REPORT

Barangaroo South Stage 1B Public Domain

Marine Ecology Impact Assessment

Client: Lend Lease
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Revision: 02/Final Draft
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1 INTRODUCTION

1.1 Background

Barangaroo is located on the north-western edge of the Sydney Central Business District, bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development dominated by CBD commercial tenants.

The Stage 1B Public Domain site is generally located to the north of the Stage 1A site, on land identified as public domain between and around Blocks 4A, 4B and Y in the approved Concept Plan (Mod 8), as shown in Figure 1. The majority of the site is legally described as Lot 212 in DP 1217691 but also includes an area of Darling Harbour. It is noted that an additional area of Darling Harbour was added to the site by the Planning Assessment Commission in their determination of Concept Plan MOD 8. This additional area is reflected in the site area identified in Figure 1.

Figure 1  Site Plan
1.2 Scope of Work

This report addresses Key Issue 8 Marine Ecology in the Secretary’s environmental assessment requirements (SEARs) which states:

- Prepare a Marine Ecology Report to assess the ecological impact of the proposed construction of Waterman's Cove, expanded foreshore promenade and the public pier on any flora and fauna, including threatened species, populations or communities (eg. *Psodonia seagrass*) or their habitats.

- Recommendation of appropriate mitigation measures during construction and operation, including potential impacts of shading from fixed structures.
2 DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 General

The State Significant Development (SSD) application will seek consent for all public domain works within ‘Stage 1B’ of the Barangaroo South Site. The extent of public domain works is illustrated on the site plan prepared by Lend Lease in Figure 1, and the preliminary indicative design drawing in Figure 2.

The public domain works include the construction of Waterman’s Cove and public pier along the foreshore, the provision for a potential building on the public pier, public domain works associated with Hickson Park as well as all typical public domain features such as trees and other landscape features, walkways, street paving, street furniture, lighting, roads and planting. Various services and infrastructure such as power and water with Landowner consent will also be included in the public domain to enable it to be used for a range of different activities. Opportunity for boat set down/pick up (i.e. no berthing), including the potential for water taxi drop off and pick up is also included in the design.

Staging of the proposed public domain works will be a key component in order to accommodate the efficient and timely construction of the works and to integrate with the construction of the residential buildings R4A, R4B and R5 located within the Stage 1B Site and The Crown Sydney Hotel Resort.

Figure 2 Preliminary indicative design
The particular waterfront elements of the Barangaroo South Stage 1B Public Domain that are relevant to this report are listed below and described in the following sections. The description includes an outline of the expected construction methodology.

- Wulugul Boardwalk and Pontoon;
- Watermans Cove and Public Pier.

2.2 Wulugul Boardwalk and Pontoon

2.2.1 Proposed Structure

The proposed Wulugul Boardwalk and Pontoon, showing key levels, are shown in Figure 3. The structure comprises a fixed boardwalk over the majority of its length with a floating pontoon and hinged gangway at the northern end. The structure extends approximately 14m into Darling Harbour beyond the face of the existing vertical caisson wall. The fixed boardwalk level steps down from 2.50m AHD in the south to a minimum of 2.0m AHD in the north at the top of the gangway leading to the pontoon.

A typical section through the fixed boardwalk near the northern end (deck level 2.0m AHD) is shown in Figure 4. A view of the boardwalk and pontoon looking south, drawn at Lowest Astronomical Tide (-0.925m AHD), is shown in Figure 5.

The proposed fixed boardwalk is supported by tubular steel piles (refer Figure 4). Situated above the piles would be precast concrete headstocks, timber girders and timber decking. The floating pontoon is restrained in place by a series of steel tubular piles along the landward side (refer Figure 5). The pontoon is likely to be fabricated from steel or precast concrete with timber board decking.
Figure 3  Wulugul Boardwalk and Pontoon showing key levels
Figure 4  Wulugul Boardwalk - section  
(Source: Grant Associates)

Figure 5  Wulugul Boardwalk and Pontoon – view looking south  
(Source: Grant Associates)
2.2.2 Construction Methodology

The proposed construction methodology would involve a combination of water based and land based plant.

