

Marine Biodiversity Assessment

HMAS PLATYPUS, NEUTRAL BAY

WALKWAY

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www.nghenvironmental.com.au e ngh@nghenvironmental.com.au

Sydney Region

18/21 mary st
surry hills nsw 2010 (t 02 8202 8333)

Newcastle - Hunter and North Coast

7/11 union st
newcastle west nsw 2302 (t 02 4929 2301)

Canberra - NSW SE & ACT

17/27 yellourn st (po box 62)
fyshwick act 2609 (t 02 6280 5053)

Bega - ACT and South East NSW

suite 1, 216 carp st (po box 470)
bega nsw 2550 (t 02 6492 8333)

Wagga Wagga - Riverina and Western NSW

suite 1, 39 fitzmaurice st (po box 5464)
wagga wagga nsw 2650 (t 02 6971 9696)

Bathurst - Central West and Orana

35 morrisset st (po box 434)
bathurst nsw 2795 (t 02 6331 4541)

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1 INTRODUCTION AND BACKGROUND

1.1 PROJECT DESCRIPTION

1.1.1 Location of the activity

The Sydney Harbour Federation Trust (SHFT) is proposing to construct a walkway from the HMAS Platypus wharf to Kesterton Park as part of remediation works to the HMAS Platypus site in Neutral Bay. The proposal site is located within Sydney Harbour, east of Sydney Harbour Bridge and approximately six kilometres from the harbour entrance (Figure 1-1).

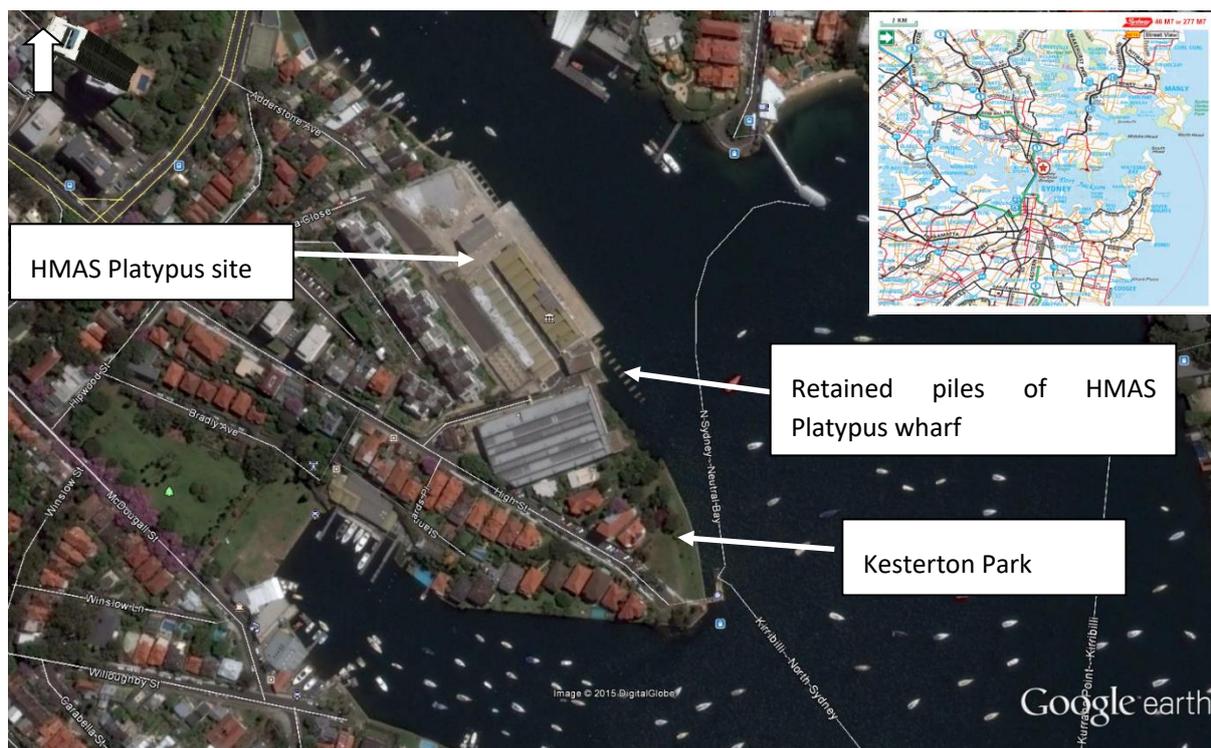


Figure 1-1. HMAS Platypus site (Source: Google earth and www.streetdirectory.com.au)

1.1.2 Proposed works

A walkway is proposed to be constructed to provide a pedestrian link from the HMAS Platypus wharf to Kesterton Park. Kayak access including a pontoon and steps to the water would also be provided. Appendix A includes plans for the proposed walkway and associated works. A new deck around 6 metres wide and 60 metres long would be installed on the retained wharf piles as shown on Figure 1-1. The piles were previously used to support the wharf deck which was removed in 2014. In addition, the proposed works would involve construction of a walkway connecting the replacement wharf platform to Kesterton Park. Seven new piles (600mm diameter) would be installed to support the walkway. The walkway would be around 2.5 metres wide. A pontoon would be constructed to the east of the deck supported by the retained wharf piles. Six new piles (600mm diameter) would be installed to support the pontoon. Steps down to the water would be constructed for kayakers at the southern end of the proposed pontoon.

1.2 SCOPE OF THE REPORT

The aims of the study are to:

- Describe the existing marine environment within the study area and determine the potential marine biodiversity constraints to the proposed works, in particular any habitats and/or flora and fauna species of conservation significance occurring or likely to occur within the study area.
- Determine the potential impacts of the proposed works on the marine environment and in particular on any habitats and/or flora and fauna species of conservation significance occurring or likely to occur within the study area.
- Provide safeguards and management measures to avoid, minimise and/or mitigate any impacts.

2 STATUTORY CONSIDERATIONS

The proposal is to be undertaken by SHFT, a commonwealth agency, and would be undertaken in Commonwealth and State waters/land. As such, relevant NSW and Commonwealth legislation apply.

2.1 NSW THREATENED SPECIES CONSERVATION ACT 1995

The TSC Act aims to conserve biological diversity and promote ecologically sustainable development, prevent the extinction and promote the recovery of threatened species, populations and ecological communities, protect the critical habitat of those species, populations and ecological communities that are endangered, eliminate or manage certain threatening processes, ensure proper assessment of activities impacting threatened species, populations and ecological communities and encourage the conservation of threatened species, populations and ecological communities through co-operative management. These include marine species.

The assessment of the proposal's impact found that there is unlikely to be a significant impact on threatened species. Accordingly, the proposal does not require a Species Impact Statement to be prepared.

2.2 NSW FISHERIES MANAGEMENT ACT 1994

The objects of the FM Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The FM Act sets out to ensure that the impact of any action affecting threatened species, populations and ecological communities of fish and marine vegetation is properly assessed. Amongst other matters, the FM Act sets out to develop habitat protection plans and protect marine vegetation and other habitats.

Under section 199, the following applies in regards to the proposed dredging and reclamation works:

(1) A public authority (other than a local government authority) must, before it carries out or authorises the carrying out of dredging or reclamation work:

(a) give the Minister written notice of the proposed work, and

(b) consider any matters concerning the proposed work that are raised by the Minister within 28 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority).

(2) Any such public authority is to notify the Minister of any dredging or reclamation work that it proposes to carry out or authorise despite any matter raised by the Minister. The Minister may, within 14 days after

being so notified, refer any dispute to the Minister responsible for the public authority. If the dispute cannot be resolved by those Ministers, it is to be referred to the Premier for resolution.

*(3) In this section, **public authority** includes the Minister administering the Crown Lands Act 1989.*

The proposal is considered reclamation and would require notification under section 199 of the Act.

Under section 205, the following applies in regards to harming marine vegetation:

(1) This section applies to:

(a) mangroves, or

(b) seagrasses, or

(c) any other marine vegetation declared by the regulations to be marine vegetation to which this section applies,

but does not apply to protected marine vegetation under section 204A.

(2) A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.

The assessment in Chapter 5 determined that the proposal has the potential to harm seagrass and a permit under section 205 may be required.

2.3 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the EPBC Act a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance which include marine biodiversity. A number of factors need to be taken into account when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is a chance of an impact, then an Assessment of Significance is required to determine the significance of the impact in accordance with Matters of National Environmental Significance Guidelines – Significant Impacts Guidelines 1.1 (Department of Environment 2013).

The assessment of the proposal's impact found that there is unlikely to be an impact on relevant matters of national environmental significance (Section 5.3). Accordingly, the proposal does not need to be referred to the Australian Government Department of the Environment and Energy.

3 METHODOLOGY

Background research and field surveys were undertaken in order to provide details on potential marine biodiversity constraints to the proposed works.

The assessment has been undertaken with reference to the following documents:

- NSW Department of Primary Industries (DPI) (Fisheries) *Policy and Guidelines for Fish Habitat Conservation and Management* (NSW DPI 2013).

3.1 BACKGROUND RESEARCH

3.1.1 Database searches

The NSW Office of Environment and Heritage (OEH) Bionet was searched for any threatened or protected marine species listed under the *Threatened Species Conservation Act 1995* (TSC Act) previously recorded within the Sydney Metropolitan Catchment – Marine zone.

