

Northern Beaches Council
Attention: Mr Daniel Milliken
(submitted online at the NSW Planning Portal at <https://www.planningportal.nsw.gov.au/>)

5 January 2023

Response to Request for Information on Survey and Mean High Water Mark Matters for Mod2022/0322, Relating to Construction of Upgraded Coastal Protection Works at 1114 Pittwater Road Collaroy (Flight Deck)

1. INTRODUCTION AND BACKGROUND

On 5 September 2022, Northern Beaches Council (in an email from Daniel Milliken to Peter Horton) requested a response to the following matters:

1. The Applicant must provide Council with a Survey, prepared by a suitably qualified Surveyor, prior to the approval of any works, which shows the exact location of the proposed works.
2. All Surveys are to show relevant boundaries in accordance with Part 2 of the *Surveying and Spatial Information Regulation 2017* and identify each of, the existing mean high water mark, the original mean high water mark and any former mean high water mark by reference to bearings and distances from the boundary. Note: If there is a difference between the existing mean high water mark and any former mean high water mark, Council will rely on the most westerly of those lines, so as to ensure proposed works are constructed wholly within privately owned land.
3. The survey is to be accompanied by a Report from the Surveyor which certifies that the survey has been prepared in accordance with Part 2 of the *Surveying and Spatial Information Regulation 2017* and if there is a new mean high water mark shown in the survey document, the reasons for the change.

Specific responses to these items are set out in turn in Section 5. Prior to this and to provide supporting information to these responses, a definition of Mean High Water Mark (MHW) is provided in Section 2, analysis to determine MHW positions seaward of the subject property since 1941 is presented in Section 3, and discussion on boundary surveys is provided in Section 4.

2. DEFINITION OF MHW

In Clause 5 of the *Surveying and Spatial Information Regulation 2017*, “mean high-water mark means the line of mean high tide between the ordinary high-water spring and ordinary high-water neap tides”.

A diagram of various tidal planes as applies in the ocean offshore of the subject property, derived from the *NSW Tide Charts 2023* (Manly Hydraulics Laboratory, 2022), is presented in Figure 1.

