Barrenjoey Road Palm Beach

1. INTRODUCTION AND BACKGROUND

Alterations and additions are proposed at 1167 Barrenjoey Road Palm Beach. A Development Application is to submitted to the former Pittwater Council (now Northern Beaches Council) seeking consent for these works.

As the property is potentially affected by estuarine hazards, it is subject to the *Pittwater 21 Development Control Plan* (DCP)¹, in particular Chapter B3.7, and the *Estuarine Risk Management Policy for Development in Pittwater* (hereafter denoted as the Estuarine Policy) which is Appendix 7 of Part D of the DCP. Horton Coastal Engineering Pty Ltd was engaged to prepare an Estuarine Risk Management Report to meet Council's requirements, as set out herein.

The report author is Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER]. Peter has postgraduate qualifications in coastal engineering and 25 years of coastal engineering experience, including numerous estuarine risk management studies along the Pittwater shoreline and at Palm Beach. He is a Member of Engineers Australia and Chartered Professional Engineer (CPEng) registered on the National Engineering Register. Peter is also a member of the National Committee on Coastal and Ocean Engineering (NCCOE) and NSW Coastal, Ocean and Port Engineering Panel (COPEP) of Engineers Australia. He has inspected the area in the vicinity of the subject property on several occasions in the last few years, including a specific recent inspection of the property on 19 October 2017.

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 a total of 34 drawings prepared by Studio McQualter, namely Drawing Nos. 0.001 to 004, 1.001 to 004, 1.101 to 104, 2.001 to 004, 2.101 to 104, 3.001, 3.101, 5.001 to 005, and 6.001 to 007. These were all Revision C and dated 30 November 2017, except Drawing Nos. 6.005 and 6.007 which were Revision B and dated 17 November 2017.

¹ The version up to Amendment 22 (effective from 28 August 2017) was considered herein.

A site survey prepared by Waterview Surveying Services was also provided, surveyed 27 June 2017, dated 30 June 2017, and Revision A.

3. EXISTING SITE DESCRIPTION

The subject property is located adjacent to the Pittwater waterway at Observation Point in the suburb of Palm Beach, in between Barrenjoey Beach to the north and Snapperman Beach to the south, as depicted in Figure 1. Views of the property are provided in Figure 2, Figure 3 and Figure 4 (all photographs taken on 19 October 2017).

Based on the survey provided, the top of the seawall is at a level of 2.0m AHD to the north and at the steps down to a sandy beach offshore of the property, and at a level of 2.1m AHD to the south of the steps. Ground levels increase moving landward, to 2.4m AHD at the base of timber steps leading up to a timber deck. The deck has a floor level of 4.3m AHD, with the dwelling having a ground floor level of 4.4m AHD, under which natural surface levels are about 2.5m AHD.

Based on the hydrographic chart AUS 215, seabed levels are relatively shallow moving offshore to the west and NW, with a level of about -1.8m AHD about 200m offshore, and a level of about -2.2m AHD about 350m offshore. This area offshore of the property comprises a flood-tide delta of marine sand, that is, sand that has been transported into the Pittwater estuary from the ocean and that is slowly prograding further south into the waterway.

4. PROPOSED DEVELOPMENT

Proposed works below the ground floor level of the dwelling are mainly limited to new structural members that will support new additions, such as new steel columns to support the extended ground floor deck and dwelling extension to the south. The existing steps from the deck to the lawn area are to be reconfigured, with the northern portion of the lawn area and top of the seawall raised by 0.5 to 0.9m to 2.9m AHD.

No changes to the existing stormwater system, which has two outlets in the seawall, are proposed.



Figure 1: Aerial view of subject property in Palm Beach



Figure 2: View of seawall at subject property from beach, looking NE



Figure 3: View of lawn area above seawall at subject property, looking north



Figure 4: View of lawn area above seawall at subject property, looking SSE

5. ESTUARINE PROCESSES

In Cardno (2015), the 100-year Average Recurrence Interval (ARI) present day water level in the region covering the subject property is reported as 1.49m AHD. This includes the effects of astronomical tide and storm surge (combined level of 1.44m AHD), and local wind setup (0.05m AHD). Wave action would temporarily and periodically increase water levels above this level, with Cardno (2015) estimating a present day Estuarine Planning Level (EPL) of 2.6m AHD. This EPL includes wave runup and overtopping effects, and a freeboard of 0.3m.

To put the 100-year ARI astronomical tide and storm surge level of 1.44m AHD in context, Mean High Water is approximately 0.5m AHD and Mean High Water Springs is about 0.6m AHD at the subject property. The combined astronomical tide and storm surge level for a monthly and bi-annual event is about 1.0m and 1.2m AHD respectively. Corresponding water levels only increase slightly for rarer events, eg 1 year ARI level of 1.24m AHD, 10 year ARI level of 1.34m AHD and 50 year ARI water level of 1.41m AHD (Department of Environment, Climate Change and Water [DECCW] (2010).

In Cardno (2015), sea level rise values of 0.4m at 2050 and 0.9m at 2100 were applied relative to the present, which is not correct as those benchmarks were derived relative to 1990, and historical sea level rise has not been discounted. Appropriate sea level rise values (relative to 2010) using that methodology would be 0.34m at 2050 and 0.84m at 2100. That stated, applying the Cardno (2015) values as is for convenience, EPL values (including wave runup effects and incorporating a 0.3m freeboard²) of 2.8m AHD and 3.2m AHD were adopted at 2050 and 2100 respectively. This means that even at 2100 the EPL is well below the deck floor level

² Although use of a freeboard is not considered to be necessary.

of 4.3m AHD and dwelling floor level of 4.4m AHD. Ocean inundation is thus inconsequential to habitable development at the subject property until well beyond 2100, that is, for a particularly conservative design life exceeding 100 years.