Water based plant would be utilised for installation of piling and precast headstocks for the fixed boardwalk. The barge involved in these works would be approximately 54m long and 24m wide. It would be oriented primarily north/south during piling operations (approximately 75% of the time).

Land based plant and equipment would be primarily utilised for installation of the girders and decking for the boardwalk. Some movements by small work boats would also take place.

The pontoon would be fabricated off site, transported to a suitable offloading point in the Harbour elsewhere, and towed into position.

The total duration of the water based component of the works, involving the barge, is estimated to be approximately 4 months.

2.3 Watermans Cove and Public Pier

2.3.1 Proposed Structure

The proposed Watermans Cove and Public Pier are shown in Figure 6.

The Cove is framed by the Public Pier in the south and Wulugul Boardwalk in the north. A small section of existing suspended wharf structure and piling would be demolished to complete the shape of the Cove (refer Figure 1). No berthing facilities are proposed within the Cove.

The levels around the Cove step down from an upper concourse level of 3.5m AHD to a minimum level near the waters edge of 1.50m AHD. A typical section through the Cove is shown in Figure 7. A view of the Cove foreshore looking north west is shown in Figure 8. The main boardwalk and lower boardwalk would be timber structure with timber decking boards.

Approximately 20 existing piles would be removed to create the inner shape of the Cove. It would be normal practice to cut the piles off at or below seabed level so they do not form a hazard to navigation. In this case, however, it is proposed to restrict navigation to the inner portion of the Cove and include aquatic eco-engineering works, utilising the piles, to improve bio-diversity, as discussed further below.

Wherever possible, existing piles would be utilised to support the boardwalks and steps of the Cove. Where new piles are required due to the required geometry of the Cove, tubular steel piles would be installed.

The Public Pier would extend into Darling Harbour by a distance of approximately 50m measured from the face of the existing vertical caisson wall. The proposed level of the timber boardwalk around the perimeter of the Pier is 1.80m AHD.
The Public Pier would be supported on steel tubular piles. Situated above the piles would be precast concrete headstocks then either timber girders and decking (perimeter boardwalk) or precast concrete deck planks (below future building structure).

As noted above, it is proposed to include aquatic eco-engineering works to improve bio-diversity in the inner area of Cove where piles are to be cut off. In principle the proposal is to cut off the approximately 20 piles below Lowest Astronomical Tide (-0.925m AHD) but above the seabed level and attach structure complexity to the piles in this subtidal area in the form of concrete reef balls and steel plates and the like to promote aquatic colonisation and recruitment, and improve bio-diversity.

It is intended that detailed design of the subtidal structure would be undertaken in consultation with the NSW Department of Primary Industries and the University of New South Wales Sydney Institute of Marine Science (SIMS). The development and monitoring of the aquatic eco-engineering works could form part of the SIMS Sydney Harbour Research Program.

Figure 6  Watermans Cove and Public Pier
Figure 7  Watermans Cove – typical section

Figure 8  Watermans Cove – view looking north west
2.3.2 Construction Methodology

The proposed construction methodology would involve a combination of water based and land based plant.

Water based plant would be utilised for installation of piling and precast headstocks. The barge involved in these works would be approximately 54m long and 24m wide. It would be oriented primarily north/south for the Public Pier works and primarily east/west for the Watermans Cove works.

Land based plant and equipment would be primarily used for installation of the girders, decking and precast deck planks. Some movements by small work boats would also take place.

The total duration of the water based component of the works, involving the barge, is estimated to be approximately 4 months each for Watermans Cove and the Public Pier.
3 EXISTING CONDITIONS

3.1 General

The existing marine ecology, water quality and sedimentary environment at Barangaroo have been outlined in WorleyParsons (2010) and Royal HaskoningDHV (RHDHV) (2015), as part of previous environmental assessments for:

- Barangaroo Stage 1 – Barangaroo Concept Plan Amendment (MP06_0162MOD4) (WorleyParsons, 2010);
- Barangaroo Stage 1 – Barangaroo Concept Plan Amendment (MP06_0162MOD8) (RHDHV, 2015)

Information contained in these documents is considered to remain relevant as a basis for the environmental assessment of the Stage 1B Public Domain works at Barangaroo. The descriptions of the marine ecology outlined in the following sections are taken from these documents.