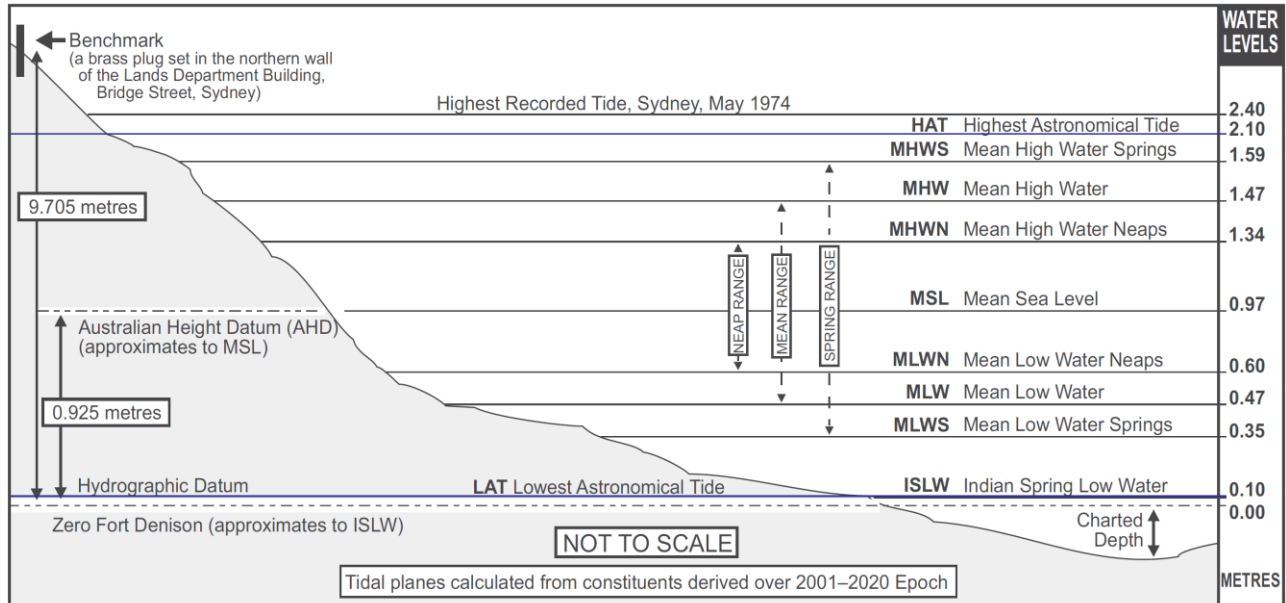


Figure 1: Tidal planes in Sydney from *NSW Tide Charts 2023*

The MHW as defined in the *Surveying and Spatial Information Regulation 2017* is represented by the intersection of the MHW water level in Figure 1 with adjacent land, which is between MHWS and MHWN as per that definition. In Figure 1, MHW is equal to 1.47m relative to Chart Datum. To express this relative to Australian Height Datum (AHD), it is necessary to subtract 0.925m, as depicted in Figure 1. Therefore, MHW is equal to 0.55m AHD at present based on the *NSW Tide Charts 2023*, which can be considered as a reliable and up-to-date source of this information.

In Table 1, published MHW values in the last nine annual versions of the Manly Hydraulics Laboratory *NSW Tide Charts* are listed. It is evident that there has only been minor (up to 30mm) variation in reported MHW values over the last decade.

Table 1: MHW from NSW Tide Charts from 2014 to 2022

Year	Period of analysis	MHW (m AHD)
2014	1990-2010	0.53
2015	1990-2010	0.53
2016	1990-2010	0.53
2017	1990-2010	0.53
2018	1990-2010	0.53
2019	1990-2010	0.53
2020	1990-2010	0.53
2021	2001-2020	0.58
2022	2001-2020	0.55

Sand levels on Collaroy Beach seaward of the subject property vary constantly in response to varying ocean water levels, wave and wind conditions. At any instant of time, a MHW can be

defined as the location of the 0.55m AHD contour on the beach, where a 0.55m AHD water level would extend to on the sand¹. These instantaneous MHWMs are not considered to represent the single adopted MHW as per the *Surveying and Spatial Information Regulation 2017*. In the same way that MHW is determined by Manly Hydraulics Laboratory based on analysis periods in the order of 20 years, it is considered that any single adopted MHW seaward of the subject property should be based on the average of many instantaneous MHWMs determined over a long period of at least many decades, to account for the constant variability in sand levels on the beach².

3. ANALYSIS OF MHW POSITIONS SEAWARD OF SUBJECT PROPERTY FROM NSW BEACH PROFILE DATABASE

A total of 26 beach profile dates have been captured at and seaward of Flight Deck in the NSW Beach Profile Database since 1941, up to 2022. This data has Map Grid of Australia (MGA) coordinates and AHD levels. Five cross section locations were analysed for the report herein, with an alongshore spacing of 20m, to determine the position of 0.55m AHD on each date (giving 130 data points). This position was determined by linear interpolation between elevations above and below 0.55m AHD, or if the profile did not extend down to 0.55m AHD it was extrapolated based on continuing the profile at the same slope as the previous two more landward data points (combined with a check that the slope was realistic). The 26 MHW positions at various dates from the NSW Beach Profile Database are depicted in Figure 2³, with the 5 beach profile locations depicted in black.

The average MHW determined from the 26 NSW Beach Profile Database MHW positions is depicted in red in Figure 2. This average MHW is located about 31m to 32m seaward of the subject property, and so happens to be similar to the 1993 MHW.

Hill & Blume (registered surveyor Paul Anthony Cechellero) has investigated available historical MHWs, and found a single MHW defined as part of DP1166942. This DP was registered in 2011, but the details of when the MHW was determined are unknown, and it can be noted that no fieldwork was undertaken to prepare the DP. This DP1166942 position is also depicted in Figure 2. This surveyor also captured the MHW on the date of the survey on 2 December 2022, as depicted in Figure 2.

