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Estuarine Risk Management Report on Works at Manly Wharf

1. INTRODUCTION

It is proposed to undertake internal alterations and additions to a retail tenancy at Manly Wharf, hereafter denoted as the 'site'. A Development Application (DA) is to be submitted to Northern Beaches Council for these works, and Council requires an Estuarine Risk Management Report as part of the DA, as set out herein.

The report author, Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER], is a professional Coastal Engineer with 32 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 completed numerous DA coastal engineering studies in the Manly area, and has inspected the area in the vicinity of the site on several occasions over his career. He completed a specific recent inspection of the site on 11 June 2024.

All levels given herein are to Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level in the ocean adjacent to the NSW mainland, and in Sydney Harbour adjacent to the site, at present.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with 19 drawings of the proposed development prepared by Acme (namely Drawing Numbers A.01.01, 02, 02A, 02B, 03, 03A, 03B, 04, 04A, 04B; A.02.00, 00A, 01, 01A, 01B; A.05.01 and 02; and A.18.01 and 02), various revisions up to J, and all dated 29 July 2024.

A site survey completed by Sydney Surveyors was also provided (reference 18803_1C, 4 sheets, and dated 30 August 2023).

3. EXISTING SITE DESCRIPTION

The site is located around the centre of Manly Cove, with a vertical aerial view in Figure 1, oblique aerial view in Figure 2, and site photographs in Figure 3 and Figure 4.

Figure 1: Vertical aerial view of site on 7 December 2023, with proposed area of (internal) works in red outline with yellow shading

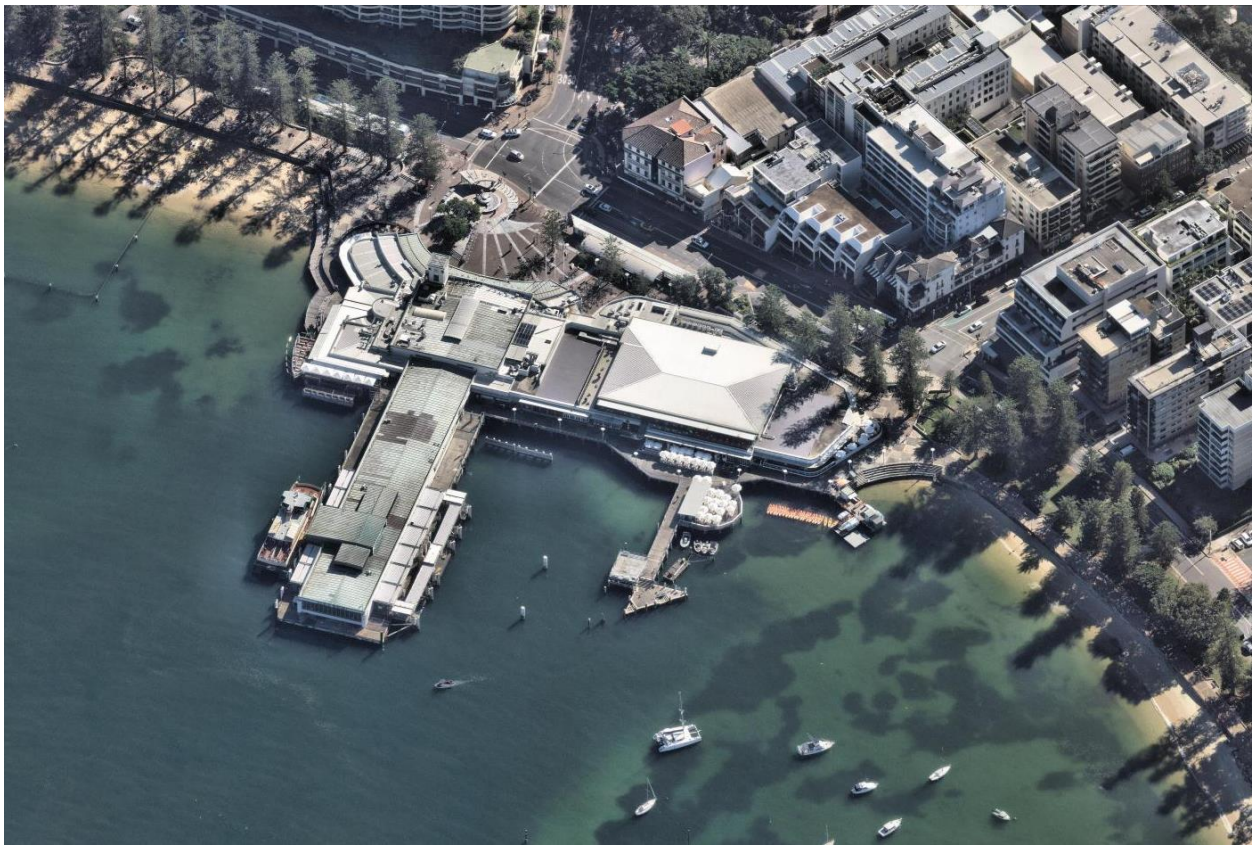

Figure 2: Oblique aerial view of site on 7 April 2024, facing north

Figure 3: View of site on 11 June 2024, facing north, with entrance area to be altered at arrow

