ENVIRONMENTAL IMPACT ASSESSMENT

FOR A PROPOSED TEMPORARY FERRY WHARF

AT GLEBE ISLAND TERMINAL BERTH 3

- AQUATIC ECOLOGY ASSESSMENT

Figure 1 View of Berth 3 at the northern end of the Glebe Island Terminal, Johnson Bay.

Report Prepared for Infrastructure NSW

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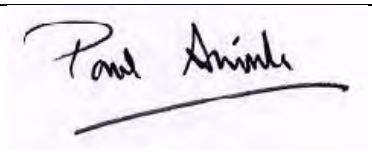
MPR APPROVAL: PAUL ANINK	 **6 November 2012**

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1 INTRODUCTION

Infrastructure NSW, on behalf of the NSW Government, is managing the redevelopment of the Sydney International Convention, Exhibition and Entertainment precinct (SICEEP) at Darling Harbour. An interim facility will be built on Glebe Island to temporarily host exhibitions during construction of the SICEEP between December 2013 and late 2016.

APP Corporation Pty Ltd (APP) is managing the development at Glebe Island, and the proposal includes the provision and use of a temporary ferry wharf at the northern end of Glebe Island (Berth 3). Marine Pollution Research Pty td (MPR) has been requested to provide an Aquatic Ecology Impact Assessment Report to support an application to NSW Roads and Maritime NSW (RMS). The ferry wharf would be serviced by a private ferry service to Circular Quay.

This report assesses the aquatic ecology of the wharf site, considers the likely impacts on the aquatic ecology of wharf construction and operation, and provides possible impact mitigation measures where necessary. The report also provides an assessment of potential navigation impacts arising from the operation of the ferry wharf and suggests mitigation measures to minimise any navigational impacts where applicable.

1.1 Site Details

Berth 3 is located at the northern end of the Glebe Island Terminal. Figure 1 shows a view of the existing Berth 3 from the water and Figure 2 provides an aerial view of a portion of Sydney Harbour around the Pyrmont peninsular, showing the site location in context with other marine facilities in this part of the harbour. Figure 3 provides a close up view of the existing berthing facility and Figures 4 and 5 show the western side of the berth and the rip=rap revetment wall to the south-west of Berth 3.

The Glebe Island terminal is built on a reclamation that is held in place by a sloping rip-rap revetment wall along the north-western side (at the disused Berth 4 - Figure 4). This rip-rap extends north to Berth 3, and Berth 3 comprises a rectangular concrete structure that is built out over the end of the revetment (Figure 4). The rip-rap revetment wall also extends south towards the disused Berth 5 piles (see Figure 5).

Whilst the Berth 3 site is open to Johnstons Bay, the actual wind fetches are not large, with the longest fetch being 1.3 km approximately north-east to Darling Harbour Terminal. Johnstons Bay is also declared an 8 knot and no-wash zone, which minimises exposure to vessel wash at the proposed ferry wharf site.

Figure 2 Aerial view of Pyrmont showing the location of the proposed ferry wharf at the northern end of the Glebe Island Terminal in relation to other marine facilities in this part of Sydney Harbour (Nearmap.com photo 8 Sep 2012).

Figure 3 Close up view of existing berthing facility at Berth 3 Glebe Island Terminal. Berths 1 and 2 facilities along the eastern side of the terminal are similar to those of Berth 3 as shown here.

Figure 4 View of western side of Berth 3 looking east from off-shore of the rip-rap revetment (unused Berth 4).

Figure 5 View of rip-rap revetment wall looking south towards the disused Berth 5 piles. The Cement and Sugar Terminals are located further south at Berths 6 and 7.

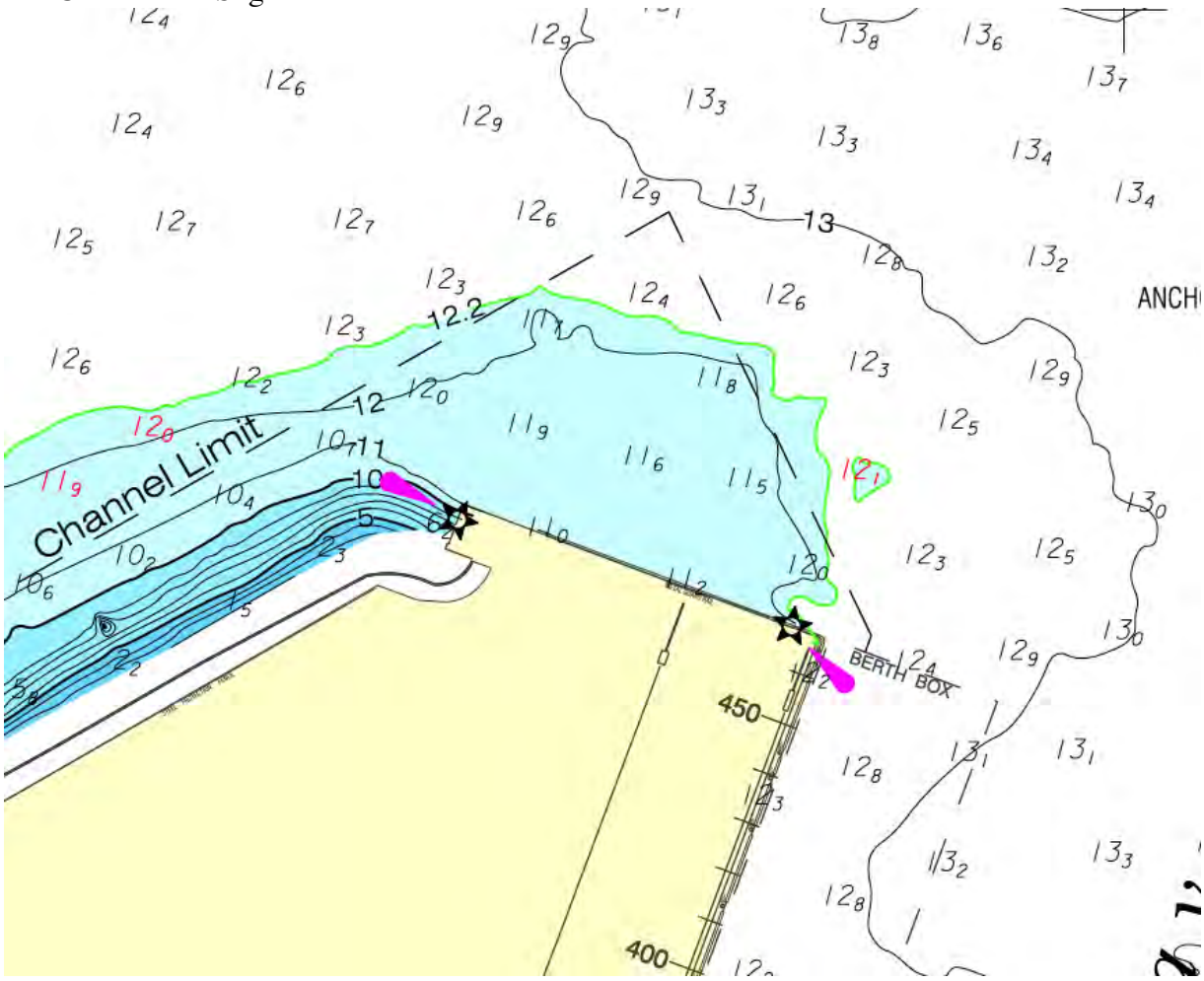

Figure 6 Portion of Sydney Ports Corporation February 2012 Hydrographic Survey of White Bay and Johnstons Bay (SWBJB 008A), showing depths below ISLW around Berth 3.