It can thus be confidently asserted that the long-term average MHW in the vicinity of Flight Deck is located well seaward of the property, in the order of 30m.

It can be noted that if MHW had been corrected for historical sea level rise, then the oldest MHWs determined would likely have been based on a lower MHW value, and hence would be slightly further seaward.

¹ It is recognised that with sea level rise recorded in Sydney over the last century, MHW generally would generally get lower moving back in time over timescales of decades.

² As stated by Gordon (2022), “the ‘location’ of MHW is, due to beach fluctuations, a probabilistic distribution rather than a single line; a zone rather than a unique location. So, seeking to establish a true ‘mean’ position of a ‘water mark’ for an open-coast beach would require extensive observations aimed at generating a statistical distribution which could be used to establish the modal, most likely, location of MHW”. Extensive observations over 28 dates have been used herein to establish the mean (average) MHW position from 1941-2022 (a period of 81 years) seaward of the subject property.

³ Note that although the 26 NSW Beach Profile Database MHWs in Figure 2 only show a year (eg 1941) or a month and year (eg Apr 2021), they are not averaged over a month or year. They are all instantaneous MHWs captured at an instant of time on a particular day in that year or month/year.

Note also that some of the MHWMs determined from the NSW Beach Profile Database, such as in June 2016, were derived at times of severe storm erosion. Given that the change in sand levels due to erosion in this storm was perceptible (as opposed to being so slow and gradual as to be, in a practical sense, imperceptible to the naked eye), it is considered to be arguable that such a MHWM would be a valid consideration in assessing the long-term average MHWM at this location⁴.