Figure 4: View of southern entrance area to be altered at site on 11 June 2024, facing NNE

The structure at the site has three levels, namely a basement with a finished floor level of about -0.6m AHD, ground floor at 3.1 to 3.6m AHD, and first floor at 6.6m to 7.6m AHD. Based on the survey, the promenade along the southern face of the site, which is suspended over the harbour, has a finished surface elevation of 3.1m AHD at its offshore edge. The existing finished floor level of the area to be altered is 3.52m AHD.

Based on NSW Government LiDAR and reflectance data collected in 2018, seabed elevations in the vicinity of the location depicted in Figure 4 vary from about -1.8m AHD at the offshore edge of the promenade, and -2.0m AHD at 10m offshore of the promenade.

4. PROPOSED DEVELOPMENT

It is proposed to undertake internal alterations and additions to a retail tenancy (former supermarket) to create a public bar and microbrewery. The floor level of this area is to be unchanged at 3.52m AHD.

The only direct entry to this area from the southern side of the site is via the entrance visible in Figure 4. This entrance area is to be altered with a ramp added on the western side of the entry (an existing ramp is being removed on the eastern side of the entry), and steps added in the centre of the entry. Floor levels are not changing (3.08m AHD at the promenade, 3.50m AHD at the entry, and 3.52m AHD at the vestibule and Barrel Hall). Basement toilets are also being relocated to the ground floor at the western end of the Barrel Hall.

Public toilets are proposed on the ground floor, replacing existing toilets in the basement, with this basement area being converted to storage. There is to be no change to any of the entry levels to the basement from stairs or the car park ramp from the street. Water levels would have to exceed 4.7m AHD to flow down the basement carpark ramp. Water levels would have to exceed 3.5m AHD to flow down any stairs, with the most exposed location to wave overtopping being at the location shown on Figure 4.

5. DESIGN LIFE

A 60-year design life (that is, at 2084) has been adopted for the proposed development. This is the same design life as adopted in the *Coastal Zone Management Plan [CZMP] for Collaroy-Narrabeen Beach and Fishermans Beach*, and the *CZMP for Bilgola Beach (Bilgola) and Basin Beach (Mona Vale)*, that were prepared by the author for Council (in previous employment) and gazetted on 7 April 2017 and 14 July 2017 respectively . Although these CZMPs do not geographically apply at the site, they are the only gazetted CZMPs in the Northern Beaches Council area, and hence are relevant to consider in the selection of design life.

As justified in the CZMPs, a 60 year life is considered to be appropriate for infill development as it is consistent with the design life used in various Australian Standards (eg *AS 3600 – Concrete structures*), tax legislation, and community expectations.

Based on *Australian Standard AS 4997 - Guidelines for the Design of Maritime Structures*, and classifying the works as a 'normal structure', the required design event for a 60 year life is 600 year Average Recurrence Interval (ARI). Therefore, a 600 year ARI design event has been adopted herein, which has a 9.5% probability of occurring over the 60 year life.

The adopted 60 year life (planning period) applies to broad considerations of estuarine risk to Manly Wharf as a whole. It is not intended that this planning period is prescriptive in regard to the life of the internal fitout or external entry components adopted in the proposed development, but rather is the life adopted to assess the structural risk to Manly Wharf as a whole from estuarine processes.

6. ESTUARINE PROCESSES

6.1 Design Still Water Level at End of Design Life

In Rhelm (2022), the 100 year Average Recurrence Interval (ARI) present day water level at the site is reported as 1.51m AHD. This includes the effects of astronomical tide, storm surge and other oceanographic effects (combined level of 1.44m AHD), plus local wind setup (0.07m).

Wave action can temporarily and periodically increase water levels above this level, particularly if large offshore swell waves propagate through Sydney Heads and reach the site.

Based on Department of Environment, Climate Change and Water [DECCW] (2010) and using linear-log extrapolation, the 600 year ARI elevated still water level at the site is 1.52m AHD, ignoring local wind setup. Including local wind setup, the design 600 year ARI water level is 1.59m AHD.

At present at the site, Mean High Water is approximately 0.5m AHD and Mean High Water Springs is about 0.6m AHD. 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 (DECCW, 2010).

In Rhelm (2022), sea level rise values of 0.4m at 2050 and 0.9m at 2100 were applied. However, it is considered to be most appropriate to directly derive sea level rise values from Intergovernmental Panel on Climate Change [IPCC] (2021), which is widely accepted by competent scientific opinion.