The Commonwealth Protected Matters search tool was used to reveal any threatened, migratory and/or other listed marine flora and fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with the potential to occur within 5 kilometres of the proposed works area.

Database searches were undertaken on 29 May 2017.

3.1.2 Literature review

A review of available literature and websites including the DPI (Fisheries) website, scientific papers, aerial imagery and reports for the Sydney Metropolitan Catchment area was undertaken to obtain an overview of any marine habitats or species of conservation significance present or likely to be present in the field survey area and/or wider locality (refer to Section 8).

3.2 FIELD SURVEYS

3.2.1 Marine habitat surveys

A marine habitat survey of the subtidal zones of the field survey area was undertaken on 8 December 2015 with SCUBA. Figure 3-1 illustrates the areas surveyed. Weather conditions were fine with clear skies. Water visibility was moderate; around 3-4 metres. The whole survey area was swum for about one hour by two SCUBA divers.



Figure 3-1: Survey area

The field survey area was swum by two divers using SCUBA to identify marine habitats at the proposal site. Surveys identified three distinct habitats. At each of the habitats the following was undertaken:

- Wharf piles. Associated flora and fauna were recorded.
- Seawall. Associated flora and fauna were recorded.
- Sandy bed. The nature of the seabed (fine sand, coarse sand, etc) and any evidence of associated flora and fauna were recorded, including seagrass or macroalgal beds.
- Subtidal rocky reef. Associated flora and fauna were recorded.

4 RESULTS

4.1 BACKGROUND RESEARCH RESULTS

4.1.1 Database searches

The NSW Bionet database searches revealed 12 listed marine fauna and no (0) listed marine flora species previously recorded within the Sydney Metropolitan Catchment (Appendix B).

The EPBC Act Protected Matters Search Tool revealed one endangered ecological community (marine), 21 listed marine fauna and 0 (zero) listed marine flora species with the potential to occur within the Sydney Metropolitan Catchment (Appendix B).

An assessment of the likelihood of these species occurring in the study area based on their habitat preference and results of field surveys was undertaken. Results are provided in Appendix B.

4.1.2 Literature review

Neutral Bay is located on the northern foreshore of Sydney Harbour, east of Sydney Harbour Bridge and approximately six kilometres from the entrance of the harbour (Figure 1-1).

A number of marine habitats of conservation significance are located along the foreshore of Sydney Harbour including rocky reefs, mangroves, macroalgal beds and seagrass beds. These marine habitats are protected from harm under the *NSW Fisheries Management Act 1994*. In Neutral Bay, previous studies have mapped the presence of seagrass beds at Hayes Street Beach as well as rocky reefs along a number of sections of the foreshore of the bay (DPI Fisheries 2010, West et al 2004). No seagrass beds have been previously recorded occur in the vicinity of the HMAS Platypus wharf (ERM 2010; NGH Environmental 2010).

Marine pest species are known to occur within the Sydney Harbour Metropolitan Catchment and include the alga *Caulerpa taxifolia*, dinoflagellates and the Pacific oyster (*Crassostera gigas*) (DPI Fisheries 2010).

The sediments of Sydney Harbour are known to contain high levels of pollutants, including heavy metals (Irvine and Birch 1998). In Neutral Bay, including the area immediately adjoining the subject site to the north, sediments were assessed to contain high levels of PAHs (Polycyclic Aromatic Hydrocarbons), TBTs (Tributyltin tin), copper, zinc, mercury, TPH C10-C36 (Total Petroleum Hydrocarbons). The seabed in the area consisted of silty sand to sandy clay (ERM 2010).

Water quality within Sydney Harbour is largely impacted by land use within the catchment, which includes high density residential, commercial, recreational and industrial uses. Elevated dioxin levels in fish and crustaceans from the harbour have led to a ban on commercial fishing and restrictions on recreational fishing activities (DPI Fisheries 2010).

Land use in Neutral Bay is mainly residential with some past industrial activities also present. Water quality is also impacted by a number of stormwater outlets located at Hayes Street Beach on the north eastern foreshore of Neutral Bay. This beach complied on average over 80 percent of the time with faecal coliform and enterococci levels with levels tending to increase with rainfall (DECCW 2006).

4.2 SURVEY RESULTS

A map of the various marine habitats located within the study area is provided in Figure 4-1. Water depth at the proposal site are presented on the concept plans in Appendix A. Site photographs are provided in Appendix C. A comprehensive list of marine flora and fauna species identified during the surveys is provided in Appendix D. These lists take into account the results of the surveys undertaken in December 2015 as part of this study as well as previous surveys undertaken at the proposal site in 2010 and 2014 by NGH Environmental. (The 2014 surveys were undertaken to relocate seahorses prior to construction activities taking place at the site and therefore did not include extensive habitat assessments.) The following summarises the results of the field surveys and provides general information on the more visible species found in the various habitats as well as the general condition of these habitats.

The species lists provided in this report are not meant to provide a comprehensive list of all species inhabiting the study area, rather it offers a snapshot in time. Species composition may vary with seasons and certain species may be more visible during day time and/or night time.

4.2.1 Study area

Intertidal habitats within the study area were located on vertical surfaces (ie. wharf piles and seawall) and some small sections of rocky reef. Subtidal habitats included vertical surfaces such as the wharf piles and the seawall as well as rocky reefs covered with macroalgae, and sandy seabed. Seagrass beds (*Halophila* sp.) were located in the study area. A general description of each habitat including associated flora and fauna species is provided below.

Wharf piles

The concrete wharf piles were 95-100% covered with sessile fauna below the high water mark. Like the seawall, the intertidal areas of the piles and concrete pile caps were covered with various invertebrates including oysters, mussels, limpets, various gastropods, barnacles and cunjevoi. In the subtidal area, the piles were covered with various sponges and ascidians. Some macroalgal species, mostly *E. radiata* and *P. elegans*, were also located on some of the piles though percent cover was very low (1-5%). A small number of fish species were also observed around the piles including bream, leatherjackets, sandy sprat (*Hyperlophus vittatus*). No seahorses were recorded during this survey though they have been previously recorded along the piles of the wharf in more extensive surveys undertaken by NGH Environmental in 2010 and 2014.

Seawall

An artificial sandstone seawall is located along the southern side of the wharf in the study area as well as below the wharf. A 'natural seawall' in the form of a sandstone cliff face is also located on the western side of the wharf (Figure 4-1).

The intertidal areas of these vertical surfaces were mostly covered with sessile invertebrates such as oysters (*Saccostrea glomerata*), mussels (*Mytilus edulis*), limpets (*Patella* sp), various gastropods (*Austrocochlea porcata*, *Morula marginalba*, *Bembicium nanum*), barnacles (*Tetraclitella purpurascens*, *Chtamalus antennatus*) and cunjevoi (*Pyuria stolonifera*). The subtidal parts of the seawall also included various species of sponges.

Rocky reef with macroalgae

A small area (around 1000 square metres) to the south west of the wharf contains rocky areas covered with macroalgae (Figure 4-1). Macroalgal cover of these areas was high (Above 75%) and in good condition. Eight species of common macroalgae were recorded with the more dominant ones being *Ecklonia radiata*, *Padina elegans* and *Sargassum linearifolium*. Macroalgae are deemed type 2 – moderately sensitive key fish habitat in accordance with DPI (2013). Sponges were also recorded as well as a low number of fish species such as bream (*Acanthopagrus australis*), leatherjackets (*Monacanthus chinensis*), ludericks (*Girella tricuspidata*). All of these species were also recorded during previous surveys and are well established.

Seabed

The seabed substrate was silty sand in the study area. A strip of seagrass (*Halophila* sp; 20% cover) around 6 metres wide and 40 metres long was observed along the deepest edge of the subtidal rocky reef (Figure 4-1). Seagrass had not been recorded at the site during previous surveys undertaken in 2010. The patch of *Halophila* sp. is around 240 square metres in size and is therefore considered a type 1 – Highly sensitive key fish habitat in accordance with DPI (2013).

While no benthic invertebrates were observed during the December 2015 surveys, a small number of benthic invertebrates were observed during previous surveys including two starfish species (*Anthenea sidneyensis*, *Astropecten polyacanthus*). It is likely that infauna (i.e. fauna located below the seabed surface) use the seabed as habitat.