Depths along the front of Berth 3 and to the immediate west and east of the berth are all greater than - 11m LAT (Lowest Astronomical Tide). The rip-rap revetment depth varies from well above HAT at the top of the slope to around -10m LAT at the bottom (see Figure 5).

With regard to marine traffic around the proposed facility there are active wharves and other commercial facilities all around the site and there is a relatively large volume of marine traffic past the site:

- There are major sugar and cement loading terminals at Glebe Island Berths 6 and 7 in White Bay, plus other commercial berths for large trading and Naval vessels at White Bay Terminal and along the Glebe Island eastern berths (see Figure 3).
- There is a fuel dispensing terminal (Baileys Marine Fuels Australia) at the north-east end of White Bay Terminal (at the old Toyota roll-on roll-off site) that services many of the commercial vessels working in Sydney Harbour, and the Water Police wharf is located in the small harbour north of White Bay Terminal (Camerons Cove).

- There are a number of large marine facilities in Rozelle and Blackwattle Bays that use Johnstons Bay for vessel transit. These include the Super Yacht Marina, the Maritime Services pontoons in Rozelle Bay and the Sydney Slipways Marina (located under the Anzac Bridge).
- There are other marina facilities in Blackwattle Bay that also service commercial vessels working on Sydney Harbour and there are fishing vessels that moor and unload at the Sydney Fish Market. All these vessel transit Johnston bay past the proposed facility.
- There are no ferry services past the proposed site and the nearest ferry wharf is at Balmain East (Darling Street Wharf) with services to and from Darling Harbour to the City. This ferry route is more than 1 km away from the proposed ferry wharf site.
- There are no commercial fishing operations or aquaculture activities in the vicinity of the proposal.

1.2 The Proposal

A detailed engineering plan for the proposed ferry wharf has not been prepared as yet, but in principle the temporary wharf would comprise a floating pontoon wharf with a wheelchair

compliant gantry walkway connection to the Glebe Island Terminal. Annexure A shows a preliminary pontoon wharf General Arrangement for the site. The pontoon wharf would most likely need to be held in place by locator piles and there would most probably need to be fender piles between the pontoon wharf and the ferry berth to protect the pontoon from ferry berthing impacts plus prevent ferry berthing impact movement of the pontoon that could result in passenger falls.

1.3 Available Information on Aquatic Habitats

The aquatic ecological communities known from the location are shown on Map 8 for the Harbour Foreshores and Waterways Area Development Control Plan 2005 (DCP), a portion of which is shown here as Figure 7. The closest identified habitats are to the north-east at White Bay Terminal and in Cameron Cove, being ‘rock intertidal and rock platform habitat (shown as dark purple).

A portion of Sheet 4 for the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005) is shown as Figure 8 below and it indicates 'wetlands' in Camerons Cove and around White Bay Terminal that coincide with the dark purple “rocky intertidal and rock platform” habitat shown in Figure 7.

Figure 7 Portion of the DCP Map 8 for Johnstons and White Bay showing 'rock intertidal and rock platform' habitat (dark purple) in Camerons Cove and around the eastern end of White Bay Terminal.

There are additional designated wetlands indicated to the east of the proposed ferry wharf (at the location of the rocky rip-rap revetment described in Section 1.2 above), around the western side of Jones Bay (to the east of the proposed wharf) and on the western side of the Glebe Island Bridge. These latter areas have all been identified as rock rubble (or rip-rap) revetments in previous aquatic ecology surveys by MPR for Sydney Slipways (MPR 2004, Baileys Marine Fuels (MPR 2006) and Jones Bay Marina (MPR 2010).

Recent mapping by NSW Department of Primary Industries Fisheries Branch (DPI Fisheries) indicates *Kelp habitat* in the near-shore shallows of Camerons Cove (Figure 9). This location also matches up with the SREP 'wetland' designation shown in Figure 7, and it is concluded that all the SREP wetland areas shown in Figure 8 are intertidal to subtidal rip rap rock revetments that support macroalgae (kelp) habitats.

With regard to intertidal marine vegetation there are no mangroves or saltmarsh indicated on the vegetation surveys prepared by Allen et al (2007) and Kelleway et al (2007).

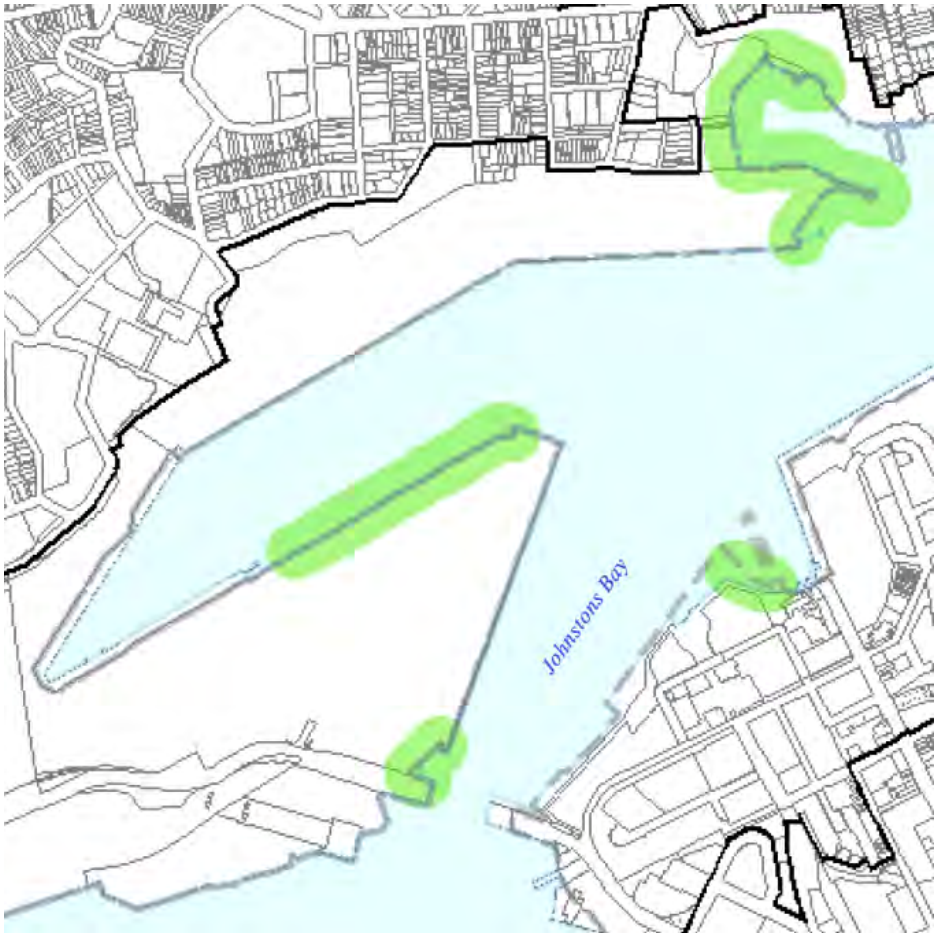

Figure 8 Portion of SREP (Sydney Harbour Catchment) Wetlands Protection Area Sheet 4 showing designated 'wetland' areas around Whites and Johnston Bays.

Figure 9 Detail of NSW DPI (Fisheries) estuarine vegetation map 39a showing kelp habitat in Cameron Cove, that coincides with the SREP Sheet 4 'wetland' designations.