The sea level rise values presented in Table 1 (at 2084) were determined for the five illustrative scenarios (shared socioeconomic pathways, SSP's[1]) considered in IPCC (2021)[2]. This includes regional sea level rise variations at Sydney as reported by the Physical Oceanography Distributed Active Archive Center (PO.DAAC), a NASA Earth Observing System Data and Information System data centre operated by the Jet Propulsion Laboratory in Pasadena, California. The sea level rise values were determined at 2084, relative to the average sea level from a 1995-2014 baseline (taken to be at 2005).

Table 1: Mean sea level rise (m) at Sydney from a 1995-2014 average level (taken at 2005) to 2084 derived from IPCC (2021) and PO.DAAC

Emissions Scenario (Shared Socioeconomic Pathway)	Exceedance Probability		
	95% exceedance	Median	5% exceedance
SSP1-1.9	0.12	0.27	0.53
SSP1-2.6	0.16	0.32	0.61
SSP2-4.5	0.24	0.42	0.72
SSP3-7.0	0.31	0.50	0.83
SSP5-8.5	0.36	0.57	0.94
Average	0.24	0.41	0.73

Taking the median exceedance probability and average of the 5 SSP's, sea level rise of 0.41m at 2084 (relative to 2005) was derived. Given that Rhelm (2022) water levels were derived at 2010 (implicitly, given that the DECCW water levels noted above were derived in 2010), the sea level rise should be determined relative to 2010. Watson (2020) found that the rate of sea level rise from satellite altimetry in the SE Australia region was 3.5mm/year from 1992-2019. Applying this rate from 2005 to 2010, the projected sea level rise (taking the median exceedance probability and average of the 5 SSP's) from 2010 to 2084 at Sydney is 0.39m.

[1] Known as representative concentration pathways in the previous IPCC (2013) assessment.
[2] The five illustrative scenarios represent varying projected greenhouse gas emissions, land use changes and air pollutant controls in the future.

Therefore, the design 600 year ARI estuarine still water level at 2084 is 1.98m AHD. This still water level is about 1.1m below the southern promenade surface level at the site.

6.2 Wave Action

Rhelm (2022) estimated that the 100 year ARI wave climate at the site was a significant wave height of 0.51m (average of the highest one-third of waves) and peak spectral wave period of 14.4s. Boat wakes with significant wave heights in the order of 0.8m are also possible.

With the promenade 1.1m above the 600 year ARI estuarine still water level at 2084 of 1.98m AHD, wave overtopping and wave runup on to the promenade would not be expected in the design event. In the design event, wave action would propagate below the promenade and runup the face of sheet piling located under the promenade and several metres landward of the offshore edge of the promenade, this remaining below the promenade.

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

The proposed development is understood to be fully enclosed from the harbour at the basement level. It is also not subject to wave action in the 600 year ARI design event in 2084 entering the ground floor, nor basement via the ground floor.

Therefore, the proposed development is at an acceptably low risk of damage from estuarine processes over an acceptably long life, without any controls required from a coastal engineering perspective (as long as the structure is maintained with the basement fully enclosed from the harbour, and the promenade at 3.08m AHD, over the design life).

The proposed development generally comprises an internal fitout to an existing building, so does not alter the risk exposure of the site to estuarine processes.

8. MERIT ASSESSMENT

8.1 *State Environmental Planning Policy (Resilience and Hazards) 2021*

Based on *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP Resilience) and its associated mapping, the site is within a "coastal environment area" and "coastal use area", as per Clause 2.10 and Clause 2.11 respectively of SEPP Resilience. However, these Clauses do not apply to land within the Foreshores and Waterways Area within the meaning of *State Environmental Planning Policy (Biodiversity and Conservation) 2021*. Therefore, with the site in the Foreshores and Waterways Area, Clause 2.10 and Clause 2.11 of SEPP Resilience are not applicable at the site.

Based on Clause 2.12 of SEPP Resilience, "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 development is unlikely to have a significant impact on coastal hazards or increase the risk of coastal hazards in relation to any other land, as it is at an acceptably low risk of being damaged by estuarine (coastal) processes for an acceptably rare storm over an acceptably long life, and would not interact with harbour waters any differently than the existing situation.

Based on Clause 2.13 of SEPP Resilience, "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 site.

8.2 Clause 6.10 of *Manly Local Environmental Plan 2013*

The proposed development is within a Foreshore Area as per *Manly Local Environmental Plan 2013* (LEP 2013), so Clause 6.10 of LEP 2013 applies. Based on Clause 6.10(2)(a) of LEP 2013, "the extension, alteration or rebuilding of an existing building wholly or partly in the foreshore area", as is proposed, is permissible in the Foreshore Area.