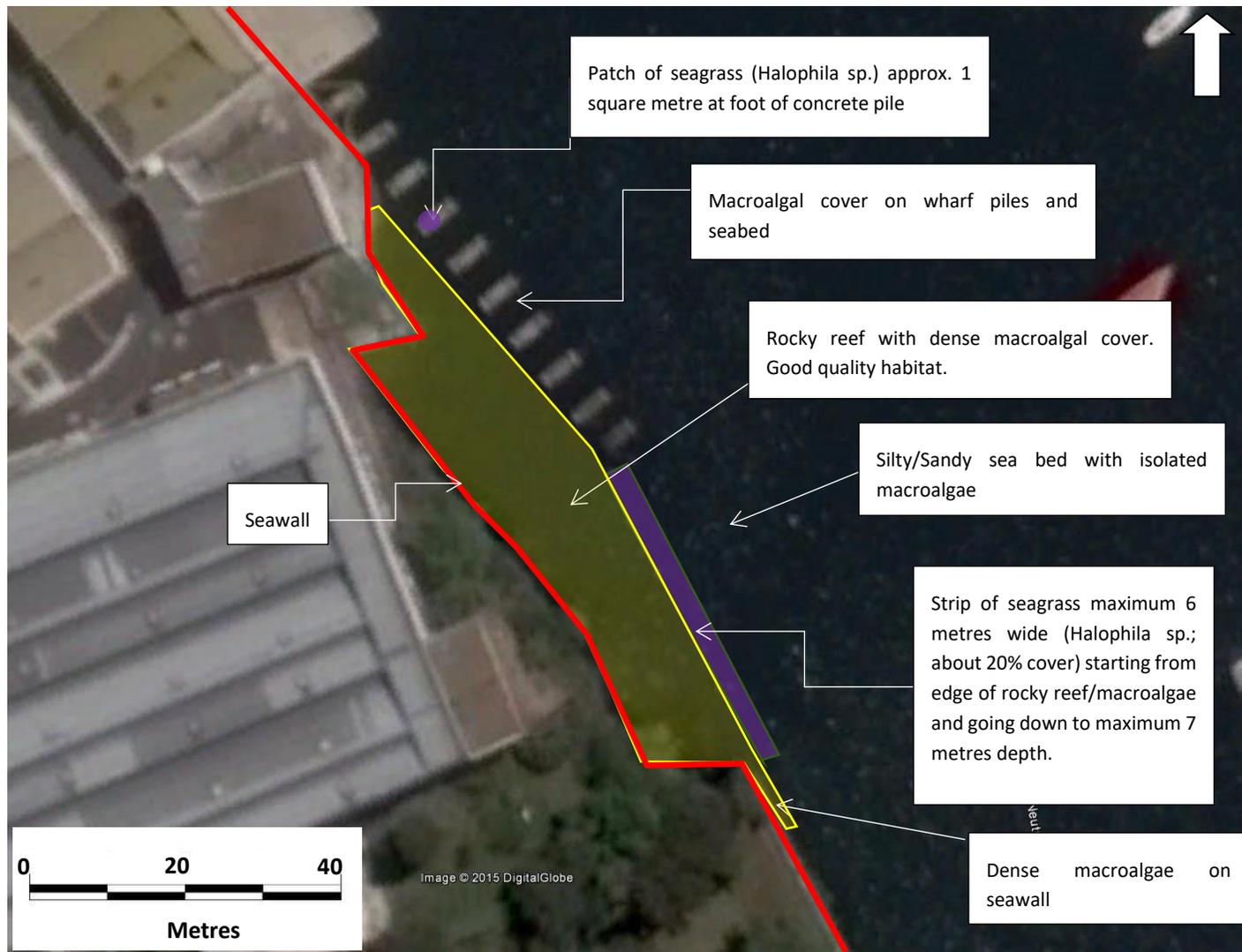


Figure 4-1 Marine habitats

4.2.2 Neutral Bay

The foreshore of Neutral Bay is mostly composed of seawalls and other manmade structures such as wharves and jetties. Small beaches can be found in various areas on the western side of the bay. At Anderson Park, the seabed substrate is mostly composed of sand with some minor rocky rubble and macroalgae present.

4.2.3 Threatened and protected species

No threatened, protected or migratory species were recorded during the field surveys. An assessment of the likelihood of occurrence of threatened, protected and migratory species revealed through background research has been undertaken based on their habitat requirements and results of field surveys (Appendix B).

The following species have been determined to have the potential to use the proposal site as habitat:

- Black cod *Epinephelus daemeli* (vulnerable under the NSW Fisheries Management Act 1994 and Environment Protection and Biodiversity Conservation Act 1999)
- Seahorses, weedy seadragons, pipefish (protected under the Environment Protection and Biodiversity Conservation Act 1999 and NSW Fisheries Management Act 1994)
- Elegant wrasse *Anampses elegans* (protected under the NSW Fisheries Management Act 1994)
- Bleekers devil fish *Paraplesiops bleekeri* (protected under the NSW Fisheries Management Act 1994).

Of the above species, only one species of seahorse, protected under Environment Protection and Biodiversity Conservation Act 1999 and NSW Fisheries Management Act 1994, was observed in the study area during the 2010 and 2014 surveys conducted by NGH Environmental.

Furthermore, the following species have been determined to have the potential to occasionally pass through or occur in proximity of Neutral Bay, though this would only be on very rare occasions:

- Australian grayling *Prototroctes maraena* (vulnerable under the Environment Protection and Biodiversity Conservation Act 1999)
- Grey nurse sharks *Carcharias Taurus* (Critically endangered under the Environment Protection and Biodiversity Conservation Act 1999 and NSW Fisheries Management Act 1994)
- Reef manta ray *Manta alfredi* (Migratory)
- Southern right whale *Eubalaena australis* (Migratory)
- Humpback whale *Megaptera novaeangliae* (Vulnerable under the Threatened Species Conservation Act 1995 and Environment Protection and Biodiversity Conservation Act 1999, Migratory)
- Green turtle *Chelonia mydas* (Vulnerable under the Threatened Species Conservation Act 1995 and Environment Protection and Biodiversity Conservation Act 1999, Migratory)
- Leatherback turtle *Dermochelys coriacea* (Endangered under the Environment Protection and Biodiversity Conservation Act 1999, Migratory)
- Little Penguin (*Eudyptula minor*) – Endangered population under the TSC Act (Little Penguin in the Manly Point Area (being the area on and near the shoreline from Cannae Point generally northward to the point near the intersection of Stuart Street and Oyama Cove Avenue, and extending 100 metres offshore from that shoreline).

5 ASSESSMENT OF IMPACTS

5.1 CONSTRUCTION

The proposed works will involve a range of activities which have the potential to impact marine biodiversity indirectly. These are discussed here and include:

- Underwater works by divers
- Boat/barge activities
- Shore based activities

Proposed underwater works, including installation of new piles, have the potential to disturb sediments which could lead to increased turbidity levels and smothering of habitats, including seagrass beds, as suspended particles settle. The study area is already impacted by siltation of biota and habitats. However, water currents may export sediments and associated contaminants outside the disturbance zone. A high number of suspension feeders such as sponges, ascidians and oysters would also be impacted by the resuspension of sediments which may further clog their feeding appendages already affected by siltation. The potential impacts as a result of migration of sediments outside the disturbance zone would be minimised through the use of silt curtains.

The proposed works would be undertaken in close proximity to sensitive habitats such as seagrass and rocky reefs with macroalgae. The use of silt curtains, if not properly installed and monitored, may damage these habitats.

Mobile species such as fish may avoid the area during the proposed works as a result of habitat disturbances and underwater construction noise. This may temporarily impact the more mobile fish species which would avoid the area and use adjacent habitats (ie. rocky reefs and/or other wharves and jetties within Neutral Bay). This impact would be temporary.

The use of boats and barges as well as shore based plant and machinery are potential sources of pollution as a result of accidental spills.

The use of boats and barges around the subtidal rocky reef may damage macroalgae from the use of propellers and anchors.

The use of boats and barges may increase the risk of the establishment of non-indigenous species including invasive species in Neutral Bay. This risk would be heightened if these boats come from outside the harbour and/or have been previously used in infested areas and have not been adequately checked and cleaned.

5.2 OPERATION

The proposed walkway has the potential to shade the seabed, limiting the growth of the seagrass below. However, this impact is likely to be minor considering the narrow width of the proposed walkway (2.5 metres), the depth at which the seagrass is located (around 5 metres below the proposed deck level at lowest astronomical tide), the use of grating for the deck of the walkway to let light through and the north westerly orientation of the walkway.

The walkway would be located east of the rocky reef for most of its length and therefore potential shading of macroalgae would be minimal (Appendix A).

The new piles to be installed are likely to become colonised by invertebrates and algal growth and provide an artificial habitat.

The pontoon including kayak facility would be located to the east of the seagrass area in deep waters and therefore disturbance of the seabed due to the use of this facility is unlikely (Appendix A).

The walkway and pontoon would increase the use of the site by walkers and kayakers. As a result, there is potential for increased litter and disturbance of the marine habitat at the proposal site. However, the proposal site is located in a highly urbanised environment and additional disturbance would be minor. It is recommended that signs be located in the vicinity of the proposal site to educate the public of the sensitive nature of the environment.

The installation of piles on the seabed would be considered reclamation. Reclamation works would require DPI (Fisheries) to be notified of the proposal in accordance with clause 199 of the *Fisheries Management Act* (refer to section 2.2).

The patch of *Halophila* sp. is around 240 square metres in size and the area of subtidal rocky reef and macroalgae is around 1000 square metres. Reclamation works within the seagrass area and rocky reef would be considered 'harm to marine vegetation' under the *Fisheries Management Act* (FM Act). The proposed works would directly damage the seagrass and macroalgal beds. A permit under clause 205 of the FM Act would be required (refer to section 2.2). In circumstances where seagrass and/or macroalgae is likely to be negatively impacted and cannot be avoided or mitigated, environmental compensation will generally be included as a condition of the permit. DPI (Fisheries) calculates habitat compensation on a minimum 2:1 basis. Five piles would be installed within the seagrass habitat and two within macroalgal habitat. Table 5-1 details the potential direct impacts to seagrass and macroalgae from the proposed development based on the concept design in Appendix A and a pile disturbance area of 0.2826 square metres per pile (600 mm diameter). The impact would be minimal compared to the overall habitat present at the proposal site.