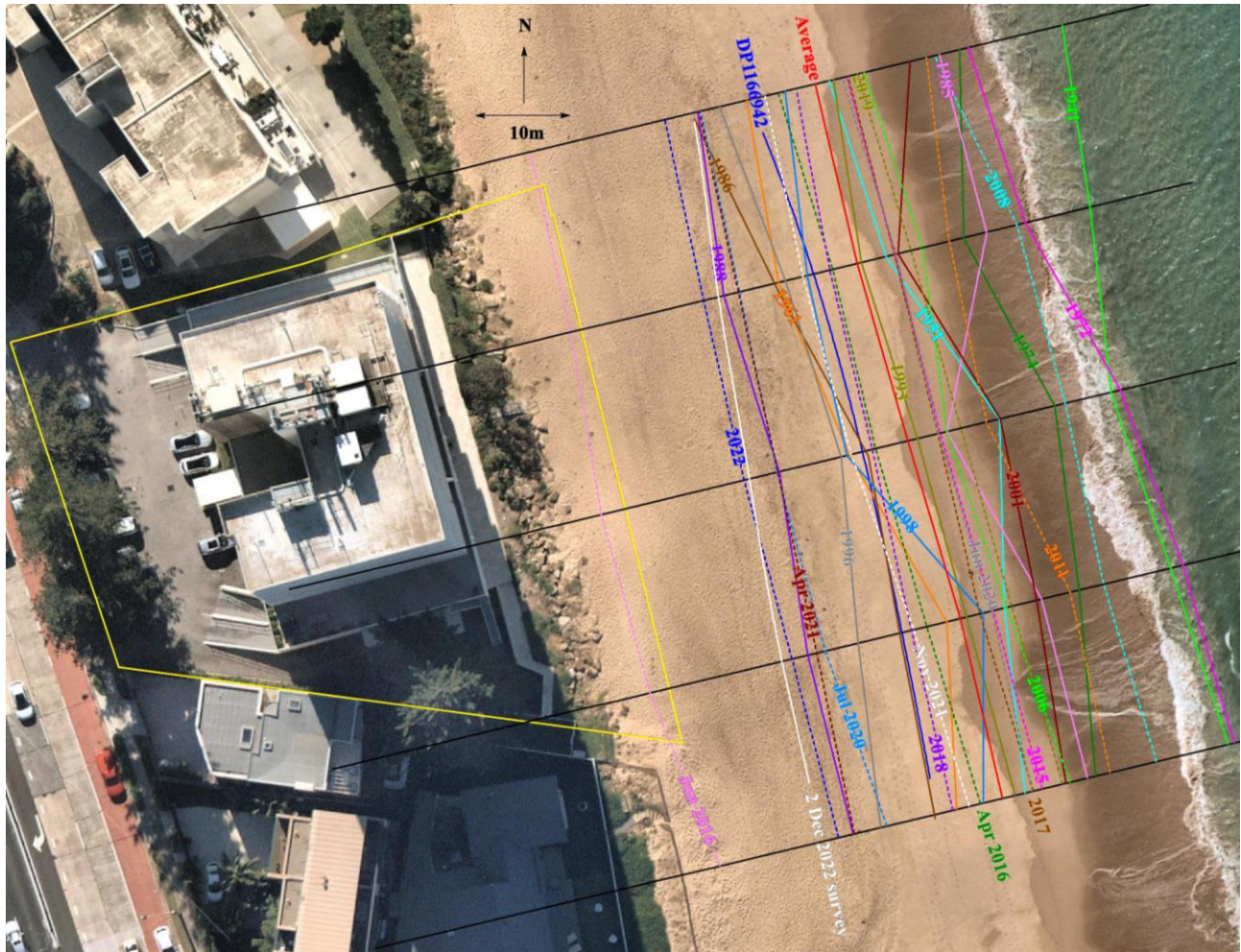


Figure 2: MHW positions at and seaward of Flight Deck from 1941 to 2022

4. BOUNDARY SURVEYS

Note that there are two property boundaries depicted in Figure 2, namely:

- the original DA survey boundary of 1 March 2017 (red); and
- the boundary surveyed by Hill & Blume on 2 December 2022 (yellow).

⁴ If a property boundary is defined on the basis of MHW, which does not actually apply at Flight Deck, if a change in the position of the MHW did not arise from natural, gradual and imperceptible erosion then the boundary is not changed, as per Clause 48(3) of the *Surveying and Spatial Information Regulation 2017*. It is postulated that the corollary of this is that a MHW should not be determined after perceptible storm erosion, if it is to be valid. This corollary has been ignored herein, and all 26 MHWs from the NSW Beach Profile Database were used to define the average.

The Hill & Blume survey, and an accompanying letter, are provided as Appendix A and Appendix B respectively.

It is evident from Figure 2 that the two boundary surveys are essentially indistinguishable. The distance between the NE corner of the boundary in the two surveys is 8mm, and it is a 15mm difference at the SE corner. The 2022 seaward boundary is located about 7mm seaward of the 2017 boundary. In Appendix B, it is noted that the boundaries in the 2022 survey have been defined as accurately as possible, so can be considered to be exact boundaries.

5. RESPONSE TO COUNCIL REQUESTS

5.1 Item 1

With regard to Item 1, the DA engineering drawings have been prepared using real world MGA coordinates, based on the 2017 survey. With the drawings set out using the 2017 survey, the proposed works are by definition within the 2022 boundary, as the 2022 boundary is slightly further seaward.

If required (although it can be stated to be unnecessary to do this to ensure that the works will be entirely within the property boundary), it is suggested that Council issues a consent condition that the Construction Certificate Drawings are set out using the 2022 survey boundary.

It is considered to be cumbersome and unnecessary for a survey to show the location of the works, when the engineering drawings have been set out using the 2017 survey, so by definition will show the exact location of the works and will be within the exact boundary. The 2017 and 2022 survey boundaries were supplied by the surveyor as dwg files to MGA coordinates, so no boundary interpretation whatsoever was and is required for the engineering drawings.

5.2 Item 2

In Appendix B, the surveyor has confirmed that the survey has been prepared in accordance with Part 2 of the *Surveying and Spatial Information Regulation 2017*, and also noted that the boundaries in the survey have been defined as accurately as possible, so can be considered to be exact boundaries. The survey in Appendix A included two MHWMs, as discussed in Section 3.