2 AQUATIC HABITATS AND ECOLOGY

A diver based aquatic ecology survey was undertaken on 26 October 2012. The survey area included the Berth 3 concrete wall habitats plus shallow in-shore waters and seabed around Berth 3 Glebe Island, and extended west to the seabed area and rip-rap rock rubble revetment for 20 m to the west side of the berth. Whilst the survey day was overcast, water visibility was reasonably good for the shallow waters, fair for mid waters and poor to non-existent for waters greater than about 7 m deep.

There are three main areas of aquatic habitat in the locality; (i) the wetted surface areas of the concrete faced berth (Figure 3), (ii) the mixed rock rubble intertidal and shallow subtidal rip-rap revetment habitat (Figure 4) and (iii) soft sediment habitat offshore from the wharf and the revetment. The revetment rip-rap rock is predominantly irregular sandstone with block sizes of around 400 to 600 mm diameter in the intertidal and immediate shallow sub-tidal and progressively larger block sizes in the subtidal to the muddy seabed. Bottom block sizes are up to 2 m diameter. The bare sediment seabed grades from silty-sand to mud with depth.

Figure 10 Riparian top of bank vegetation on riprap revetment supports nesting Silver gulls.

There is a distinct depth zonation of aquatic biota on the concrete walls and rock revetment. This zonation and the biota of each of the zones are described as follows:

- The riparian shore comprises a concrete slab at Berth 3 (Figure 3) and the upper riparian part of the rip-rap revetment adjacent to Berth 4. The latter riparian habitat supports a cover of planted grasses plus a mix of herbs and weeds (Figure 5). This habitat provides suitable nesting habitat for seabirds, and at the time of survey was well utilised by nesting Silver gulls (Figure 10).
  The upper intertidal comprises bare concrete or bare rock with no aquatic biota (Figures 3 and 4).
- The middle intertidal portions of the breakwater and revetment wall both support a limited variety of intertidal animals (Figures 3 and 5). There are a few littorinid snails *(Bembicium nanum)* plus encrusting barnacles *(Elminius sp.)*.
- The lower intertidal habitats support a variety of gastropod molluscs; *B. nanum, Austrocochlea obtusa,* the Oyster borer, *Morula marginalba* plus several limpet and false limpet species *(Cellana*

tramoserica and *Montfortula sp.)*. There is a distinct oyster band from the lower intertidal into the shallow subtidal (Figures 11 and 12) comprising two species, the native Sydney Rock Oyster plus the introduced declared pest species the Pacific Oyster.

- The intertidal fringe plus shallow sub-tidal fringes of the concrete berth wall, the wood berth fenders and of the revetment rocks all support a patchy cover of encrusting red coralline algae plus a variety of short frondose brown algae species including *Dictyota dichotoma* plus *Sargassum sp*. Overall cover is good (Figures 13 and 14).
- Below the coralline algae fringe there is a patchy band of algae including three brown macroalgae species *(Ecklonia radiata, Padina sp., and Sargassum spp.)*, a number of frondose algae, some mussels plus a variety of sponge and tunicate species (Figures 15 to).
- Below the subtidal algae zone the rocks become progressively covered with silt and consequently there are less attached biota (Figure 52). Both the concrete and lower revetment walls to around 6 m above the mud seabed substratum support a very sparse and patchy sponge, tunicate and bryzoan fauna (Figures 23, 55, 57, 64).
- The concrete wall and revetment rocks from around 5 m above the seabed to the seabed are covered in silt and support no attached biota.

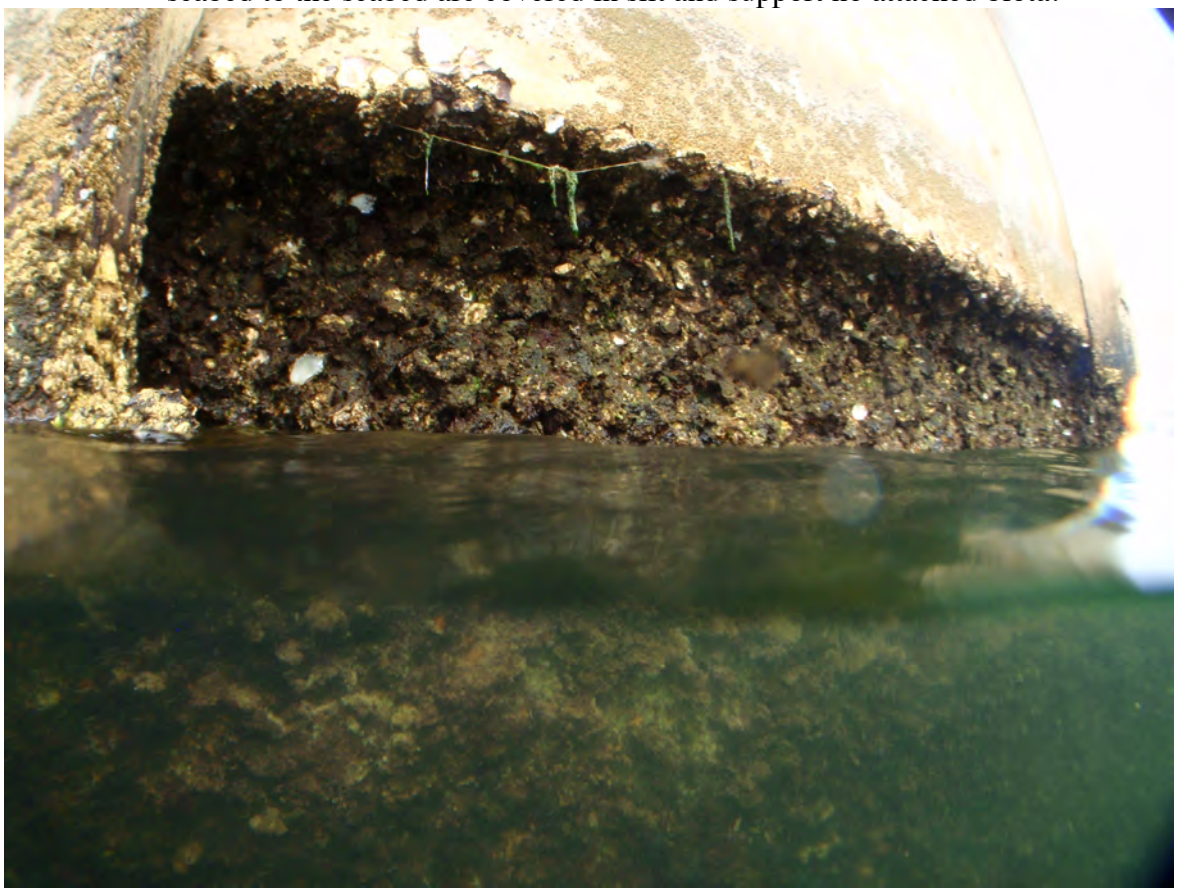

Figure 11 Intertidal to shallow sub-tidal fringe on concrete wall. Note oyster zone in the intertidal and fringing alge zone below.

- The seabed at the toe of the revetment wall is soft silty-sand becoming progressively more muddy with depth away from the wall. Whilst there was no available light, the presence of burrows could be confirmed by feel and it would appear that the soft substratum seabed supports benthic infauna (animals that live in the sediments). There were no plants encountered on the seabed and none were expected at these depths.
- With respect to fish fauna, the following species were observed; eastern hula, puffer fish, bream, glassy sprat, black-fish, mullet, fan bellies leatherjacket (Figure 44), oyster blennies and gobies.

With respect to the other specific habitat requirements of DPI Fisheries and of NSW Roads and Maritime, there were no mangroves, saltmarsh or seagrass along the existing facility foreshore or in the vicinity of the proposed facilities.