While water quality and sediments (and sediment contamination) are not the focus of this report, it is useful to also summarise information on these factors, as set out below:

Water quality measurements have indicated that physico-chemical conditions in Darling Harbour, in the vicinity of Barangaroo, are typical of a sub-tropical estuary in south eastern Australia. The average measured surface and mid-depth pH of 8.2 was within the general acceptable pH range (7 - 8.5) for subtropical eastern Australian estuaries (ANZECC / ARMCANZ, 2000). Average conductivity values of 53,500μS/cm (surface) and 53,100μS/cm (mid-depth) were slightly below the ANZECC / ARMCANZ (2000) value of 54,000μS/cm. Turbidity in surface waters (average of 1.6NTU) was slightly higher than in mid-depths (average of 1.2 NTU) however, both values were within the general acceptable range (0.5 to 10 NTU) for subtropical eastern Australian estuaries (ANZECC/ARMCANZ, 2000). Dissolved oxygen concentrations of 8.2mg/L (surface) and 8.1mg/L (mid-depth), equating to percentage saturation values of approximately 88% and 86% respectively, were also within the acceptable range of 80 to 100% saturation.

In regard to sediments:

- the surface sediments comprise sandy clayey silt, the mean percentages by weight for each sediment fraction based on four samples was sand 23%, silt 40% and clay 37%;
- anthropogenic debris was observed on the seabed including rocks, chains, bricks, steel and old fencing;
- concentrations of metals exceeded screening levels\(^1\) across the majority of the area sampled;
- concentrations of polycyclic aromatic hydrocarbons (PAHs) exceeded screening values across the majority of the area sampled;
- concentrations of tributyl tin (TBT) exceeded screening values across the majority of the area sampled.

\(1\) The screening levels were the Interim Sediment Quality Guidelines (ISQG) – Low concentration set out in ANZECC/ARMCANZ (2000).
Elevated concentrations of contaminants in sediments in Sydney Harbour is common due to the long history of urban and industrial activity. Heavy metal contamination would be linked to diffuse source and concentrated source stormwater runoff to the Harbour. Elevated PAH concentrations would be associated with the former gasworks operations nearby. The likely source of elevated TBT would be anti-fouling agents on ships hulls using Darling Harbour.

3.2 Survey Methods

Marine surveys were conducted using:

- commercially qualified divers who undertook visual assessment of the sea floor, underwater photography and sediment coring;
- remotely operated video transect techniques.

Four sites were visually assessed, photographed and sampled at Barangaroo as shown in Figure 9. The locations and maximum depths recorded at each of the sampling sites are listed in Table 1. Sediment samples were collected by diver coring at each site, using a 50mm polycarbonate core to a depth of 20cm.

In addition to underwater photography, four towed video transects were performed to provide a broader overview of the site and to confirm the presence or absence and extent of any sub-aquatic vegetation. The location of each video transect is shown in Figure 10.

The general location and length of each of the towed video transects was as follows:

- Transect 1: 113m, located adjacent to the southern end of the development footprint;
- Transect 2: 77m, located adjacent to the southern end of the development footprint;
- Transect 3: 57m, located adjacent to the northern end of the development footprint; and
- Transect 4: 103m, located in the central section of the development footprint.

<table>
<thead>
<tr>
<th>Table 1 Location and Depths of Sampling Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Barangaroo (BG) (impact)</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Figure 9  Locations of sampling sites

Figure 10  Locations of underwater video transects
3.3 **Benthic Habitat / Marine Flora**

The benthic habitat in Darling Harbour, adjacent to Barangaroo, consisted of clayey, silty, sandy sediments. Considerable bioturbation was evident across the entire site, presumably from burrowing organisms, such as polychaete worms and invertebrate crustaceans (see Figure 11 and Figure 12). The substrate towards the southern end of the development contained a high proportion of clay and was relatively undisturbed. Much of the substrate here had a 'honeycomb' type appearance. The middle and northern sections of the site contained a higher percentage of silt than the southern area. The underwater terrain was relatively flat across the site, with little evidence of features showing movement such as sand ripples. Video transects provided evidence of areas of dense shell rubble, possible organic materials (e.g. dark woody looking objects), occasional sponges and discarded anthropogenic objects on the seabed (see Figure 12). No aquatic vegetation was observed by divers, or was reported on the underwater video transects.