Table 5-1 Impacts to seagrass and macroalgae from the proposal

Seagrass impact		Macroalgae impact		Total impact (square metres)
Square metres	% of area	Square metres	% of area	
1.41	0.59	0.57	0.05	1.98

5.3 ASSESSMENT OF SIGNIFICANCE

5.3.1 Commonwealth assessment

Department of Environment (2013) provides guidelines to assess whether actions are likely to have a significant impact on matters of national environmental significance and need to be referred to the DEWHA. Furthermore, DEWHA (2010) provides guidelines to assess whether actions undertaken by

commonwealth agencies on any land or actions undertaken by any person on commonwealth land are likely to have a significant impact on the environment that the action need to be referred to the Department of Environment and Energy. These guidelines have been used in the following assessment of impacts of the proposed works on marine flora and fauna.

DEWHA (2010) includes a number of criteria to help determine whether an action is likely to have a significant impact on the environment. Table 5-2 provides a summary of the criteria relevant to the proposal and marine biodiversity and determines whether the proposal would have a significant impact. This has taken into consideration the results of the impact assessment above and management measures from Section 6 that would be implemented. The results show that significant impacts are unlikely to arise.

Table 5-2 Assessment of significance criteria

Criteria	Triggered		Comment
	Yes	No	
Impacts on coastal landscapes and processes			
Is there a real chance or possibility that the action will:		✓	
Alter coastal processes, including wave action, sediment movement or accretion, or water circulation patterns			Coastal processes would not be affected.
Permanently alter tidal patterns, water flows or water quality in estuaries		✓	Tidal patterns and water flows would not be affected. Impacts to water quality as a result of sediment disturbances would be temporary.
Reduce biological diversity or change species composition in estuaries, or		✓	The proposed works is unlikely to change species composition.
Extract large volumes of sand or substantially destabilise sand dunes?		✓	No sand extraction would be required.
Impacts on ocean forms, ocean processes and ocean life			
Is there a real chance or possibility that the action will:			
Reduce biological diversity or change species composition on reefs, seamounts or in other sensitive marine environments		✓	The proposed works is unlikely to reduce biological diversity or change species composition
Alter water circulation patterns by modification of existing landforms or the addition of artificial reefs or other large structures		✓	Water circulation patterns would not be affected.

Criteria	Triggered		Comment
	Yes	No	
Substantially damage or modify large areas of the seafloor or ocean habitat, such as sea grass		✓	Only a small area of seagrass (<i>Halophila</i> sp.) would be damaged as a result of the proposed works.
Release oil, fuel or other toxic substances into the marine environment in sufficient quantity to kill larger marine animals or alter ecosystem processes, or		✓	Proposed works has the potential to create minor disturbances of contaminated sediments in proximity of the wharf. The larger Neutral Bay area also contains contaminated sediments. It is unlikely that these disturbances would kill large marine animals or alter ecosystem processes.
Release large quantities of sewage or other waste into the marine environment?		✓	The proposed works would not release large quantities of sewage or other waste into the marine environment.
Impacts on plants			
Is there a real chance or possibility that the action will: Involve medium or large-scale native vegetation clearance		✓	The proposed works would not involve medium or large scale native vegetation clearance.
Involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species		✓	The proposed works would not involve the clearance of any listed threatened species.
Introduce potentially invasive species		✓	The proposed works could potentially introduce invasive species (eg. macroalgae <i>Caulerpa taxifolia</i>) if contaminated barges or boats are used during construction. Appropriate management measures would be put in place to avoid this potential impact.
Involve the use of chemicals which substantially stunt the growth of native vegetation, or		✓	The proposed works would not involve the use of chemicals which would impact the growth of marine vegetation.

Criteria	Triggered		Comment
	Yes	No	
Involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species?		✓	Not Applicable
Impacts on animals			
Is there a real chance or possibility that the action will:		✓	
Cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals		✓	The proposed works are unlikely to cause a long-term decrease in a native population.
Displace or substantially limit the movement or dispersal of native animal populations		✓	The proposed work would not limit the movement or dispersal of native animal populations.
Substantially reduce or fragment available habitat for native species;		✓	The proposed works would not substantially fragment or reduce available habitat for native species.
Reduce or fragment available habitat for listed threatened species which is likely to displace a population, result in a long-term decline in a population, or threaten the viability of the species		✓	The proposed works would not reduce or fragment habitat for listed threatened species.
Introduce exotic species which will substantially reduce habitat or resources for native species, or		✓	The proposed works could potentially introduce invasive species if contaminated barges or boats are used during construction. Appropriate management measures would be put in place to avoid this potential impact.
Undertake large-scale controlled burning or any controlled burning in areas containing listed threatened species?		✓	Not Applicable

Department of Environment (2013) lists a number of criteria that need to be considered to determine whether an action is likely to have a significant impact on a matter of national environmental significance. In regards to marine flora and fauna this may include any migratory species and threatened species listed on the EPBC Act. Eight such species have been determined to have the potential to occur within Neutral Bay (refer to Section 4.2.3). All these species are highly mobile species and would only occur in Neutral Bay on very rare occasions. Therefore, impacts to threatened and/or migratory species listed under the EPBC Act are unlikely to arise and an Assessment of Significant Impact under the EPBC Act is not required (refer to Appendix B for species lists and habitat table).

No significant impacts to marine biodiversity are likely to arise as a result of the proposed works. As such a referral to the Department of Environment and Energy is not required.

5.3.2 State assessment

Five threatened marine species under the TSC Act and/or FM Act have the potential to occur at the proposal site (Section 4.2.3). However, these are highly mobile species and potential impacts as a result of the proposed limited scope works are unlikely to arise. An assessment of significant impact under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* is therefore not required (refer to Appendix B for species lists and habitat table).

No significant impacts to marine biodiversity are likely to arise as a result of the proposed works. As such a Species Impact Statement is not required.

6 MITIGATION MEASURES

- DPI (Fisheries) would be notified of the proposed reclamation works in accordance with clause 199 of the *Fisheries Management Act*.
- A permit under clause 205 of the *Fisheries Management Act* would be required for harm to seagrass and macroalgae.
- The walkway design should ensure maximum light penetration to the seabed to minimise impacts to macroalgal and seagrass growth.
- Signs should be installed to educate the public on the sensitive nature of the marine environment at the proposal site and the wider locality and to minimise disturbances.
- A silt curtain would be placed around the construction site to contain any sedimentation to the disturbance zone. A gap of 500mm would be maintained between the seabed and the bottom of the silt curtain at the lowest astronomical tide. Where feasible, the silt curtain would be placed in such a way to avoid the rocky reef and seagrass areas. The silt curtain would be monitored throughout construction on a daily basis to ensure damage to seagrass and macroalgae is avoided.
- Installation of the piles should be undertaken in a manner that would cause minimal disturbance to the seabed. Where possible, piles will be screwed into place rather than driven.
- All fuels and other chemicals required for the proposed would be stored in a bunded area away from the foreshore.
- A spill management plan would be prepared for the proposed works and an appropriately sized spill kit would be located on site at all times during construction.
- All construction boats and barges would be checked for invasive species prior to entering Neutral Bay.
- Use of propellers in shallow areas and over rocky reefs would be avoided where possible to limit sediment disturbances and damage to macroalgae.
- Anchoring would not be allowed within the rocky reef and seagrass areas.
- Daily tool box talks and the Safe Works Method Statement (SWMS) should highlight recommended mitigation measures and appropriate corrective measures.

7 CONCLUSION

The Sydney Harbour Federation Trust (SHFT) is proposing to construct a walkway from the HMAS Platypus wharf to Kesterton Park as part of remediation works to the HMAS Platypus site in Neutral Bay.

The proposal site includes four types of marine habitats which provide habitat for a variety of common fauna species:

- Wharf piles with associated epiphytic growth including invertebrates and macroalgae
- Seawalls (natural and artificial) with associated epiphytic growth including invertebrates and macroalgae
- Sandy bed with a 240 square metre of seagrass (*Halophila* sp). This area is considered a type 1 – highly sensitive key fish habitat
- Subtidal rocky reef with dense macroalgae. This area is considered a type 2 – moderately sensitive key fish habitat.

The proposal has the potential to temporarily disturb the habitats and associated fauna at the proposal site during construction activities, in particular during the installation of the piles which would disturb the bed sediments. The installation of the piles would also directly impact the seagrass and macroalgal bed. However, the overall area of disturbance of these two sensitive habitats would be minor relative to the availability of habitat present at the site and negligible when considering similar habitats within Neutral Bay and Sydney Harbour. Management measures have been proposed to avoid, minimise or mitigate impacts. This includes the requirement to notify DPI (Fisheries) of the proposed works and obtain a permit for any harm to seagrass and macroalgae.

The proposed works are unlikely to significantly impact the environment, including threatened or migratory species listed under the EPBC Act, FM Act or TSC Act. A referral or species impact statement are not required.