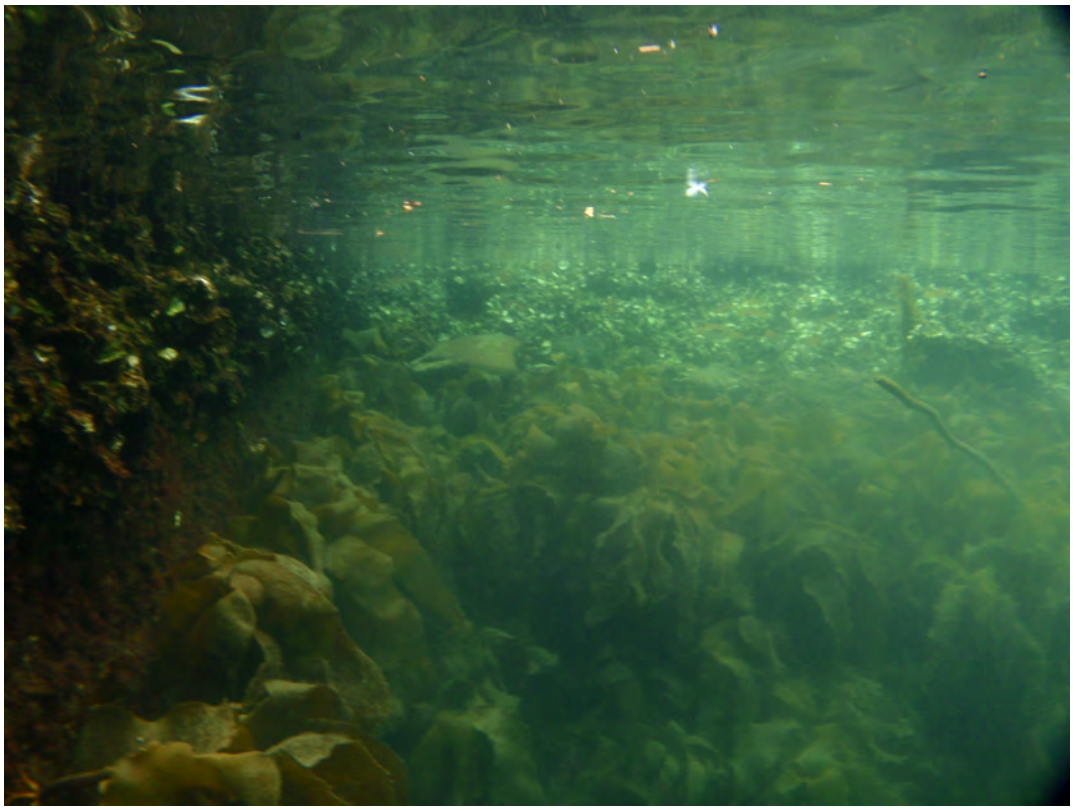

Figure 12 View of intertidal to shallow subtidal fringe on rock revetment with oyster band at the top and a kelp and *Sargassum* band in the shallow subtidal.

Figure 13 Close up view of subtidal fringe on concrete wall showing band of red coralline algae below oysters plus fringing algae plus tunicate band below.

Figure 14 Close up view of subtidal fringe on revetment rocks showing sparse fringe of frondose algae between oyster band and kelp plus *Sargassum* zone below.

Figure 15 Mixed kelp, frondose algae and tunicate zone in deeper sub-tidal below subtidal fringe on concrete wall.

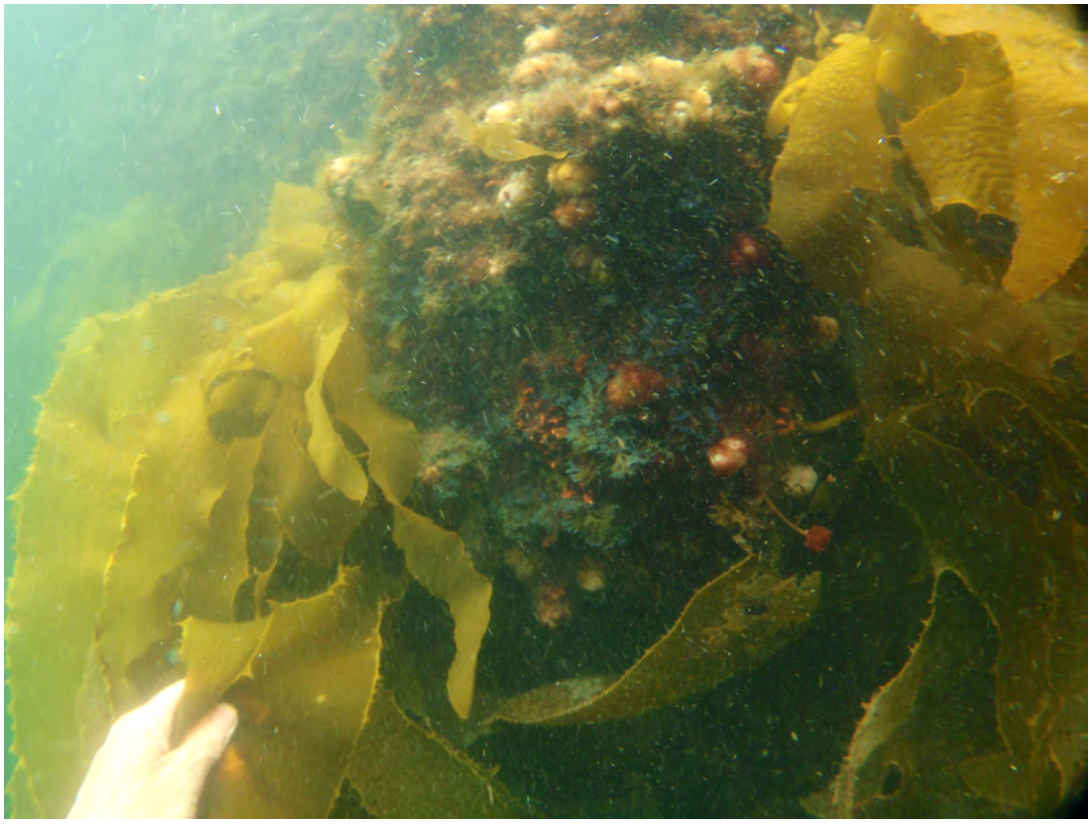

Figure 16 The wooden fenders on the concrete wall support a similar but more dense assemblage of biota in the sub-tidal zone than the concrete wall as shown in Figure 15.