**Seagrass / Mangroves / Saltmarsh**

No seagrass was observed during spot dives, or on the video transects undertaken at the study site. The water depth (~ 13 m) and associated low light penetration would presumably restrict the growth of seagrasses in the footprint of the proposed over-water structures. No mangroves or areas of saltmarsh were observed at, or near, the proposed development during the site visit. The site lacks appropriate depth, substrate and habitat for such vegetation to occur.

**Introduced Marine Flora**

No introduced marine algae *Caulerpa taxifolia* was observed during the spot dives or on video transects undertaken at the study site. It is possible that the oysters observed growing on the pylons at the north of the site were the Pacific Oyster, *Crassostrea gigas*. 

![BG1](image1.jpg)  
![BG2](image2.jpg)
Figure 11  Benthic habitat at Barangaroo captured by diver photography
3.4  Marine Fauna (Benthic Infauna)

A diverse range of benthic marine organisms were identified in sediments from Barangaroo, and also at two reference locations in Berrys Bay and Snails Bay, including polychaete worms, amphipods (eg. yabbies and shrimps), crustaceans (eg. crabs, shrimps, isopods), ascidians (sea squirts), cnidarians (polyps found), brittle stars, bivalves (eg. clams) and gastropods (marine slugs).

Species Diversity

There were no significant differences in species diversity between locations ($p > 0.05$), or between sites (Two-way ANOVA, $df = 2$, $F = 1.4$, $p > 0.05$). There was a difference in species diversity between sites within locations ($df = 6$, $F = 7.9$, $p = 0.00$). Infauna diversity was not homogeneous across the locations, likely attributed to differences in substrate type, whereby, the southern end of Barangaroo was dominated by clayey silts and the centre and southern ends by silt. The regression analysis indicated that as sediment size increased, species diversity decreased (multiple $R = -0.67$). Refer to Table 2 and Table 3.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>ANOVA - Species Diversity - Summary of all Effects</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>df effect</td>
</tr>
<tr>
<td>Location</td>
<td>2</td>
</tr>
<tr>
<td>Site</td>
<td>3</td>
</tr>
<tr>
<td>Sites within locations</td>
<td>6</td>
</tr>
</tbody>
</table>
Species Abundance

There were no significant differences in abundance between locations \((df = 2, F = 1.3, p > 0.05)\). There was a difference in abundance between sites \((df = 3, F = 4.1, p = 0.018)\) and between sites within locations \((df = 6, F = 8.5, p = 0.00)\). Like species diversity, abundance was also variable across locations, also likely attributable to substrate types. The regression analysis indicated that as sediment size increased, species abundance decreased \((\text{multiple } R = -0.82)\). Refer to Table 4 and Table 5.

Table 3  Regression Analysis - Species Diversity

<table>
<thead>
<tr>
<th></th>
<th>BETA</th>
<th>SE of BETA</th>
<th>B</th>
<th>SE of B</th>
<th>T(10)</th>
<th>p-value</th>
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<td>PSA</td>
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<td>0.023051</td>
<td>-2.81756</td>
<td>0.018237</td>
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</tbody>
</table>

Regression Summary for Dependent Variable: SPECDIV
\(R^2 = 0.66523978\) \(\text{Adjusted } R^2 = 0.38679837\)
\(F(1,10) = 7.9386 p < 0.01824\) Std. Error of estimate: 1.5261

Table 4  ANOVA - Species Abundance - Summary of all Effects

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<tr>
<th></th>
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<th>MS effect</th>
<th>df error</th>
<th>MS error</th>
<th>F</th>
<th>p-value</th>
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<td>0.000054</td>
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Table 5  Regression Analysis – Species Abundance

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<th></th>
<th>BETA</th>
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<th>B</th>
<th>SE of B</th>
<th>T(10)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Intercept</td>
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<td>6.83045</td>
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<tr>
<td>PSA</td>
<td>-0.820080</td>
<td>0.180961</td>
<td>-0.24975</td>
<td>0.055111</td>
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<td>0.001088</td>
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</table>