It is not considered to be appropriate for Council to refer to an instantaneous MHW as potentially defining the property boundary, as can be inferred by “if there is a difference between the existing mean high water mark and any former mean high water mark, Council will rely on the most westerly of those lines, so as to ensure proposed works are constructed wholly within privately owned land”. As discussed in Section 2 and Section 3, the long-term average MHW is relevant to this matter and to boundary definition, not any single instantaneous MHW⁵.

⁵ Gordon (2022) considered that right line boundaries were lost when land “permanently falls below MHW” (underline added herein). This is consistent with the view expressed herein that any single MHW on a variable sand level beach cannot be used to validly define what is the MHW for assessing such matters.

5.3 Item 3

In Appendix B, the surveyor has confirmed that the survey has been prepared in accordance with Part 2 of the *Surveying and Spatial Information Regulation 2017*. The MHWMs depicted in the survey and as derived from the NSW Beach Profile Database do not alter the current right line boundaries in the Strata title, as the long-term average MHW is in the order of 30m seaward of the property. Neither of the MHWMs depicted on the survey are considered to represent the long-term average MHW, with this represented by the red line in Figure 2.

6. REFERENCES

Gordon, Angus (2022), "Who Owns the Beach? Living with Increasing Uncertainty", *29th NSW Coastal Conference*, Kingscliff, 31 May – 2 June


Manly Hydraulics Laboratory(2022), *NSW Tide Charts 2023*, published by the NSW Department of Planning and Environment, December, ISSN 1039-1231

7. 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

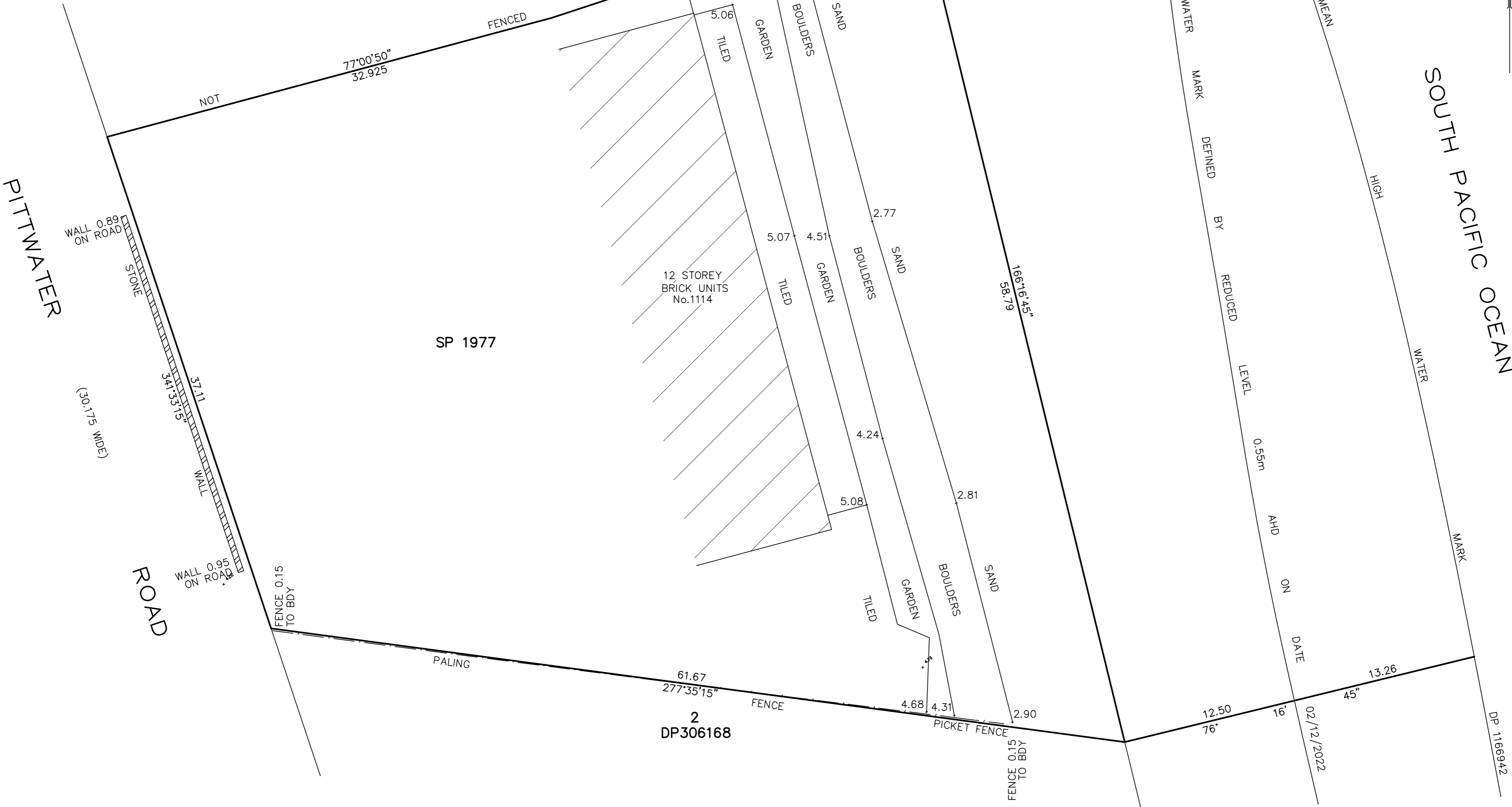
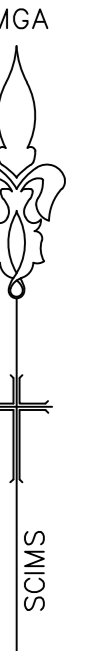
Director and Principal Coastal Engineer