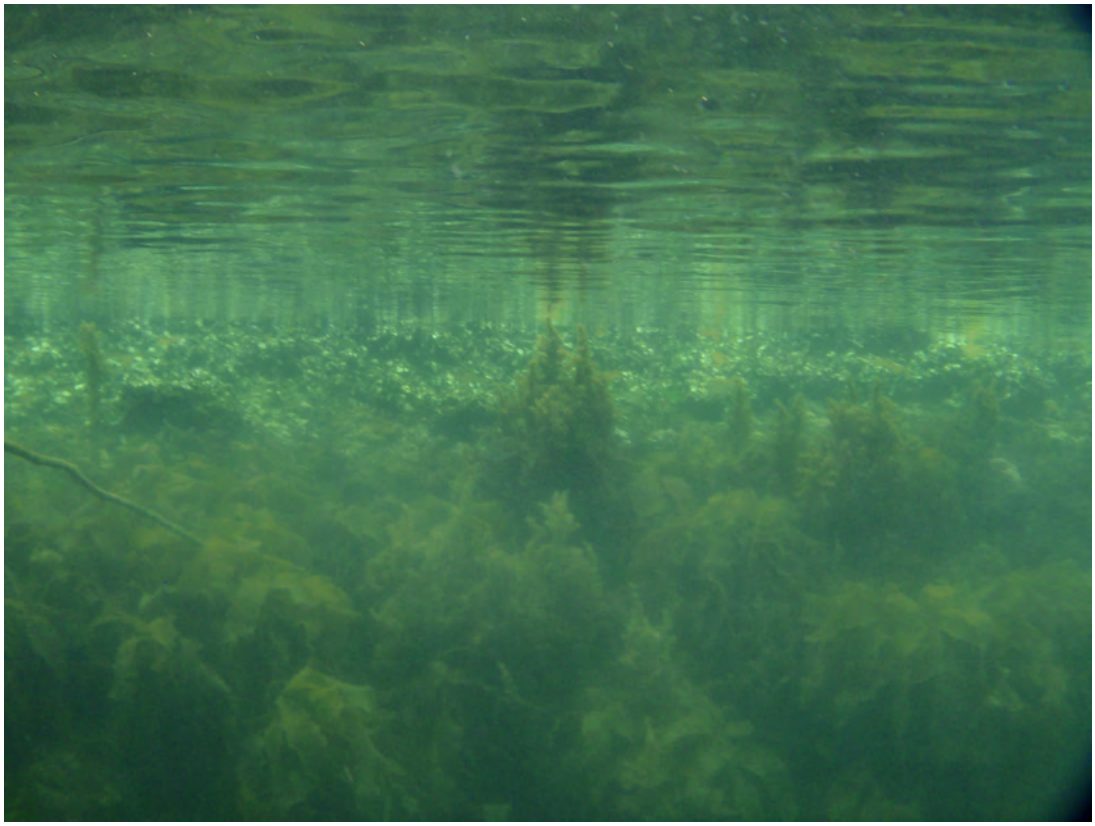

Figure 17. The revetment rocks support a mixed macro-algae zone comprising kelp and *Sargassum*, with an understory of frondose algae plus tunicates.

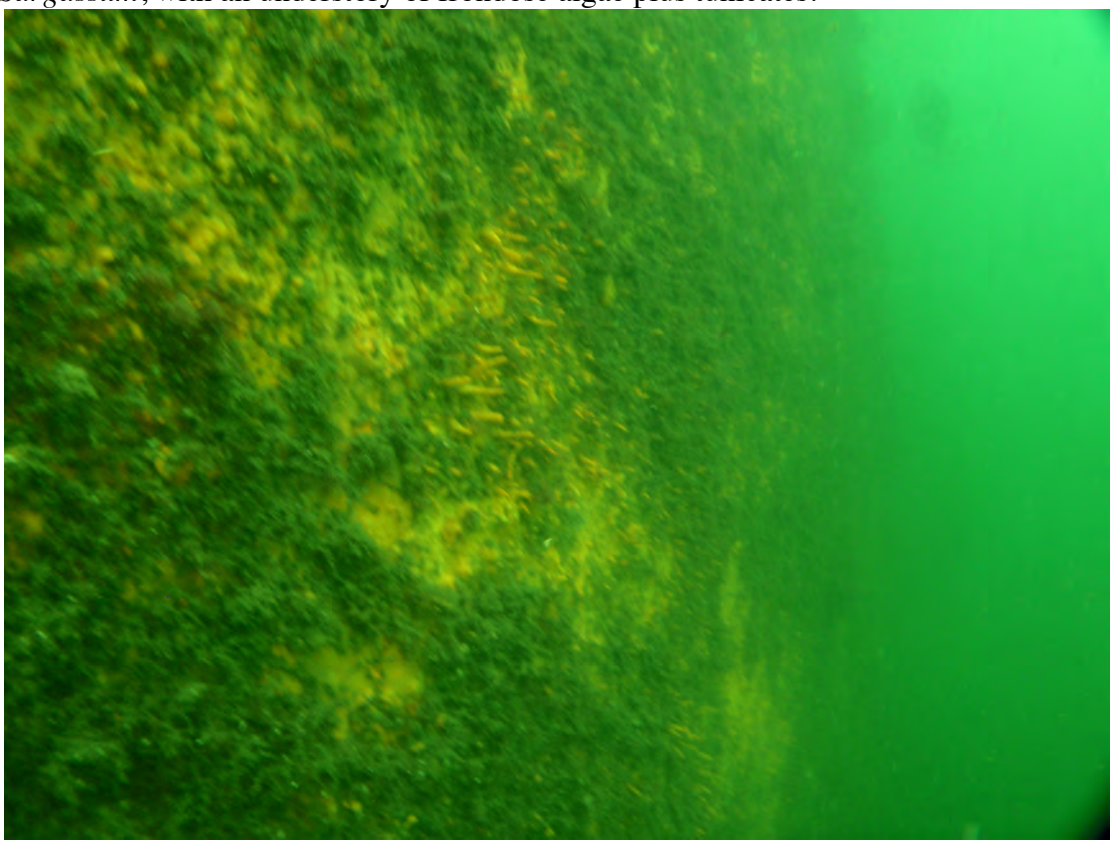

Figure 18. From about 3 to 4 m below the intertidal there is insufficient light to support macroalgae on the concrete wall, and the biota are dominated by encrusting frondose bryozoans plus yellow encrusting and orange sponges.

Figure 19. The lower limit of algae growth on the revetment is shallower than that on the concrete wall by around 1m due to the prevalence of smothering silt on the algae.

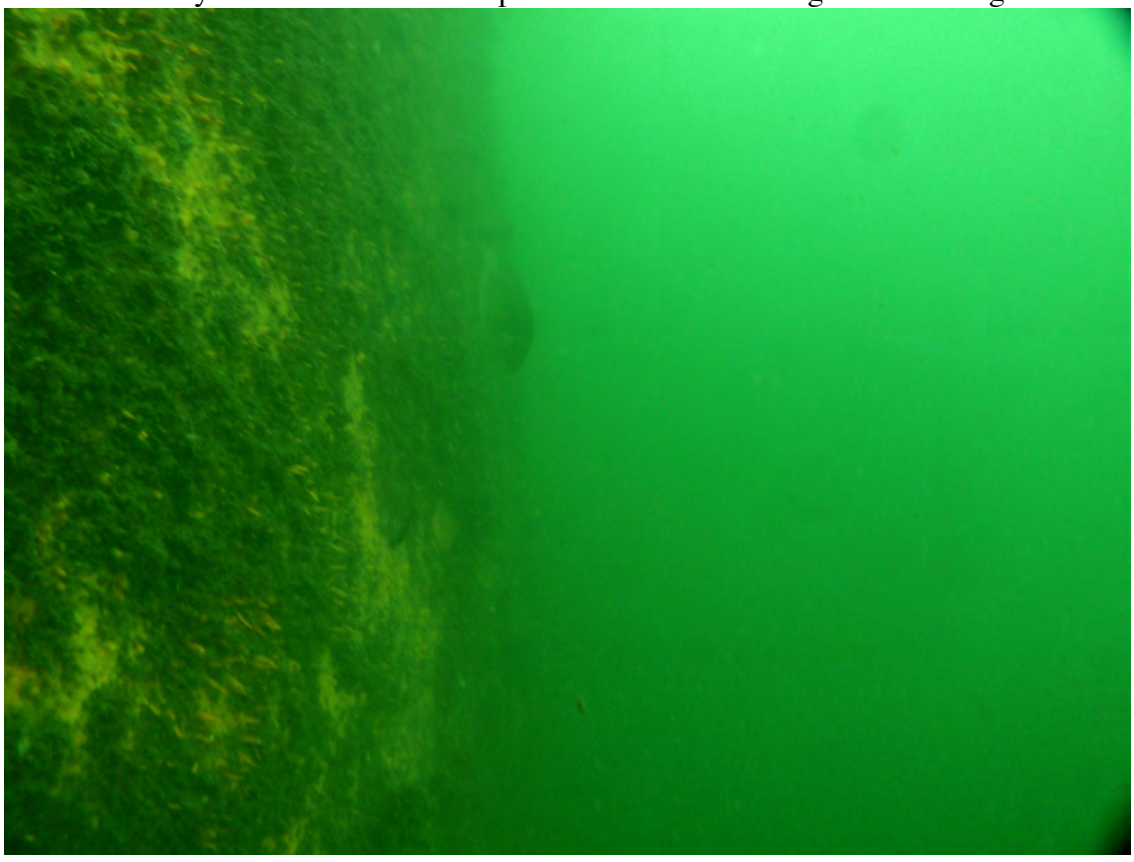

Figure 20. The extent of coverage by sponges decreases with depth on the concrete wall. Note blackfish swimming vertically along wall face in the background.