Based on Clause 6.10(3) of LEP 2013, " development consent must not be granted under this clause unless the consent authority is satisfied that:

(a) the development will contribute to achieving the objectives for the zone in which the land is located, and
(b) the appearance of any proposed structure, from both the waterway and adjacent foreshore areas, will be compatible with the surrounding area, and
(c) the development will not cause environmental harm such as:
    (i) pollution or siltation of the waterway, or
    (ii) an adverse effect on surrounding uses, marine habitat, wetland areas, fauna and flora habitats, or
    (iii) an adverse effect on drainage patterns, and
(d) the development will not cause congestion or generate conflict between people using open space areas or the waterway, and
(e) opportunities to provide continuous public access along the foreshore and to the waterway will not be compromised, and
(f) any historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land on which the development is to be carried out and of surrounding land will be maintained, and
(g) in the case of development for the alteration or rebuilding of an existing building wholly or partly in the foreshore area, the alteration or rebuilding will not have an adverse impact on the amenity or aesthetic appearance of the foreshore, and
(h) sea level rise or change of flooding patterns as a result of climate change has been considered"

With regard to (a), the development location is understood to be in an area that is not zoned to be within LEP 2013.

With regard to (b), the development mostly involves internal alterations, with only minor changes to external appearance, as addressed by others.

With regard to (c), as internal alterations are proposed, the proposed development is unlikely to interact with harbour waters if appropriate construction environmental controls are applied. Therefore, environmental harm would not be expected. The proposed development would not alter drainage patterns, being over water.

With regard to (d), the existing retail uses and development extent are not be altered, and nor would public access as per (e).

With regard to (f),these are not coastal engineering matters and are to be addressed by others.

With regard to (g), see Item (b) above.

With regard to (h), sea level rise was considered in Section 6.1 herein.

The Foreshore Area is also discussed in Chapter 4.1.4.5 of *Manly Development Control Plan 2013* (DCP), but by addressing the above, the DCP has also been addressed.

8.3 *State Environmental Planning Policy (Biodiversity and Conservation) 2021*

The site is within the Sydney Harbour Catchment, in a "Foreshores and Waterways Area", is a "Strategic Foreshore Site", and is adjacent to a "Rocky Foreshores and Significant Seagrasses" area as per *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP Biodiversity).

The proposed development would not significantly affect water quality if appropriate construction environmental controls are applied, nor water quantity, satisfying Clause 6.6 of SEPP Biodiversity.

The proposed development would not cause an adverse impact on terrestrial, aquatic or migratory animals or vegetation, does not involve the clearing of riparian vegetation, would not cause erosion or sedimentation (with hydrodynamics unaltered), and would not have an adverse impact on wetlands (with no wetlands in proximity), satisfying Clause 6.7 of SEPP Biodiversity.

The proposed development would not affect flooding or cause the release of pollutants, satisfying Clause 6.8 of SEPP Biodiversity.

The proposed development would not affect public foreshore access, satisfying Clause 6.9 of SEPP Biodiversity.

The proposed development would not affect downstream catchments, satisfying Clause 6.10 of SEPP Biodiversity.

The site is within Zone 2 - Environment Protection as per Clause 6.26 of SEPP Biodiversity. As all works are internal, the proposed development would not affect seagrass and ecological communities in rocky foreshore areas, satisfying Clause 6.32 of SEPP Biodiversity.

Although a Strategic Foreshore Site, based on Clause 6.46(1)(d) and (e) of SEPP Biodiversity, Division 5 of SEPP Biodiversity does not apply to the proposed development as it comprises "structural or non-structural alterations to the interior of an existing building" and "minor structural or non-structural alterations to the exterior of an existing building".

With satisfaction of the above, and only internal alterations proposed, there are no additional matters in the *Sydney Harbour Foreshores and Waterways Area Development Control Plan 2005* that need to be considered herein.

9. CONCLUSIONS

The proposed development at Manly Wharf is at an acceptably low risk of being damaged by coastal processes for an acceptably rare storm over an acceptably long life. With the southern promenade at the site being 1.1m above the 600 year ARI estuarine still water level at 2084 of

1.98m AHD, wave overtopping and wave runup on to the promenade would not be expected in the design event.

The proposed development satisfies the requirements of *State Environmental Planning Policy (Resilience and Hazards) 2021* (Clauses 2.12 and 2.13), Clause 6.10 of *Manly Local Environmental Plan 2013*, and *State Environmental Planning Policy (Biodiversity and Conservation) 2021* for the matters considered herein.

10. REFERENCES

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

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Watson, Phil J (2020), "Updated Mean Sea-Level Analysis: Australia", *Journal of Coastal Research*, Volume 36, Issue 5, September, pp. 915-931

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.

Yours faithfully
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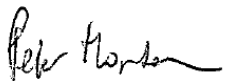

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