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9 GLOSSARY

Infauna – Aquatic animals living in the substrate of a body of water

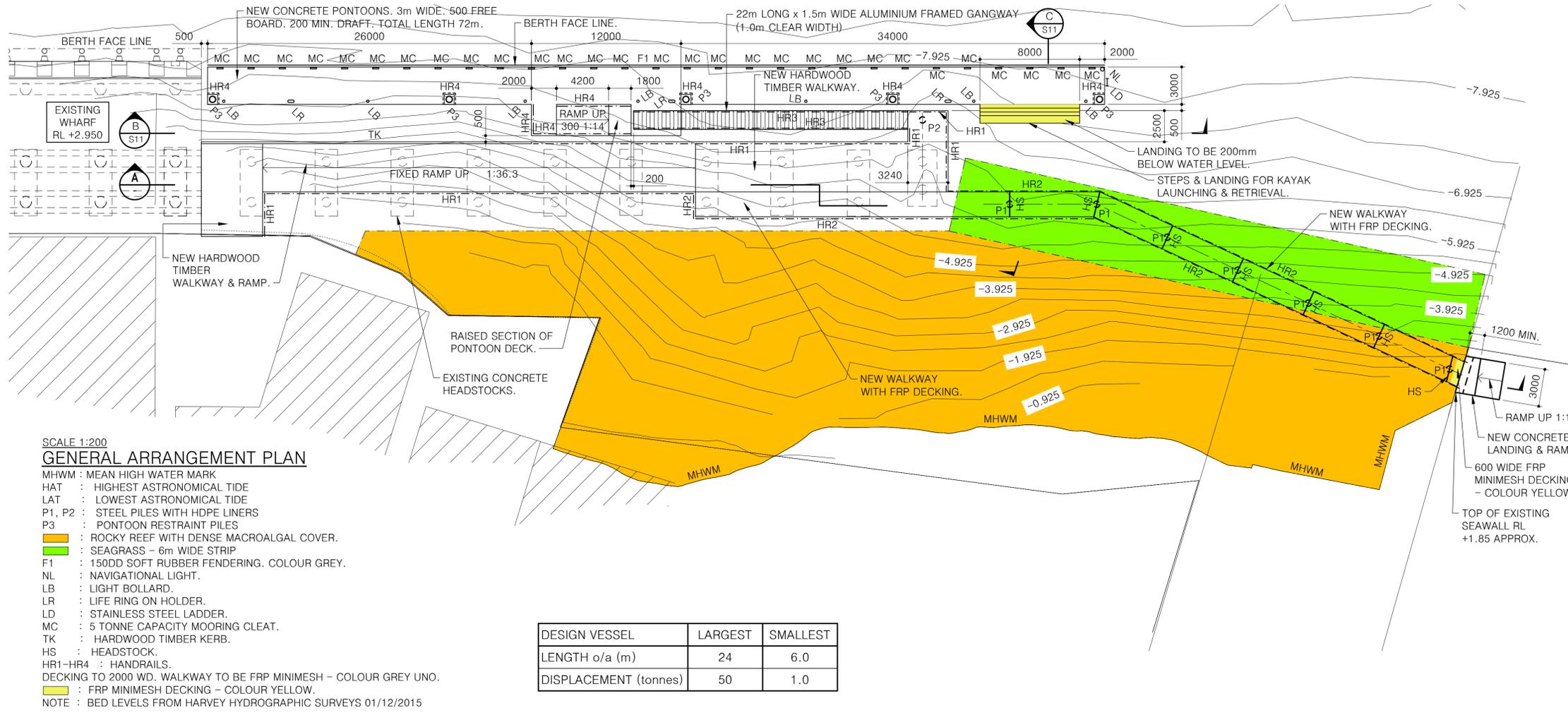
Intertidal zone – The area of the foreshore between the lowest and highest tide mark

Non-indigenous – Organisms not occurring naturally in a particular area

SCUBA – Self Contained Underwater Breathing Apparatus

Subtidal zone – The zone below the low tide that is always covered by water

APPENDIX A CONCEPT DESIGN

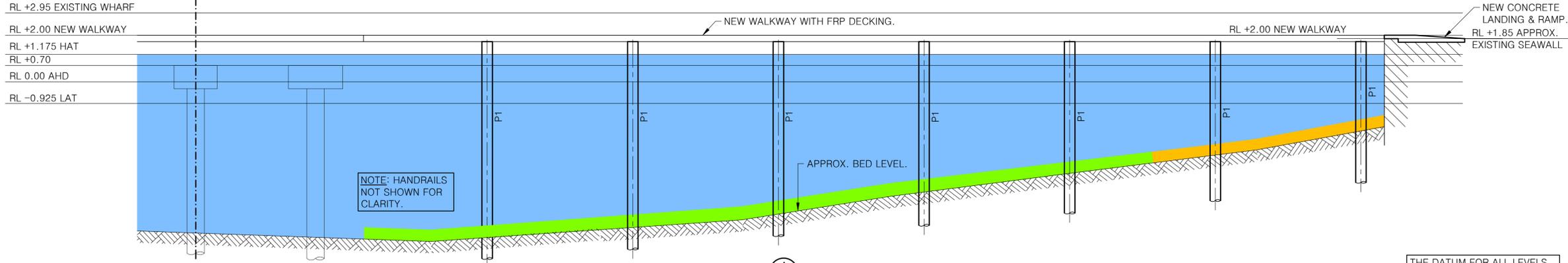
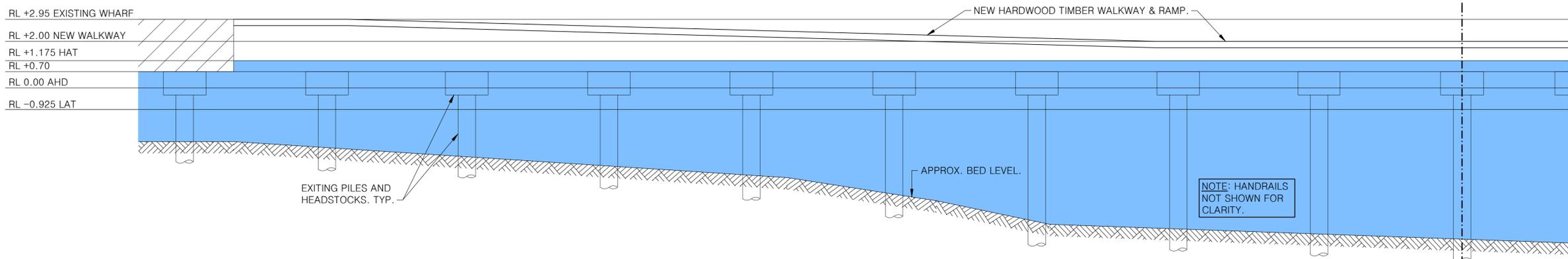


SCALE 1:200
GENERAL ARRANGEMENT PLAN

- MHWM : MEAN HIGH WATER MARK
- HAT : HIGHEST ASTRONOMICAL TIDE
- LAT : LOWEST ASTRONOMICAL TIDE
- P1, P2 : STEEL PILES WITH HDPE LINERS
- P3 : PONTOON RESTRAINT PILES
- [Orange Box] : ROCKY REEF WITH DENSE MACROALGAL COVER.
- [Green Box] : SEAGRASS - 6m WIDE STRIP
- F1 : 150DD SOFT RUBBER FENDERING. COLOUR GREY.
- NL : NAVIGATIONAL LIGHT.
- LB : LIGHT BOLLARD.
- LR : LIFE RING ON HOLDER.
- LD : STAINLESS STEEL LADDER.
- MC : 5 TONNE CAPACITY MOORING CLEAT.
- TK : HARDWOOD TIMBER KERB.
- HS : HEADSTOCK.
- HR1-HR4 : HANDRAILS.
- DECKING TO BE 2000 WD. WALKWAY TO BE FRP MINIMESH - COLOUR GREY UNO.
- [Yellow Box] : FRP MINIMESH DECKING - COLOUR YELLOW.
- NOTE : BED LEVELS FROM HARVEY HYDROGRAPHIC SURVEYS 01/12/2015

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B	15.05.17	PRELIMINARY ISSUE	W.O'B	M.B.
C	18.05.17	PRELIMINARY ISSUE	W.O'B	M.B.
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CLIENT
SYDNEY HARBOUR FEDERATION TRUST



LEVEL 6, 1 JAMES PLACE,
NORTH SYDNEY, NSW 2060
TEL. (02) 9409 3300
FAX. (02) 9929 6667
info@tlbengineers.com
www.tlbengineers.com
ABN 94 074 717 892