Figure 21. Silt smothers most encrusting growth and aquatic plants on the revetment rocks from about 3m depth down.

Figure 22. By 4m depth there are only isolated sponges found on the revetment rocks and then only around edges where silt cover is slightly less.

Figure 23. The yellow sponge that forms thin encrusting sheets in shallower, less silty waters occurs as erect bulbous forms in deeper waters as an adaptation to silt smothering.

Figure 24 Fan bellied leatherjacket pressed against the concrete wall to camouflage itself from the potential predatory diver.

2.1 Protected and Threatened Species and Endangered Ecological Communities

The NSW Fisheries Management Act 1994 (FMA) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) require that any proposed activity be assessed with respect to its potential impact on species or ecological communities listed as threatened under the Threatened Species Schedules of the Acts or listed as migratory species under the EPBC Act. Species listed under the EPBC Act only require consideration if the the species occur in Commonwealth controlled areas or in any waters if works are being undertaken by or on behalf of a Commonwealth agency.

2.1.1 Fish and Sharks

The FMA and EPBC Act list a number of marine and estuarine shark and teleost fish species as Vulnerable Species under Schedule 5 of the Act. Syngnathiformes (seahorses, sea-dragons, pipefish, pipe-horses and sea-moths) are protected under the EPBC and FMA:

- Whilst the listed Grey Nurse and Great White shark species could conceivably

visit the locality it is considered highly unlikely and they would be only found in the locality when in pursuit of mobile prey species from other parts of the outer harbour.

They would not make use of any of the habitats available in the locality. The likelihood of these species occurring is low and none were observed during the field surveys.

- Of the listed teleost fish species known from Sydney Harbour only one, the Black Rock Cod *Epinephelus daemelli* could potentially occur in rocky reef areas of Johnstons Bay but would likely not occur on the rip-rap rock revetment rocks or the concrete wall by virtue of lack of suitable crevice habitat that is not subjected to smothering by silt.
- Of the 31 species of syngnathiformes known from NSW waters, three, (White's seahorse *Hippocampus whitei*, Coleman's Seahorse *Hippocampus colemani* and the pygmy pipehorse *Idiotropiscis sp.)*, are endemic to NSW and White's seahorse is common in Sydney Harbour, including Mort Bay at Balmain. Whilst there is suitable seahorse habitat at the site (i.e., the shallow kelp and *Sargassum* habitat on the concrete and adjacent revetment rock), it is not considered that is sufficient suitable habitat to support a permanent population of seahorses.

A specific search was made within and around sub-tidal boulder fields at the locality for Black Rock Cod. Whilst the shallow rocky reef area near the wharf supported a variety of reef fish, all are common to reefs in Sydney Harbour. There was no suitable rock habitat, rock crevice or cave habitat for adult Black Cod in the locality, and no specimens of Black Cod were observed during the field work for this study. Whilst the shallow rock rubble slope habitat does provide some suitable shelter and feeding habitat for juvenile Black Cod, these would not be expected to occur as transients in the area due to lack of other suitable connected transient habitat

Specific searches were also made on both the rock rubble reef and under plus around the wooden fenders on the concrete wall for syngnathids, with particular reference to White's seahorse, which is found around piles in the inner harbour. None were found, and, based on the fragmented nature of suitable habitat at the site, plus lack of suitable connecting habitat to other sites towards Balmain, none are expected.

2.1.2 Other Listed or Protected Species

With regard to other aquatic species or ecological communities and migratory species listed under the TSC and EPBC Acts, Little Penguins are observed fishing and feeding throughout the harbour, and could be expected to visit the site from time to time.

Various listed cetaceans (whales and dolphins), marine mammals (seals and sea lions), marine reptiles (turtles and sea-snakes) and sea-birds (migratory ocean birds and waders) are known from the outer Sydney Harbour and are known to penetrate the harbour to and beyond the study area, albeit rarely.

Of the species that may occur in the vicinity of the site, few would be utilising the resources of the site to any great extent and would generally be in the locality as transients or opportunistic feeders. The site does not provide any significant habitat features for these species. It is concluded that there would not be any threatened species residing within the locality of the wharf and that the wharf and the locality do not constitute specific habitat for other threatened aquatic species as listed under the FMA, TSC and EPBC Acts.

Searches were made for the pest algae species *Caulerpa taxifolia*, listed under the FMA. Whilst the species is known from Sydney Harbour there were no plants or patches of this species found at or near the study site and none are expected by virtue of the depth of the seabed at this site which limits light penetration to the seabed, to the extent necessary to support plant life.

3 IMPACT ASSESSMENT

3.1 Construction Impacts

With regard to the assessment of possible aquatic impacts, the wharf construction works require placement of locator and fender piles and installation of gantry ramps from the Glebe Island tarmac to the floating pontoon ferry wharf.

All proposed new piles would be driven into silty-sand substratum. As there are no seagrass beds, marina algae or rocky rubble reef habitat located in the construction area there will be no impacts on marine vegetation. There will be a loss of benthic habitat in the silty-sand sediments, arising from pile placement:

- Placement of the each of the new piles would displace some shallow sub-tidal silty sand sediment habitat. Whilst some of the existing benthic organisms would be displaced sideways by the action of pile driving, some organisms would be lost to the initial pile placement.
- As the area of disturbance from the pile driving activity is very small compared to the total area of soft sediment habitat in the study area, this impact is considered insignificant.

Potential indirect impacts on the aquatic ecology of the proposed construction works are as follows:

- Whilst placement of piles creates turbidity, this is not considered a significant problem as turbidity would be localised to the immediate area around the piling work area, would be confined to bottom waters and would settle rapidly.
  Further, the seabed within the project area is predominantly loose silty-sand subjected to a relatively constant 'rain' of smothering silt, and the benthic assemblage in the locality would be expected to contain organisms that are tolerant of this incessant turbidity. That is, the organisms most likely to be affected by localised turbidity would already be turbidity tolerant and would thus not be impacted.
- Placement of the floating pontoon wharf against the concrete wall will shade the shallow water marine algae habitats between the pontoon and the wall with a consequent loss of marine algae habitat. However, the remaining three sides of the floating pontoon wharf plus the shallow wetted surface areas of the locator plus fender piles exposed to sunlight will provide suitable habitat for colonisation by

marine algae and consequently, there will be an overall net increase in available marine algae habitat at the site. This is considered a beneficial impact.