Regression Summary for Dependent Variable: ABUND
\(R = 0.82007957\) \(\text{Adjusted } R^2 = 0.63978355\)
\(F(1,10) = 20.537 p < 0.00109\) Std. Error of estimate: 3.6486
4 ASSESSMENT OF IMPACTS AND RECOMMENDED MITIGATION MEASURES

4.1 General

A description of the proposed development of the Wulugul Broadwalk and Pontoon, and Watermans Cove and Public Pier, including proposed construction methodologies, was set out in Sections 2.1, 2.2 and 2.3. It is convenient to outline the assessment of impacts of the proposed development on marine ecology and recommended mitigation measures separately for the construction phase and post-construction phase of the project.

4.2 Construction Phase

4.2.1 Assessment of Impacts

Waste: Partial demolition of the existing wharf structure at Watermans Cove may generate waste which has the potential to impact on the health of the marine environment in Darling Harbour if appropriate mitigation and waste disposal measures are not undertaken. Environmental controls on removal of demolition waste would form part of the Spoil and Waste Management Sub-Plan. Further, a clearance survey of the seabed by divers would be undertaken at the completion of the works. No significant impacts on marine ecology due to waste generation would be expected.

Noise: Noise impacts on marine biota are expected over the duration of the works (eg. from engines, generators, and construction equipment). However, mobile marine fauna have the ability to relocate to other areas during construction and no significant impacts would be expected.

Marine Construction Equipment: The use of boats and barges during piling works would result in some disturbance to benthic habitat through activities such as anchoring. Minimisation of anchoring impacts can be achieved by undertaking as much of the construction work as possible from land, and limiting the time required for barges to be anchored. This methodology is being adopted during construction planning, eg. by incorporation of precast elements in the construction to reduce schedule. Anchoring would not occur in any sensitive environments such as seagrass beds as these do not occur in the vicinity of the proposed development.

The construction vessels also have the potential to cause pollution through fuel and oil leaks. Potential impacts of fuel and oil leaks can be mitigated by making available spillage equipment so that any accidental spills or leaks can be absorbed immediately.

Water Quality: Proposed construction works have the potential to impact on water quality in Darling Harbour and in turn on marine ecology. Installation of piling has the potential to create increases in turbidity through resuspension of sediments. Any disturbed sediments would however locally re-settle and remain in the same physico-chemical environment. In addition, piling operations would be intermittent and temporary in duration. Accordingly, no significant impacts on marine ecology due to piling operations would be expected.

Notwithstanding the above, water quality monitoring is recommended. Installation of a silt curtain during marine works is also recommended, unless it can be shown by monitoring of similar marine construction
activities at the site, eg. construction of the adjacent ferry hub, that installation of a silt curtain is not required to ensure satisfactory water quality.

**Benthic Infauna:** Installation of piles into the seabed would displace soft sediment benthic habitat, crushing any associated benthic fauna. However, the high availability of similar benthic habitat in Sydney Harbour would suggest that benthic communities such as those recorded at Barangaroo would be widespread and thus any localised impacts from activities such as piling would be considered to be negligible at a broader scale. Elevated concentrations of contaminants currently exist in the sediments at the site and may be impacting on the diversity and abundance of marine organisms, reducing richness and evenness of communities. However, the benthic organisms would be expected to have adapted to the existing situation and the proposed development would not lead to any additional contamination.

**Mobile fauna:** Mobile fauna, such as fish and sharks, may be impacted by the presence of barges and by noise generated during construction works. However, due to the current high levels of boating activity in Darling Harbour these effects are likely to be negligible.

**Sessile Organisms:** Removal of part of the existing wharf and its support structure at Watermans Cove would eliminate a small portion of the artificial habitat for sessile invertebrates which currently exists at the site. However, the proposed new over-water structures would increase the surface area of habitat available for sessile marine fauna. In addition, eco-engineering works, utilising the cut-off piles, is proposed (refer Section 2.3.1) to improve bio-diversity. It is expected that both intertidal and subtidal habitats would be increased, given materials used for construction are not deleterious to marine life (eg. no anti-fouled surfaces or treated wood).