TAYLOR LAUDER BERSTEN PTY. LTD.
CONSULTING STRUCTURAL, CIVIL & MARITIME ENGINEERS

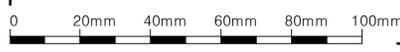
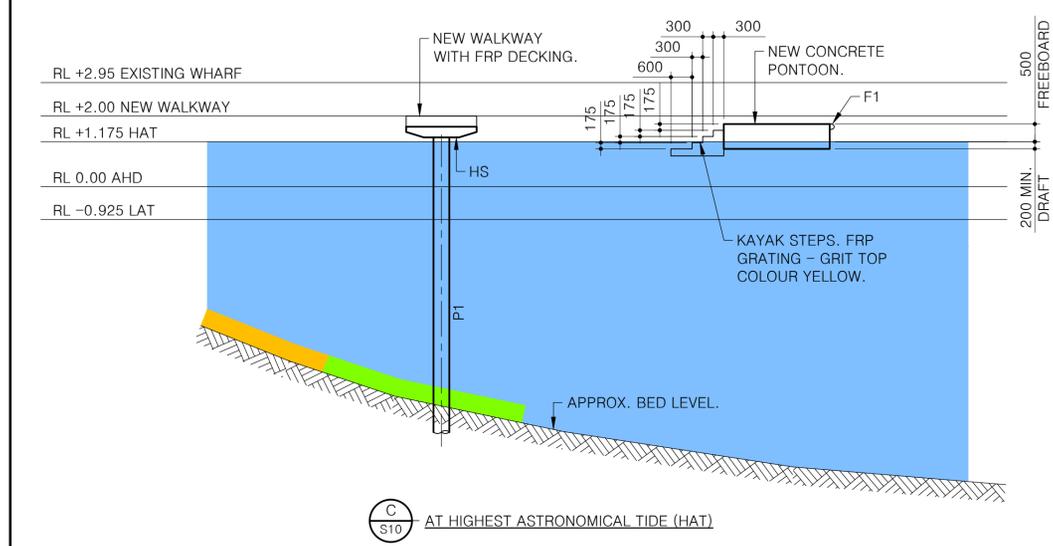
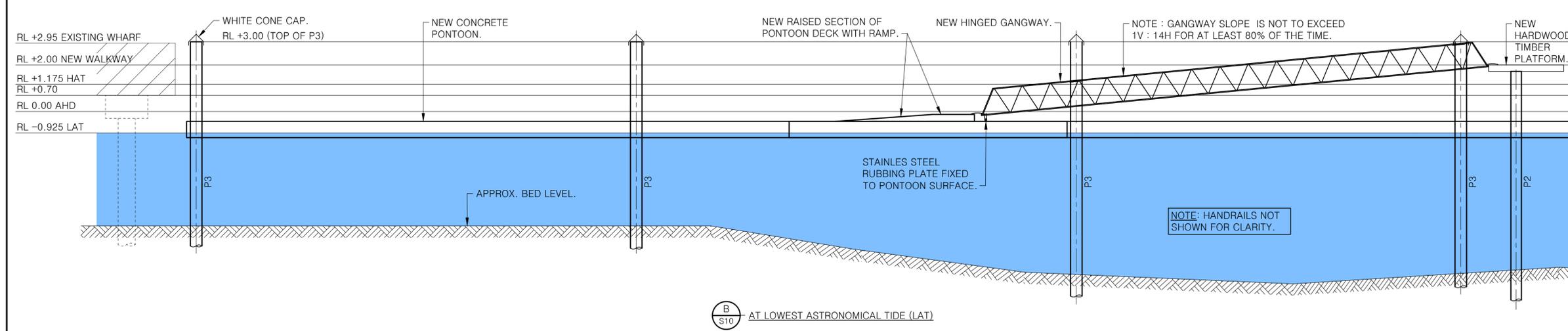
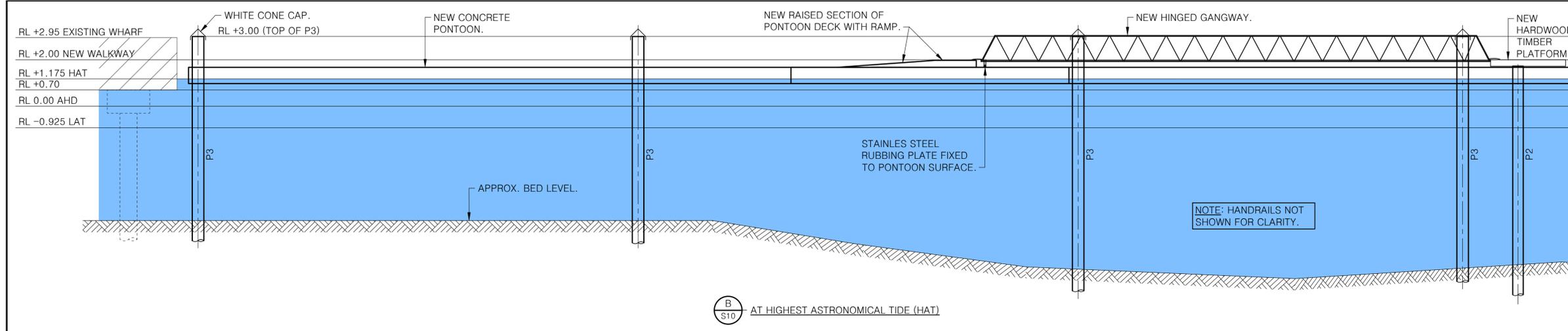
PLATYPUS WHARF AND
PEDESTRIAN LINK TO
KESTERTON PARK

GENERAL ARRANGEMENT
AND LONG SECTION

Director	M. Baker	Project No.	15372
Sheet Size	A1	Dwg. No.	S10
Scales	1:100 UNO	Rev. No.	E

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SYDNEY HARBOUR FEDERATION TRUST



LEVEL 6, 1 JAMES PLACE,
NORTH SYDNEY, NSW 2060
TEL. (02) 9409 3300
FAX. (02) 9929 6667
info@tlbengineers.com
www.tlbengineers.com
ABN 94 074 717 892

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PLATYPUS WHARF AND PEDESTRIAN LINK TO KESTERTON PARK

SECTIONS

Director	M. Baker	Project No.	15372
Sheet Size	A1	Dwg. No.	S11
Scales	1:100 UNO	Rev. No.	B

APPENDIX B DATABASE SEARCH RESULTS AND LISTED SPECIES EVALUATIONS

Table C-1. An evaluation of the likelihood and extent of impact to threatened and/or protected marine flora/fauna recorded within Sydney Metro Catchment (TSC Act and FM Act listed species) or with the potential to occur within a 5km radius around the proposal site (EPBC Act listed species). Records are from a search of the DECCW, BioNet and the (EPBC) Environmental Reporting Tool for the Department of Environment and Energy. Ecology information has been obtained from the Threatened Species Profiles on the NSW DECC website and NSW DPI (fisheries) website and through available scientific literature.

Fauna Codes:

Presence of Habitat:

Present: Potential or known foraging, roosting, nesting, refuge, movement corridor (including movement of genetic material) or other habitat is present within the proposal site.

Absent: No potential foraging, roosting, nesting or other habitat is present within the proposal site.

Likelihood of Occurrence

None: Species does not occur at the proposal site.

Unlikely Species is unlikely to occur at the proposal site.

Vagrant: Species could occur on occasion as a vagrant or passing over/across the proposal site

Possible: Species could occur and utilise resources in the proposal site.

Present: Species was recorded during the field investigations

Likelihood of Impact

High: Species present at site and activities could impact species if no safeguards are in place

Medium: Species not observed during surveys but has potential to occur at site and be impacted by activity if no safeguards are in place

Low: Species unlikely to occur at site and/or nature of activities unlikely to impact species should it occur.

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
EEC					
<p><i>Posidonia australis</i> seagrass meadows of the Manning-Hawkesbury ecoregion</p> <p>Endangered populations in NSW: <i>Posidonia australis</i> in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie</p>	<p>E-EPBC EP-FM</p>	<p>Within NSW, <i>Posidonia australis</i> occurs from Wallis Lake in the north to Twofold Bay in the south, with a few isolated populations found along the coastline and at offshore islands.</p> <p>The species can grow in coarse sandy to fine silty sediments between the low tide line and approximately 10 m depth. It may also occur in deeper water if water clarity is good. It can form large, dense stands (called meadows), and is also often found mixed with other species of seagrass such as <i>Zostera</i> (eelgrass) and <i>Halophila</i> (paddleweed).</p> <p>The expansion of meadows of <i>Posidonia australis</i> occurs primarily by the lateral (sideways) growth of the rhizomes.</p> <p>Sexual reproduction is via the production of monoecious flowers (male and female reproductive organs on the same plant) that are pollinated underwater. <i>Posidonia australis</i> fruits in November and the floating fruits are distributed by currents before splitting open to expose the seed. Successful recruitment of <i>Posidonia australis</i> from seed has rarely been observed by researchers. Many fruits tend to be blown onto shore where most of the seeds are thought to perish due to desiccation.</p> <p>Seedlings take 2–3 years before producing rhizomes (which help anchor plants) and are thought to be vulnerable to physical disturbance from wave action, storms, currents and smothering during this time.</p> <p>Intact stands of <i>Posidonia australis</i> have the ability to grow quite rapidly, however if the growing tips of the rhizomes are damaged, the plants cease to establish lateral rhizome runners and are very slow to recover. For example, it can take up to 50 years to close a gap of 1 m following damage to these tips. As a result of the factors listed above, the endangered populations of <i>Posidonia australis</i> are unlikely to re-establish naturally to pre-development levels in the short to medium term.</p>	<p>Yes</p>	<p>None, not recorded at proposal site</p>	<p>Low</p>
Fish					
<p><i>Epinephelus daemeli</i> Black Cod</p>	<p>V-FM V-EPBC</p>	<p>Adult Black Cod are usually found in caves, gutters, and beneath bommies in rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools and larger juveniles around rocky shores in estuaries. Black Cod are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in a few seconds. They are</p>	<p>Yes. Rocky reefs present in Neutral Bay.</p>	<p>Possible though not observed during previous surveys</p>	<p>Low; activity unlikely to have more than a minor impact.</p>