- Given that location of the site within the outflow sub-tidal plumes from known historic industrial areas in Rozelle and Blackwattle Bays, there are likely to be various contaminants in the sediments on the seabed where piling works are to occur (MPR 2002, 2012). However due to the pulse nature of the pile driving activities it is considered that there would be no significance turbidity plume generated by the piling works, and therefore mobilisation of contaminants to the water column associated with piling works would also be insignificant. In any case, residual risk of mobilisation of contaminants from the sediments to the water column can be minimised by use of silt curtains around the pile driving works to contain any potential sediment plumes.
- There are likely to be over-water activities relating to the construction, and additional safeguards should be provided to prevent materials falling onto the seabed. This potential impact can be mitigated to insignificance by the use of best practice construction management procedures that can be written into the Construction Environmental Management Plan (CEMP) for the project.

3.2 Operational Impacts

The main potential operational impacts arising from the use of the ferry wharf are disturbance of aquatic habitats from vessel propeller or jet wash and the potential for litter and contaminated stormwater entering the harbour from use of the shelter:

- With regard to propeller and jet wash impacts, the wharf pontoon is located further off-shore then the existing concrete wall and in water depths that are always greater than -11m ISLW. Further, the orientation of the pontoon wharf would be either parallel to the concrete wharf in which case propeller or jet wash would be directed parallel to the shore rather then towards the inshore revetment rock reef habitats.
- If the floating pontoon wharf was orientated normal to the concrete wharf vessels would dock in forwards and back out which would also limit jet or propeller wash to deeper waters away from rock rubble habitats. Thus, by virtue of orientation and depth for ferry and other vessel use of the proposed wharf facility, there are no potential propeller or jet wash impacts expected on the aquatic habitats or biota of the locality.
- With regard to litter arising from use of the wharf, this is an ongoing concern for all the public ferry wharves in Sydney Harbour. Accordingly, this impact would be minimised by the use of current best practice as applied by Sydney Ferries and local

governments to resolve this problem elsewhere in Sydney Harbour.

3.2.1 Navigational Aspects

With regard to potential navigational impacts arising from the temporary ferry wharf proposal, the following issues will need to be addressed during detailed wharf design:

Lighting interference with existing navigational lighting.

- Currently there are two sets of fixed red navigation lights, one on each corner of the Glebe Island Berth 3 concrete structure (Figure 6). The lights are set into the upper part of the concrete structure at each of the two corners (four lights in all - see Figures 4 and 25). There is potential for the proposed temporary structure to physically obscure these lights and there is also the potential for making the lights less visible via interference from ferry wharf lighting. Both these aspects will need to be taken into account and resolved during detailed wharf design.

Figure 25 North-west side of Glebe Island berth 3 showing north facing "fixed red" navigation light. There is a similar light on the west facing side and two others at the north-eastern and east sides of the berth.

Limited Visibility of Fairways from Ferry berthed at Pontoon.

- The present Glebe Island tarmac plus the kerb along the edge of the berth in the vicinity of Glebe Island Berth 3 are set at a maximum height of around 3.6m above ISLW, and there is the potential for obstruction of ferry master's views of vessel traffic in the fairways of Johnstons Bay and White Bay, particularly when the ferry is

leaving a pontoon aligned parallel to the berth. The speed limit in these two bays is 8 knots. Vessels berthed at Glebe Island 2 could further obscure sight lines to traffic in Johnstons Bay fairway (see Figure 3). This aspect will need to be considered during detailed design, and when finalising selection of the vessels that will service this wharf. Currently the proposal is to use the Captain Cook III, which is 37m long, gross tonnage 399 Tonne and has a draft of 3.2m.

Berthing Loads under adverse Wind and Wave Conditions.

- Whilst the site is protected from most long-fetch wave action there are likely to be times where high winds will generate sufficient waves such that the combine waves and windage on a ferry berthing broadside to a pontoon orientated parallel to the berth will be pushed heavily against the pontoon fenders. The pontoon itself could also oscillate within the constraints of its locator piles, possibly exacerbating berthing impacts. These aspects will need to be considered during detailed engineering design for the proposed temporary wharf; both from the point of view of structural integrity and from the point of view of passenger safety whist standing on the pontoon wharf or whilst embarking between the ferry and the pontoon.

3.3 Fisheries Management Act Permit and Habitat Protection Requirements

Part 7 of the Fisheries Management Act 1994 (FMA) sets out the conditions under which permits are required for various construction activities, and the conditions under which a permit may be granted are specified in the NSW DPI (Fisheries) Policy and Guidelines (NSW Fisheries 1999). With respect to estuarine activities, permits are required for reclamation or dredging works and for the taking or harming of marine vegetation:

- The present proposal does not include activities that fall under the definition of dredging or reclamation.
- The proposal would not result in any significant net loss of macroalgae habitat and there would be an overall greater area of hard substratume habitat suitable for macroalgae colonisation created by virtue of the extra wetted surface areas on the pontoon and piles.
- Provided suitable construction precautions are in place (as outlined in Section 3.5 below), there is negligible risk of damage to adjacent marine algae habitats on the rip-rap revetment rock. It is concluded that the proposal would not require a permit under the FMA to take or kill marine vegetation.

3.4 Sydney Region Environmental Plan (Sydney Harbour Catchment) 2005

Clause 21 of the SREP (Sydney Harbour Catchment) outlines nine criteria for biodiversity, ecology and environmental protection:

17(a) Need for development to have a neutral or beneficial effect on water quality entering the waterway.

Provided construction works utilise best management practice for containing water and materials loss from the site, water quality impacts would be minimal and temporary.

17(b) Need for development to protect and enhance terrestrial and aquatic species, populations and ecological communities and, in particular, should avoid physical damage and shading of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

The development would result in shading of existing marine vegetation habitat on the berth concrete wall by virtue of the placement of the pontoon wharf against the wall, but this would be offset by the introduction of a greater area of similar wetted hard substratum on the pontoon front and sides that would support marine algae, with an overall net increase in marine algae habitat at this location.

Marine mammals, reptiles and aquatic or migratory birds may utilise the aquatic resources of the site on a transient or opportunistic basis and would not be impacted in any significant way as there is abundant alternate or equivalent habitat in the locality and throughout the harbour.

Syngnathid fish were not found on the existing concrete wetted surfaces and are not expected due to inadequate suitable habitat plus lack of connectivity for the adjacent rock revetment habitat with other similar habitat along the Balmain shore..

17(c) Need for development to avoid indirect impacts on aquatic vegetation as a result of increased access.

There will be no increased access to the aquatic vegetation at the site arising from the development.

17(d) Need for development to avoid indirect impacts on aquatic vegetation (such as changes to flow, current and wave action and changes to water quality) as a result of increased access.

By virtue of the openness of the site to the harbour, there are not likely to be any significant changes to tidal flow, currents, wave

action or water quality arising from the proposal.

17(e) Need for development to protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation.

There are no natural inter-tidal foreshore areas, natural landforms or native vegetation at the Glebe Island site, as this is a totally reclaimed and paved site. There is riparian vegetation established on the top of the rip-rap revetment rock adjacent to the site and this habitat will not be affected by the proposal. This habitat currently supports a breeding colony of Silver gulls and, by virtue of the isolation of the ferry site from this habitat, the breeding Silver gull population would not be affected by the construction or operation of the proposed ferry wharf.

17f) Need for development to retain, rehabilitate and restore riparian land.

The total riparian shore at this location comprises reclaimed land behind revetment walls (sandstone and concrete). The wharf construction project does not include any works on riparian lands and thus does affect existing riparian land.

17(g) Need for development on land adjoining wetlands to maintain and enhance the ecological integrity of the wetlands and where possible to provide a vegetative buffer to protect wetlands.