6. RISKS OF DAMAGE TO PROPOSED DEVELOPMENT AND MITIGATION OF THOSE RISKS

The seawall north of the steps is proposed to be raised by 0.9m. It is recommended that there is consideration of wave forces on the additional blocks in the design of this raising, and the effect of raising on the global stability of the wall. With a crest level of 2.9m AHD, overtopping of the wall is not considered to be a significant issue until after significant sea level rise has been realised beyond 2100. Even if overtopping of the seawall occurred in a severe storm (well into the future), the implications of this are only likely to relatively insignificant, with some damage to landscaped areas such as lawn, requiring reinstatement in due course.

In design of the supports for the proposed additions, there should be consideration in the material selection for occasional salt water immersion from wave runup.

It is recommended that only boating equipment and related items that can withstand periodic inundation be placed in the storage area below the deck (or other locations on site), or they should be placed at a level above 3.2m AHD (particularly for potentially toxic materials). All electrical equipment, wiring, and any other service pipes and connections should be placed above 3.2m AHD, or waterproofed if below 3.2m AHD.

If the recommendations within this Section 6 are followed, the risks of damage to the proposed development would be suitably mitigated.

7. CONTROLS IN PITTWATER 21 DCP

Based on Section B3.7 of the DCP:

- 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 works would not impact on surrounding properties. In particular, the raised seawall is matching the level of the adjacent seawall to the north, and

would only occasionally be reached in severe storms, whereby wave energy would be reflected or transferred to have vertical rather than horizontal momentum. This would not significantly impact on estuarine processes, being well above typical estuarine water levels. If the recommendations in Section 6 are followed, the risks of the proposed development being adversely affected by estuarine processes would be suitably mitigated.

With regard to Item 2, it has been recommended in Section 6 that materials should be selected that are inundation compatible below 3.2m AHD, which is a conservative EPL.

With regard to Item 3, if the recommendations in Section 6 are followed in design and construction, then all structures would have a low risk of damage and instability due to wave action and tidal inundation.

With regard to Item 4 and Item 5, it was recommended in Section 6 that this apply.

Item 6 is not applicable.

With regard to Item 7, the habitable area of the existing and proposed development is above the EPL, and it is thus possible to 'shelter in place' in a severe storm.

Further based on Section B3.7 of the DCP, developments that propose mitigation works that modify the wave action or tidal inundation behaviour within the development site including the filling of land, the construction of retaining structures and the construction of wave protection walls may be permitted on a merit basis subject to demonstration through an Estuarine Risk Management Report that:

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

As noted above, the raising of the existing seawall would not be expected to adversely impact on surrounding properties or the environment. With regard to (b), the raising of the seawall is not necessary to achieve protection of the proposed development from inundation up to the EPL, given that the development is already sufficiently raised above the EPL.

8. CLAUSE 5.5 OF PITTWATER LOCAL ENVIRONMENTAL PLAN 2014

Based on Clause 5.5(3)(d) of *Pittwater Local Environmental Plan 2014*, development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that the proposed development will not:

- (i) be significantly affected by coastal hazards, or
- (ii) have a significant impact on coastal hazards, or
- (iii) increase the risk of coastal hazards in relation to any other land.

As outlined in Section 7, if the recommendations in Section 6 are followed then the risks of the proposed development being adversely affected by estuarine processes (and hence coastal hazards) would be suitably mitigated, and the development would thus not be significantly affected by coastal hazards.

As also outlined in Section 7, the proposed works would not impact on surrounding properties (and thus would not increase the risk of coastal hazards in relation to any other land) or impact on estuarine (coastal) processes.

9. CONCLUSIONS

At 1167 Barrenjoey Road Palm Beach, alterations and additions are proposed. If the recommendations in Section 6 are followed, the risks of the proposed development being adversely affected by estuarine processes would be suitably mitigated.

The proposed development complies with Section B3.7 of the Pittwater 21 DCP, and Clause 5.5(3)(d) of *Pittwater Local Environmental Plan 2014*.

10. REFERENCES

Cardno (2015), *Pittwater Estuary Mapping of Sea Level Rise Impacts*, LJ2882/R2658v7, Revised Draft, for Pittwater Council, February

Department of Environment, Climate Change and Water [DECCW] (2010), *Coastal Risk Management Guide: Incorporating sea level rise benchmarks in coastal risk assessments*, DECCW 2010/760, August, ISBN 978 1 74232 922 2

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.

Although the current Estuarine Policy does not have a form that is required to be filled in, Council has in practice recently requested that a form provided in a former Estuarine Policy be filled in, as provided overleaf.

Yours faithfully HORTON COASTAL ENGINEERING PTY LTD

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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 Deborah & Michael Mills and Studio McQualter (the client), and is subject to and issued in accordance with an agreement between the client and Horton Coastal Engineering Pty Ltd. Horton Coastal Engineering Pty Ltd accepts no liability or responsibility whatsoever for the report in respect of any use of or reliance upon it by any third party. Copying this report without the permission of the client or Horton Coastal Engineering Pty Ltd is not permitted.

Estuarine Risk Management Policy for Pittwater Form No. 1 is provided overleaf

FORM NO. 1 **To be submitted with Estuarine Risk Management Report**

Development Application for Deborah & Michael Mills / Studio McQualter

Name of Applicant

Address of site 1167 Barrenjoey Road Palm Beach

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 11th December 2017 (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 Relating to 1167 Barrenjoey Road Palm Beach

Report Date:

11 December 2017

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 | |
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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

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Chartered Professional Status

Membership No.

MIEAust CPEng 452980

Peter Horton