

Northern Beaches Council
Attention: Mr Daniel Milliken
725 Pittwater Road
Dee Why NSW 2099

21 October 2018

Development Application DA2018/1289 for Upgraded Coastal Protection Works at 1150-1168 Pittwater Road Collaroy – Response to Council Questions

1. INTRODUCTION

Northern Beaches Council has provided comments on DA2018/1289 for construction of coastal protection works at 1150-1168 Pittwater Road Collaroy. Based on an email from Greg Britton (Council's coastal engineering advisor) to Peter Horton on 20 September 2018, it was noted that:

1. The proposed coastal protection works comprise mainly the contiguous piles, the infill plug piles, the reinforced concrete wall, and the permanent ground anchors (let's call it the 'maritime structure' element of the works). The 'coastal structure' element (the rock toe) is a relatively minor element and indeed the overall works have been designed to not necessarily rely on the toe. There is much discussion on the BoD aspects for the rock toe but less so for the maritime structure element. Is it intended James Taylor & Associates will produce a maritime structure design statement (BoD)?
2. You have taken a 'normal structure' within the meaning of AS4997 to arrive at a 10% encounter probability as being a reasonable basis for design of the maritime structure. May be worth a discussion as to whether properties being protected along Collaroy Narrabeen could fall into the category of 'high property value.....' which would involve a different (lower) encounter probability.
3. Reference is made in the coastal engineering report to adoption of a scour level of -2m AHD. Note that JK Geotechnics adopted a scour level of -1.5m AHD in order to achieve a suitable Factor of Safety of 1.5 in the case of the WALLAP analysis (see p.12 or JK report, Section 4.4.2). In part they justify this on the basis of the existence of the rock toe, but the coastal engineering report notes that the rock toe has been ignored in the structural analysis. The discussion within the various reports may need some cross referencing/consistency.

At a meeting between Council staff (Daniel Milliken, Craig Morrison), Greg Britton and Peter Horton on 20 September 2018, Council also requested additional justification as to why the proposed design and alignment had been adopted, rather than a standard rock revetment. This issue has been denoted as "Item 4" herein for convenience.

Responses to Items 1 to 4 are provided below in turn.

2. RESPONSES TO ITEMS 1 TO 4

2.1 Item 1

With regard to Item 1, a separate structural engineering design statement has been provided by James Taylor & Associates, see Attachment A.

2.2 Item 2

2.2.1 Encounter Probability

With regard to Item 2, it is agreed that a “normal structure” as per AS 4997-2005 refers to a “normal maritime structure” facility category as per Table 5.4 of AS 4997, and with reference to Table 6.1 of AS 4997, a normal commercial structure is implied. With Table 6.1 of AS 4997 also noting that the next category of structure would be a “special structure / residential” (or “special structures / residential developments” in Table 5.4), then it is considered reasonable (on face value) that coastal protection works (excluding rock works) protecting a residential development be classified as Facility Category 4 (“special structure / residential”).

That stated, correspondence in 2014 with one of the members of the committee that prepared AS 4997, Andrew Patterson, indicated that the context of the facility categories in AS 4997 was in relation to multi-unit overwater developments such as at Walsh Bay, Woolloomooloo Finger Wharf, and Pymont. These sites were required by government to have a design life of 100 years, and the implications of having to carry out repairs on an overwater building are different (more onerous) to a normal suburban house using normal tradespeople. Andrew advised that it would not be unreasonable to adopt a shorter design life, say 50 years, for single suburban dwellings (although he thought that multi-unit dwellings should remain as a 100 year life).

It is uncertain if typical residential development should have a Function Category of 2 (“normal structures”) or 3 (“high property value or high risk to people”) as per AS 4997. Given the relatively high property values at the subject properties, the fact that one property contains a unit block, and to avoid argument, a Function Category of 3 has been adopted herein.

For Facility Category 4, from Table 6.1 of AS 4997 a design life of 100 years should be adopted. From Table 5.4 of AS 4997, for Facility Category 4 and Function Category 3, a 2,000 year Average Recurrence Interval (ARI) wave height should be adopted for design. This event has a 4.9% probability of occurring over the 100 year design life.