Although sessile organisms do not have the ability to move away from undesirable conditions, recent research in Sydney Harbour has found that small in-frequent disturbance of contaminated sediments does not significantly impact on sessile marine organisms such as ascidians and bryozoans, presumably as they have evolved to deal with frequent natural changes in water conditions within estuaries such as salinity and turbidity (Knott and Johnston, 2010). Since any disturbance of sediments would be mitigated, short-term and highly localised, the potential disturbance of sediments at the site is unlikely to have any significant impacts on sessile marine organisms in the vicinity.

**Aquatic Vegetation:** Physical disturbance and increased sedimentation can seriously degrade seagrass beds through direct removal, smothering and/or reduced light intensity (Poiner and Peterken, 1995; Smith and Pollard, 1999). Suspension of sediments can also smother the photosynthetic surfaces of algae (Knott and Johnston, 2010). In addition, new over-water structures have the potential to impact on light availability to the seabed. However, no seagrass or other aquatic vegetation exists at the site. Due to the lack of aquatic vegetation, no impact on this sensitive habitat is expected.

**Threatened and Protected Species:** The proposed development is not expected to have a significant impact on any threatened or protected species of flora or fauna. No aquatic vegetation protected under the Fisheries Management Act is present in the vicinity of the proposed development. The only species of aquatic fauna which have the potential to occur in the area include the Little Penguin, Loggerhead Turtle and Green Turtle. However, appropriate habitat for these species does not exist at the site, and due to high level of maritime development and boating activity in this area their presence is unlikely. In addition, each of these species has the ability to remove themselves from the area if conditions are unfavourable.
4.2.2 Summary of Mitigation Measures

To minimise the impacts associated with the construction phase of the development it is recommended that the following mitigation measures be implemented:

Solid Waste: To minimise solid waste impacts the following should be undertaken:

- removal of all construction waste from the site;
- preventing any waste from entering the Harbour;
- managing all waste in accordance with the EPA’s Waste Classification Guidelines (2014);
- preparing and implementing a Spoil and Waste Management Sub-Plan;
- ensuring that all waste associated with barges and boats is contained and disposed of appropriately; and
- clearance survey of the seabed by divers at the completion of the works.

Noise: Noise should be managed in accordance with the EPA’s Interim Construction Noise Guidelines (2009). Silencers should be used on engines and machinery where possible to minimise noise impacts on marine biota.

Water Quality: To minimise water quality impacts the following should be undertaken:

- any construction activities should limit the creation of turbid plumes into the marine environment by utilising appropriately designed and positioned silt curtains, installed prior to the commencement of operations, unless it can be demonstrated that a silt curtain is not required (see Section 4.2.1);
- water quality monitoring should be undertaken to ensure that water quality conditions are maintained beyond the silt curtains and in the broader area;
- having site spillage equipment available at the site to absorb any spills that may enter the water.

4.3 Post–Construction Phase

4.3.1 Assessment of Impacts

The Wulugul Boardwalk and Pontoon would extend some 14m into Darling Harbour beyond the face of the existing vertical caisson wall. The Public Pier also extends over water into Darling Harbour by approximately 50m.

Potential post-construction impacts of the proposed development relate to:

- shading of sensitive habitat such as seagrass;
- restriction of fish passage;
- alteration of tidal currents due to installation of piling.

Studies have shown that there is an absence of sensitive habitat at the site including seagrass. Being open piled structures the proposed development would not restrict fish passage. The proposed structures would not lead to any significant alteration of the existing tidal currents near the seabed (which are low in magnitude) given the large cross-sectional area of the Darling Harbour waterway and the limited ‘blockage’ caused by the isolated pile foundations.
In view of the above, no significant long term impact due to the proposed over-water structures would be expected.

As outlined in Section 2.3.1, it is proposed to introduce eco-engineering works, utilising the cut-off piles in Watermans Cove, to improve bio-diversity at the site. This initiative would be a positive benefit to marine ecology. The additional surface area provided by the proposed structures generally would increase the habitat available for sessile marine fauna.

4.3.2 Summary of Mitigation Measures

There are no specific recommended mitigation measures for the post-construction phase associated with the proposed over-water structures as no potential long term adverse impacts would be expected.
5 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