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		usually black in estuaries and banded around clear water reefs. Black Cod are usually slow growing. Smaller fish are mostly females, but they generally change sex to become males at around 100-110 cm in length.			
Australian grayling <i>Prototroctes maraena</i>	V-EPBC	Australian grayling occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas. They occur in fast-moving shoals and are a shy fish, fleeing when disturbed. They reach sexual maturity at 1–2 years of age when approximately 150 mm in length. Spawning takes place during late summer or autumn. Females can lay up to 82 000 small (approx. 1 mm) eggs, probably in the middle reaches of rivers, where they presumably settle among the gravel of the streambed. Once hatched, the larvae swim towards the water surface where they are swept downstream to the sea. The larvae and young juveniles have a marine stage before returning to freshwater rivers during spring when they are about 6 months old. The rest of their life cycle is spent in freshwater. Australian grayling are opportunistic omnivores, with a mixed diet of aquatic algae and insects.	No, breeding and feeding mostly occurs in freshwater. Juveniles may occur in estuaries and at sea.	Vagrant	Low
Elegant wrasse <i>Anampses elegans</i>	P-FM	Elegant wrasse are a widespread but uncommon species found on coral reef and rocky reef habitats at depths from 2 to 35 m. The distribution of elegant wrasse extends from southern Queensland to Montague Island on the NSW south coast, particularly around inshore islands. Elegant wrasse are a subtropical, warm-temperate species that are active during the day. Elegant wrasse can be found in different habitats depending on life cycle stage. Juveniles are found among seaweed in coastal bays and harbours. Juveniles travel in small schools feeding in short bouts. Large juveniles are found in small aggregations on coastal rocky reefs. They are carnivorous, feeding on small crustaceans and molluscs by scraping the surface of small seaweeds with their forward-projecting comb-like teeth.	Yes, rocky reefs and macroalgal beds present at site.	Possible though not observed during previous surveys	Low; activity unlikely to have more than a minor impact.
Bleekers devil fish <i>Paraplesiops bleekeri</i>	P-FM	Eastern blue devil fish, <i>Paraplesiops bleekeri</i> , also known as Bleakers blue devil fish, are a shy, secretive fish found in caves, crevices and under ledges on inshore reefs and estuaries. Eastern blue devil fish are distributed from southern Queensland to Montague Island on the NSW south coast. Eastern blue devil fish are a benthic, inshore reef inhabitant. They occur in shallow waters in estuaries as well as in deep waters offshore ranging from 3 to 30 metres. Juveniles of the species are very rarely seen. The few juvenile individuals that have been observed were found in the back of narrow	Yes, rocky reefs present at site.	Possible though not observed during previous surveys	Low; activity unlikely to have more than a minor impact.