The DCP for the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 indicates that there are designated wetlands at the north west side of the Glebe Island Berth 3 site and the wetlands are interpreted to be the kelp habitats on the rock revetment wall alongside Glebe Island Berth 4. The proposed ferry wharf will not interfere with this habitat and operation of the ferry wharf will not impact on this habitat. Construction works can be managed in a manner to protect the existing vegetated rock rubble reef.

17(h) Need to assess the cumulative environmental impact of the development.

Assessment of the cumulative impacts of the proposal on the aquatic environment provided above indicates that colonisation of the ferry pontoon wharf wetted front and sides by marine algae will result in an overall increase in vertical hard substratum habitat for marine lgae at this location. There are no long-term water quality or ecological impacts arising from the proposal. Accordingly, the net impact of the proposal will be beneficial compared to the present situation.

17(i) State whether sediments in the waterway adjacent to the development

are contaminated, and what means will minimise their disturbance. Contamination investigations for the bays around the site and for the harbour sediments generally have found that there are elevated levels of hydrocarbons, heavy metals, PAH and TBT throughout the harbour. The sources of this contamination are varied and would include shipbuilding/maintenance and general runoff from the surrounding urban and former industrial catchments. As there will be no significant disturbance of sediments arising from construction works, there are no significant disturbance impacts expected. Notwithstanding, silts curtains will be deployed around the piling works to limit the potential spread of turbidity plumes from piling operations.

3.5 Recommended Aquatic CEMP

All contractors undertaking construction work associated with the Glebe Island Berth 3 ferry wharf construction project shall ensure that their activities do not cause any harm to the adjacent inshore rock rubble marine vegetation habitats as indicated on Figures 4 to 6 of this report. In order to achieve these aims, contractors shall implement the following precautions:

- No vessels are to be moored over the inshore rock rubble habitats and all vessel movements and vessel placements (e.g., barges) should be confined to the bare sediment habitat offshore from the Glebe Island 3 concrete wharf.
- There will be no stockpiling of demolition or construction materials on the seabed.
- No vessel is to be moored with anchor or other bottom tackle located in the rock rubble marine vegetation habitats.
- Mooring lines or cables must not be laid across the rock rubble marine vegetation habitats if there is any risk of these cables reaching the bottom due to wave action or low tides. If deployed, they must be suitably buoyed prior to laying, and kept buoyed once laid, to prevent cable drag and cable swing damage (scalping) to marine vegetation areas. Where this is impractical, contractors should use floating rope.
- In order to minimise wash and prevent bottom scouring of the marine vegetation habitats, towing or pushing vessels must not use excessive power to manoeuvre barges into place near the designated marine vegetation habitats. Scouring damage can also be minimised by 'working the wind and tides', i.e., only moving floating plant into place on high tides and under favourable or no winds.
- The potential for turbidity plumes associated with piling operations should be mitigated by the use of floating silt curtains to contain any plumes to the immediate area the piles and these silt curtains are not to be removed until there are no remaining visible plumes within the curtains.

4 CONCLUSIONS

It is concluded that construction of a temporary ferry wharf at Glebe Island Berth 3 would result in temporary loss of shallow sub-tidal marine algae habitat on the berth concrete seawall via shading from the pontoon wharf but that the pontoon wharf itself will provide additional suitable wetted surface habitat for colonisation by marine algae that would result in an overall increase in marine algae habitat at the locality:

- The new encrusting assemblages including macroalgae will colonise wetted surfaces of the pontoon and associated fender and locator piles will be a net beneficial impact of the proposal.
- There will be no disruption to adjacent inshore rock rubble reef biotic assemblages arising from construction or operation of the facility.
- Detailed design will include addressing structural integrity, lighting interference with existing navigation aids, visibility of adjacent fairways by ferry masters leaving the wharf and passenger safety on the pontoon and during embarking, especially during adverse weather conditions.
- Possible impacts arising from the proposed construction works and from operation of the new facilities can be minimised to insignificance by appropriate construction, demolition and operational safeguards as outlined in the report.

On balance, there will be a net beneficial impact from the proposed wharf construction works; there would be no net loss of aquatic habitat to shading as in the medium to long term, there will be a beneficial impact for reef fish assemblages utilising the additional marine marcroalgae based assemblages on the wetted surfaces of the pontoon and piles to be introduced to the locality.

Accordingly, the project could meet the aquatic ecology conservation requirements of the SREP (Sydney Harbour Catchment) 2005 and could meet the aquatic ecology and fish habitat conservation requirements of the Fisheries Management Act 1994 (FMA) and the NSW DPI Fisheries' guidelines (NSW Fisheries 1999). The proposed construction works would not require any permits under the FMA.

5 REFERENCES

DECC (2009)

Environmentally Friendly Seawalls, A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries. DECC Report 2009/328 prepared on behalf of Sydney Metropolitan Catchment Authority, June 2009.

Gommon M F, Glover J C M and Kuiter R H (1994)

The fishes of Australia's South Coast. The Flora and Fauna of South Australia Handbooks Committee. State Print Adelaide.

Kelleway, J., R.J. Williams and C.B. Allen (2007)

An Assessment of the Saltmarsh of the Parramatta River and Sydney Harbour. NSW Department of Primary Industries – Fisheries Final Report Series No. 90. August 2007.

Kuiter R H (1997)

Guide to Sea Fishes of Australia. New Holland, Sydney.

MPR (2004)

Aquatic Ecology Survey – Marine Maintenance & Repair Facility at Rozelle. Report prepared for Sydney Slipways Pty Ltd.

MPR (2006)

Aquatic Ecology Survey - Proposed Baileys Marine Facility, White Bay 6. Report prepared for Kelloge Brown & Root June 2006.

MPR (2010)

Jones Bay Marina Expansion – Aquatic Ecology Assessment. Report prepared for Peleton Group (August 2010).

MPR (2012a)

Demolition of Jacksons Landing Wharf, and Construction of a new Boardwalk. Report prepared for Lend Lease Pty Ltd (February 2012).

MPR (2012b)

Upgrade of Mort Bay Balmain Ferry Wharf – Aquatic Ecology Assessment. Report prepared for Hansen Yunken Pty Ltd (July 2012).

NSW Fisheries (1999)

Policy and Guidelines Aquatic Habitat Management and Fish Conservation. (Eds) A K Smith and D A Pollard. NSW Fisheries, Sydney.

NSW Fisheries (2004)

NSW Control Plan for the noxious marine weed *Caulerpa taxifolia* in NSW waters. NSW Fisheries February 2004.

PB (2008)

Contamination investigation Woodley's Marina Berrys Bay, Waverton. Report by Parsons Brinckerhoff for Maritime Authority of NSW.

SMCMA (2008)

Sydney Harbour Foreshore & Estuarine Vegetation Mapping, Assessment, Planning And Management. Sydney Metropolitan Catchment Management Authority, 2008.

SPCC (1981) The Ecology of Fish in Botany Bay. Report BBS23, Environmental Control Study of Botany Bay. SPCC Sydney.

West, R J, Thorogood, C, Walford, T, Williams, R J (1985)

An Estuarine Inventory for New South Wales, Australia. Fisheries Bulletin 2. Division of Fisheries, Department of Agriculture N.S.W.

West G, Williams R J and Laird R (2004)

Distribution of estuarine vegetation in the Parramatta River and Sydney Harbour, 2000. NSW DPI Fisheries, Final Report Series No 70. December 2004.

ANNEXURE A PRELIMINARY GENERAL ARRANGEMENT FOR PROPOSED FLOATING PONTOON WHARF AT GLEBE ISLAND BERTH 3