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Our reference: 8A0094gwb_prh-seawall construction-v3
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**Subject: Public Domain (Stage 1A) Planning Application, Barangaroo South
Seawall Construction / Modification**

Dear Mark,

I refer to our recent discussions regarding the Department of Planning & Infrastructure Director-General's environmental assessment requirements (DGRs) for the preparation of an Environmental Impact Statement (EIS) for the proposed Stage 1A Public Domain, Barangaroo South. In these discussions you requested we address Key Issue No 7 which states:

7. Seawall Construction/Modification

The EIS should address whether modifications to the estuarine foreshore comply with the recommendation of *Environmentally Friendly Seawalls – A guide to improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries* (DECC, 2009). In addition, EIS should address the impacts of modifying the existing seawalls on the water quality of Darling Harbour.

Our assessment is set out below. It includes firstly a description of the proposed modifications to the estuarine foreshore, and an outline of the recommendations of *Environmentally Friendly Seawalls – A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries* (DECC, 2009).

Description of the Proposed Modifications to the Estuarine Foreshore

The existing foreshore along the Stage 1A Public Domain, Barangaroo South, comprises a vertical faced reinforced concrete caisson and coping beam (together these features are referred to in this letter report as the seawall). The crest of the coping beam is at a level of 2.1 to 2.2m above Australia Height Datum (AHD).

It is proposed to raise the level of the crest of the seawall to a minimum 2.5m AHD to address the greater risk of inundation behind the seawall over time due to climate change, in particular sea level rise. The risk assessment relating to climate change and sea level rise is set out in Arup (2013).

The extension of the seawall up to a minimum 2.5m AHD is proposed to comprise a vertical structure. A timber boardwalk will be installed over a width of 4m landward of the elevated seawall crest. **Figure 1** shows the proposed arrangement. In this Figure the seawall crest level is depicted as 2.9m AHD.

Environmentally Friendly Seawalls (DECC, 2009)

This document sets out a range of techniques to increase the environmental and habitat values of both existing and new seawalls, while minimising disruption to natural processes. It advocates use of natural materials such as rock and emphasises three key principles:

- maximise the use of native foreshore and estuarine vegetation:
 - include estuarine vegetation such as saltmarsh in the seawall,
 - plant native foreshore vegetation behind the seawall and in the gaps of rock seawalls,
 - establish mangroves in front of the seawall,
- maximise habitat diversity and complexity:
 - create walls of boulders of varying sizes and shapes, or irregularly shaped and weathered blocks,
 - include pool or crevice areas that retain water at low tide, and create seawalls with blocks that extend outwards,
 - use blocks cut from rock without cement between them to provide gaps and crevices,
- create low-sloping seawalls or include changes of slope:
 - build seawall with a gentle slope using boulders,
 - use benches or steps to break up and vary the slope,
 - do not build vertical seawalls.

Importantly, the Environmentally Friendly Seawalls document deals with structures situated within the intertidal zone, ie. from Lowest Astronomical Tide (LAT) to Highest Astronomical Tide (HAT) or, currently, in terms of AHD, from -0.93m AHD (approximately LAT) to 1.08m AHD (approximately HAT).

Compliance of Proposed Seawall Modification with Environmentally Friendly Seawalls (DECC, 2009)

The proposed seawall modification involves an increase in crest level of the existing seawall from around 2.1 to 2.2m AHD, up to a minimum of 2.5m AHD. As such, the proposed modification is situated well above the current intertidal zone (-0.93m AHD to 1.08m AHD as noted above) and, accordingly, the Environmentally Friendly Seawalls Guideline document is not a relevant consideration for the seawall modification, at present.

Should a rise in mean sea level occur into the future associated with climate change the position of the intertidal zone relative to current AHD will also rise. The tidal range itself (LAT to HAT) would not change as this is related to the effects (mainly) of the sun and the moon.

Arup (2013) has set out a summary of sea level rise policy benchmarks and projections to the year 2100 as part of their climate change and sea level rise report for the Public Domain (Stage 1A). In order for the proposed modification section of the seawall to become intertidal

at some point into the future it would be necessary for sea level to rise a minimum of approximately 1.0m (2.1m AHD less 1.08m AHD).

A sea level rise of 1m is near the upper limit of estimates to the year 2100. It is in excess of the NSW Government's sea level rise planning benchmark value to 2100 of 0.9m included in the then NSW Sea Level Rise Policy Statement, November 2009¹.

Based on the above it is considered very unlikely that the modification section of the seawall would become intertidal over the life of the project, and thus very unlikely over time to fall within the scope of recommendations set out in Environmentally Friendly Seawalls (DECC, 2009). In any case, should this occur within the life of the project, adaption measures could be readily applied to that section of the seawall which becomes intertidal. Of the recommendations included in DECC (2009), such adaption measures would likely comprise pooling or crevice elements installed on the face of the seawall, since use of vegetation or creation of low-sloping elements would not be feasible due to water depth and geometrical/spatial constraints.

Impacts of Proposed Seawall Modification on the Water Quality of Darling Harbour

Construction Phase

The proposed seawall modification is situated directly above the existing reinforced concrete caisson and coping beam and should be able to be constructed fully from land. As such, the construction phase erosion and sediment control measures for the Public Domain, Barangaroo South, as discussed in detail in the Environmental Construction and Site Management Plan, prepared by Cardno in conjunction with Lend Lease Project Management & Construction (Cardno, 2011) would adequately address the potential for water quality impacts during construction of the seawall modification.

Should the use of over-water plant and equipment be proposed during construction of the seawall modification, it is recommended that a floating turbidity barrier be installed in Darling Harbour as a precaution to assist in capturing any construction materials or the like that may enter the waterway.

Post-Construction Phase

The detailed design of the immediate foreshore area behind the seawall modification involves drainage of this area landwards to enter the overall internal stormwater drainage and treatment system. This system includes current best practice water sensitive urban design measures. The system will capture large stormwater events (up to 100 year Average Recurrence Interval) and safely convey these to Darling Harbour whilst also providing water quality treatment through a comprehensive treatment train to meet Barangaroo Development Authority obligation targets (Cardno, 2013).

Based on the above, the proposed seawall modification would not have any adverse long term impact on the water quality of Darling Harbour.

¹ Note that the 2009 NSW Sea Level Rise Policy Statement is no longer NSW Government Policy. Any reference to the 'NSW sea level rise planning benchmarks' in various guidelines and documents should now be taken as meaning 'council's adopted sea level rise projections' where available. The City of Sydney has not produced a local council sea level rise policy (Arup, 2013). A sea level rise planning benchmark value to 2100 of 0.9m remains reasonable in the opinion of the writer and has been adopted as a planning value by numerous NSW coastal Councils.

References

Arup (2013), "Public Domain (Stage 1A) Planning Application – Climate Change and Sea Level Rise", report prepared for Lend Lease (Millers Point) Pty Limited, Final, 18 December 2013

Cardno (2013), "Stormwater Management and Civil Infrastructure Assessment – Project Application – Barangaroo South – Public Domain", prepared for Lend Lease Building Pty Ltd, 28 November 2013

Department of Environment & Climate Change NSW (2009), "Environmentally Friendly Seawalls – A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries", published on behalf of Sydney Metropolitan Catchment Authority, June 2009.

Yours faithfully

HASKONING AUSTRALIA



Greg Britton
Director