It is not intended to revise the design life for the proposed works from 60 years, as adopted in the original DA documents and as justified therein, and consistent with Council’s requirements and the applicable CZMP. Based on the comments from Andrew Patterson above, this is considered to be reasonable. Applying a 2,000 year ARI wave height to a 60 year life, this event has a 3.0% probability of occurring over this life. Therefore, it is considered to be reasonable to adopt a 3% encounter probability for the proposed works, rather than a 10% probability as adopted in the original DA documents.

2.2.2 Implications of Revised Encounter Probability

In the Coastal Engineering Report submitted with the DA, the following was noted:

“However, the proposed works have been structurally designed ignoring the presence of the rock toe, and allowing for scour down to -2m AHD adjacent to the wall (see Section 6.4 for further discussion on scour). This is conservative as:

- the rock toe would be expected to limit scour, or infill any scour hole that formed; and
- significant scour of the (hard) cemented sand layer would not be expected, with about 2m depth of scour of cemented sand required to reach the design scour level of -2m AHD.

Realisation of a scour level of -2m AHD adjacent to the wall is barely credible, and the probability of this scour level being realised over the design life is considered to be much less than 10%.

Furthermore, as discussed in the geotechnical report submitted with the subject DA (JK Geotechnics, 2018), structural design has been undertaken assuming a conservative groundwater level difference of 3.5m between the landward and seaward sides of the wall at the time of maximum scour.

With these conservative scour and groundwater assumptions, it is considered that the piling and anchor design is consistent with the intent of AS 4997, with regard to much less than a 10% probability of the ultimate design conditions being realised over the design life”.

The above comments are reinforced herein, except that it can be stated (with changes from the above comments in bold) that “realisation of a scour level of -2m AHD adjacent to the wall is barely credible, and the probability of this scour level being realised over the design life is considered to be much less than **3%**” and “with these conservative scour and groundwater assumptions, it is considered that the piling and anchor design is consistent with the intent of AS 4997, with regard to much less than a **3%** probability of the ultimate design conditions being realised over the design life”.

It is reiterated that the scour level can only be realised if the rock toe fails and boulders are transported seaward of the wall, and the cemented sand layer erodes about 2m. The ultimate design condition can only be reached if there is a 3.5m groundwater level difference between the landward and seaward sides of the wall at the time of maximum scour.

2.3 Item 3

With regard to Item 3, a separate geotechnical engineering response has been provided by JK Geotechnics, see Attachment B.

2.4 Item 4

With regard to Item 4, the main reasons why a standard rock revetment was not adopted at the subject properties were as follows:

- a standard rock revetment has a large cross-shore footprint (in the order of 20m for the crest level required at the subject properties);
- it would not be geometrically possible to fit a structure with this footprint seaward of existing dwellings and entirely on private property at some properties, namely 1150, 1158 and 1168; and
- the cost, difficulty and uncertainty in obtaining landowner's consent from the Department of Industry – Lands & Water meant that construction entirely on private property was required.

A lower footprint structure had to therefore be designed to both fit within the subject properties and not encroach on existing dwellings, as has been proposed.

The alignment adopted is appropriate and indeed highly beneficial to the public as:

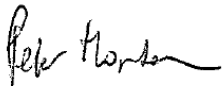
- the works are entirely on private land;
- the proposed works can integrate with surrounding works without negatively impacting on these existing or future upgraded works;
- the seaward extent of the proposed works is considerably less than the existing works. In particular, at 1168, where existing works extend about 5m to 11m (average 8m) seaward of the property on to Crown Land, this rock will be entirely removed, at the 'pinch point' (narrowest beach area that is generally the first location along Collaroy-Narrabeen Beach to be impassable for the public at times of elevated waves and water levels at present). The seaward extent of rock will also be reduced at 1150, 1166a and 1166b, and essentially be the same as existing at the other 7 subject properties; and
- the more landward alignment of the proposed works (compared to existing) would lead to a significant increase in the proportion of time that the public beach is passable alongshore by the public.

3. SALUTATION

Should you require any additional information or clarification, please do not hesitate to contact Peter Horton via mobile on 0407 012 538, or via email at peter@hortoncoastal.com.au.

Yours faithfully

HORTON COASTAL ENGINEERING PTY LTD



Peter Horton
Director and Principal Coastal Engineer

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Refer to Attachments A and B overleaf