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APPENDIX A: HILL & BLUME SURVEY

PITTWATER ROAD

SOUTH PACIFIC OCEAN



SP 677

SP 1977

12 STOREY BRICK UNITS No.1114

2 DP306168

- 1) A SITE AND BOUNDARY SURVEY HAS BEEN CARRIED OUT.
- 2) ORIGIN OF LEVELS IS PM 3988, RL = 5.085 A.H.D.

Surveyor: PAUL ANTHONY CEHELLERO Date of Survey: 2 DECEMBER 2022 Surveyor's Ref: 64242 PC	PLAN OF BOUNDARIES OVER SP 1977 BEING 1114 PITTWATER ROAD, COLLAROY.	L G A : NORTHERN BEACHES Locality: COLLAROY Subdivision No: Lengths are in metres. Reduction Ratio 1:200	Registered	DP
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APPENDIX B: HILL & BLUME LETTER ACCOMPANYING SURVEY

05 January, 2023
64242

Northern Beaches Council

Attention: Mr Daniel Milliken

Re: Response to Request for Information on Survey and Mean High Water Mark Matters for Mod2022/0322, Relating to Construction of Upgraded Coastal Protection Works at 1114 Pittwater Road Collaroy (Flight Deck)

1. Our accompanying survey dated 2/12/2022 shows relevant boundaries in accordance with Part 2 of the *Surveying and Spatial Information Regulation 2017* and identifies each of, the existing mean high water mark (defined by RL 0.55 AHD), and the former mean high water mark by DP1166942 prepared by Crown Lands and registered in 2011. Please note that the seaward boundary of SP1977 is not a MHW, but a fixed Torrens title boundary which is many metres west of the MHW. The boundaries in this survey have been defined as accurately as possible, so can be considered to be exact boundaries.
2. The survey indicates that there is a new mean high water mark and is shown in the survey document, the reasons for the change are the variations in sand movement from time to time.
3. I have reviewed the report of Horton Coastal Engineering entitled "Response to Request for Information on Survey and Mean High Water Mark Matters for Mod2022/0322, Relating to Construction of Upgraded Coastal Protection Works at 1114 Pittwater Road Collaroy (Flight Deck)" dated 5/1/2023, and Hill & Blume concurs with this report.

Yours faithfully,
HILL & BLUME PTY LIMITED



Registered Surveyor