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		crevices. Eastern blue devil fish are solitary creatures that usually live alone in caves, crevices or under ledges during the day. They are most active at night. Little is known about their diet but they are known to feed on brittle stars.			
Syngnathiforms (seahorses, sea dragons, pipefish)	P-FM, Listed EPBC	Off the NSW coast syngnathiformes are found in a variety of habitats ranging from deep reefs to coastal algae, weed or seagrass habitats, or around man made structures such as jetties or mesh nets. Weedy seadragons can be observed along reefs with kelp or along the edge of sand areas feeding on very small shrimp-like mysids and other small crustaceans. There are 19 pipefish species known to inhabit NSW waters such as the Tiger pipefish <i>Filicampus tigris</i> that can be found in seagrass beds or sheltered reefs to depths of 15 metres. Pipehorses are found on soft bottoms near reefs or rubble in shallow to very deep waters, or amongst seagrasses. Often the ends of jetties are rich with seahorses due to water circulation patterns that sometimes present rich patches of zooplankton on which they feed. Seahorses in particular are able to wrap their tails around structures and feed on passing organisms. Ghostpipefish species are found in NSW in habitats ranging from muddy open bottoms to reefs with rich invertebrate life, usually in sheltered coastal or estuary waters. Seamoths are found lying flat or crawling on sandy or muddy bottoms.	Yes, rocky reefs, macroalgal beds, wharf present at site	Possible; previously recorded at the site	Low; activity unlikely to have more than a minor impact.
<i>Carcharias (east population)</i> Grey Nurse (east population)	<i>taurus coast</i> Shark coast	CE-FM, CE-EPBC	The Grey Nurse Shark is a coastal species found on the continental shelf from the surf zone down to at least 190 m. The shark is a slow, strong-swimming species that is often seen hovering motionless near the bottom in or near deep sandy bottomed gutters or in rocky caves around inshore rocky reefs and islands at depths between 15 and 25 meters. These sites may play an important role in pupping and/or mating activities as grey nurse sharks often form aggregations at these sites. Occasionally, they are also found throughout the water column.	No, occurs in gutters or in rocky caves around inshore rocky reefs and islands. While rocky reefs are present at site, depth is too shallow.	Vagrant in deeper areas of Neutral Bay Low
<i>Carcharodon carcharias</i> Great White Shark		V-FM, V-EPBC, Migratory	The White Shark is widely distributed, and located throughout temperate and sub-tropical regions in the northern and southern hemispheres. In Australia, its range extends primarily from Moreton Bay in southern Queensland, with at least one record as far north as Mackay, around the	No. Proposal site is located	Unlikely Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		southern coastline and to North West Cape in Western Australia. Great White Sharks are large, rare, warm-blooded apex marine predators. It is estimated that they mature at 12-18 years for females and 8-10 years for males. Maximum length is 6.4 metres, though specimens of up to 7 metres may exist. Great White Sharks reproduce only one every two to three years and produce between two and ten pups per litter.	within an estuary.		
<i>Rhincodon typus</i> Whale Shark	V-EPBC, Migratory	One of only three filter-feeding sharks (the other two being the basking and megamouth sharks), the whale shark feeds on minute organisms including krill, crab larvae, jellyfish etc. Whale sharks have a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S. They are known to inhabit both deep and shallow coastal waters and the lagoons of coral atolls and reefs. This species is widely distributed in Australian waters. Although most common at NMP (and to a lesser extent at Christmas Island and in the Coral Sea), sightings have been confirmed further south than Kalbarri (on the mid-west coast of WA) and Eden (on the NSW south coast). Whale sharks have also been recorded from Commonwealth waters between Australia and Indonesia. This species is thought to prefer surface sea-water temperatures between 21 - 25°C. Sightings at NMP, however, are most common in water temperatures around 27°C. The sharks (regularly) appear at locations where seasonal food 'pulses' are known to occur. The predictable annual whale shark aggregation at NMP is closely linked with an increase in productivity of the region. This is associated with a mass coral spawn which occurs around March/April each year. Whale sharks are regarded as highly migratory - although these 'migration patterns' are poorly understood.	No. Generally confined to more tropical waters.	Unlikely	Low
Mammals					
Sperm Whale <i>Physeter macrocephalus</i>	V-TSC, V-EPBC	Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. Concentrations of Sperm Whales tend to occur where the seabed rises steeply from a greater depth, beyond the continental shelf. It is likely they feed on squid, octopus and fish. They are	No, generally confined to waters beyond	None	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		able to dive to depths of 2500m and have been recorded eating Giant Squid up to 10m in length.	the continental shelf.		
<i>Eubalaena australis</i> Southern right whale	V-TSC, E-EPBC, Migratory	Temperate and subpolar waters of the Southern Hemisphere, with a circumpolar distribution between about 200 S and 550 S with some records further south to 630 S. Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America. They feed in the open ocean in summer. They move inshore in winter for calving and mating. Calving females and females with young usually remain very close to the coast, particularly in the 5-10 m watermark. They feed on krill and copepods by filtering water through their baleen (plates of keratin that hang inside their upper-jaw). It appears Southern Right Whales may not feed at all in Australian waters.	Yes, species is known to come in Sydney Harbour on occasions.	Vagrant during migratory period. Only very temporary resident of Sydney Harbour.	Low
<i>Megaptera novaeangliae</i> Humpback whale	V-TSC, V-EPBC, Migratory	Species occurs in oceanic and coastal waters worldwide. The population of Australia's east coast migrates from summer cold-water feeding grounds in Subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef. They are regularly observed in NSW waters in June and July, on northward migration and October and November, on southward migration.	Yes. Species is known to come in Sydney Harbour on occasions.	Vagrant during migratory period. Only very temporary resident of Sydney Harbour.	Low
<i>Balaenoptera musculus</i> Blue Whale	E-EPBC, Migratory	Oceanic within Southern Hemisphere between 20 degrees to 70 degrees South including NSW waters. Breeds in warm water at low latitudes, preferring open seas rather than coastal waters. Often feeds during spring and summer on krill close to the ice edge.	No, prefers open seas	None	Low
<i>Arctocephalus pusillus doriferus</i> Australian Fur Seal	V-TSC	The Australian Fur seal has a relatively restricted distribution around the islands of Bass Strait, parts of Tasmania and southern Victoria. They can be seen hauling out (coming ashore) on islands off South Australia and areas of southern New South Wales such as Montague Island with the occasional animal appearing as far north as the mid north coast of New South Wales. Their preferred habitat especially for breeding is rocky islands, which include boulder or pebble beaches and gradually sloping rocky ledges. These seals feed on a variety of bony fish species plus squid and octopus. Australian Fur Seals come ashore each year and form breeding colonies.	No, prefers rocky islands, which include boulder or pebble beaches	None	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		Females spend most of the gestation period at sea, coming ashore just before the birth of a single pup between October and December.			
<i>Arctocephalus forsteri</i> New Zealand fur-seal	V-TSC	Occurs in Australia and New Zealand. Reports of non-breeding animals along southern NSW coast particularly on Montague Island, but also at other isolated locations to north of Sydney. Prefers rocky parts of islands with jumbled terrain and boulders. Feeds principally on cephalopods, fish also seabirds and occasionally penguins.	No, prefers rocky parts of islands with jumbled terrain and boulders.	None	Low
<i>Dugong dugong</i> Dugong	E-TSC	Extends south from warmer coastal and island waters of the Indo-West Pacific to northern NSW, where it's known from incidental records only. Major concentrations of Dugongs occur in wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands. Will also occupy deeper waters if their sea grass food is available. Shallow waters such as tidal sandbanks and estuaries have been reported as sites for calving.	No, prefers wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands	None	Low
Birds					
<i>Eudyptula minor</i> Little Penguin in the Manly Point Area (being the area on and near the shoreline from Cannae Point generally northward to the point near the intersection of Stuart Street and Oyama Cove Avenue, and extending 100 metres offshore from that shoreline)	Endangered population n-TSC	The Little Penguins spend the first 2-3 years of their life at sea and eventually return to breed between July and March. Penguins tend to make their nests in rock crevices, in sand or soft soil and nesting material is from leaves, twigs and bark or whatever is available, even plastic packaging or paper bags. Generally they will have several paths to their nests so that they can approach them in safety. The male is responsible for the nest building and the female must decide whether the nest is good enough for her to lay her eggs. The male can sometimes be seen gathering material for the nest. The current population at Manly is reasonably stable and if the conditions are good. The parents tend to have two clutches of chicks per breeding season, initially in August/September and another in November/December. Penguins leave the nest about an hour before sunrise and return about an hour after sunset. Whilst penguins are mainly solitary feeders, they	No breeding habitat present. Potential foraging habitat.	Vagrant (foraging)	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		sometimes group and feed together. Their main diet is small shoaling fish, squid and cuttlefish. An adult can travel 20 km per day when foraging, and have been known to dive as deep as 60 m. During the breeding season they do not venture far for foraging.			
Reptiles					
<i>Chelonia mydas</i> Green turtle	V-TSC, V-EPBC, Migratory	Widely distributed in tropical and sub-tropical seas. Usually found in tropical waters around Australia but also occurs in coastal waters of NSW, where it is generally seen on the north or central coast, with occasional records from the south coast. Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches throughout their range. Scattered nesting records along the NSW coast.	Yes, species occasionally sighted in Sydney Harbour	Vagrant	Low
<i>Dermochelys coriacea</i> Leathery Turtle, Leatherback Turtle, Luth	E-EPBC Migratory	Throughout the world's tropical and temperate seas and in all coastal waters of Australia. Most sightings are in temperate waters. Large numbers of Leathery Turtles feed in coastal waters from southern Queensland to the central coast of NSW. Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW. A number of sightings in southern waters suggest species actively seeks temperate feeding grounds, rather than occurring only as stray vagrants. Feed on jellyfish.	Yes	Vagrant	Low
Loggerhead turtle <i>Caretta caretta</i>	E-EPBC Migratory	Loggerhead Turtles are found in tropical and temperate waters off the Australian coast. In NSW they are seen as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.	No, breeds in northern NSW and feeds in deeper ocean waters	Unlikely	Low
Flatback turtle	V-EPBC Migratory	The flatback turtle is endemic to Australia and all known breeding sites of this species occur only in Australia. They feed in the northern coastal regions of Australia, extending as far south as the Tropic of Capricorn. Their	Absent, occurs in Queensland.	Unlikely	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
<i>Natator depressus</i>		feeding grounds also extend to the Indonesian archipelago and the Papua New Guinea coast. Flatback turtles have a preference for shallow, soft-bottomed sea bed habitats away from reefs.			
Hawksbill turtle <i>Eretmochelys imbricata</i>	V-EPBC Migratory	Hawksbill turtles typically occur in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Other feeding areas include Torres Strait and the archipelagos of the Northern Territory and Western Australia, possibly as far south as Shark Bay or beyond. Hawksbill turtles also feed at Christmas Island and the Cocos (Keeling) Islands.	Absent, occurs in northern NSW only.	Unlikely	Low
Migratory Species					
Fish					
Porbeagle or Mackerel Shark <i>Lamna nasus</i>	Migratory	The Porbeagle primarily inhabits oceanic waters and areas around the edge of the continental shelf. They occasionally move into coastal waters, but these movements are temporary.	No.	None	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray <i>Manta alfredi</i>	Migratory	<p>M. alfredi is commonly sighted inshore, around coral reefs and rocky reefs in coastal areas. Long-term sighting records suggest that this species is mostly resident to tropical and subtropical waters</p> <p>M. alfredi predictably aggregates to particular locations such as Lady Elliot Island, North Stradbroke Island and Byron Bay in eastern Australia, for which they display a high degree of site fidelity (i.e. visit the same site over time) and residency</p> <p>They can be found as far south as Albany in Western Australia up and around to Sydney Harbour in New South Wales, from coastal zones stretching through to the continental shelf.</p>	Yes, rocky reefs	Vagrant	Low
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray <i>Manta birostris</i>	Migratory	<i>Manta birostris</i> is considered a more oceanic and migratory species, and is found predominantly in cooler, temperate to subtropical waters.	No	Unlikely	Low
Mammals					
<i>Balaenoptera edeni</i> Bryde's Whale	Migratory	There may be 2 distinct groups in some areas one occurring offshore and partially migratory and the other living inshore and resident all year-round. The two forms differ slightly in their reproductive behaviour and the offshore animals are usually larger, have more scaring and have longer and broader baleen than the inshore variety. There may also be a 'dwarf' form around the Solomon Islands. The Bryde's whale prefers water temperatures above 20°C (68°F) so it is most common in coastal areas of tropical and subtropical waters of all seas. Some tropical populations are possibly sedentary with most migrating short distances with no known long-distance migrations to higher latitudes. They often feed on schooling	No, prefers deep tropical/subtropical waters	Unlikely	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		fish, and unlike the surface swimming sei whales, they are deep divers. They often approach ships, seemingly out of curiosity.			
<i>Caperea marginata</i> Pygmy Right Whale	Migratory	Pygmy Right Whales have primarily been recorded in areas associated with upwellings and with high zooplankton abundance, particularly copepods and small euphausiids which constitute their main prey. It is inconspicuous at sea and only surfaces for a few seconds at a time. It has not been observed breaching or lobtailing but it will throw its snout out of the water. Distribution appears limited by the surface water temperature as they are almost always found in 5° to 20°C temperature water. This excludes the whales presence south of the Antarctic Convergence and the cold waters of the Antarctic. Population numbers are unknown as it is easily confused with the Minke whale but Pygmy Right whales may be more common than the limited sightings suggest. Pygmy Right Whales have been seen in sheltered shallow bays, but it appears that these are predominantly juveniles and sub-adults.	No	Unlikely	Low
<i>Lagenorhynchus obscurus</i> Dusky Dolphin	Migratory	Dusky dolphin tend to like deep offshore water, hunting in pods which can sometimes number less than 20, but often more than 100. They can be found in the southern hemisphere in temperate and sub-Antarctic waters. Kiakoura in New Zealand is the place best known for these marine mammals, as they are there in numbers all year. In Australia these dolphin have been seen in places such as southern NSW, the eastern edge of Bass Strait, Wilson’s Promontory and Cape Shank, Kangaroo Island, and Tasmania, but nowhere with any consistency.	No prefers deep offshore	Unlikely	Low
Indo-Pacific Humpback Dolphin <i>Sousa chinensis</i>	Migratory	In Australia, Indo-Pacific Humpback Dolphins are known to occur along the northern coastline, extending to Exmouth Gulf on the west coast (25° S), and the Queensland/NSW border region on the east coast (34° S).	No	Unlikely	Low
<i>Orcinus orca</i> Killer Whale, Orca	Migratory	The pelagic killer whale is found in oceanic and shelf waters. While the species is found in both warm and cold waters, it may be more common in cold, deep water. Off Australia, they are often seen along the continental slope and on the shelf, and near seal colonies. Macquarie Island is a key locality for the species in the Australian region as it is regularly sighted there. Killer whales are a top-level carnivore and often hunt in packs. Their diet differs seasonally and regionally. The specific diet of Australian killer	No, prefers deep cold waters	none	Low

Species	Listing	Ecology	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
		whales is not known but there are reports of attacks on dolphins, young humpbacks, blue whales, sperm whales, dugongs and Australian sea lions. They are also known to herd bottlenose dolphins and common dolphins.			

APPENDIX C PHOTOGRAPHS

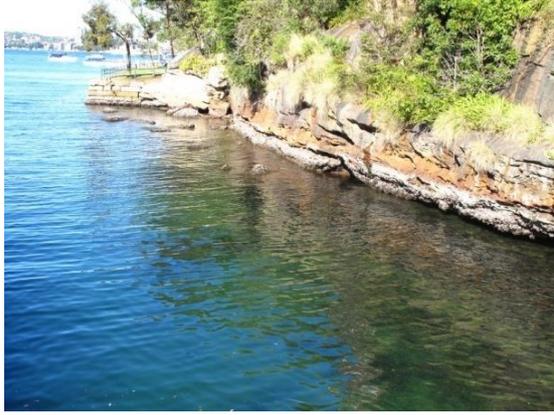


Photo 1. Cliff face in proximity of southern side of HMAS Platypus wharf. Kesterson Park is in the background.



Photo 2. Rocky reef covered with macroalgae and sandstone seawall on southern side of HMAS Platypus wharf.



Photo 3. Rocky reef covered with macroalgae.



Photo 4. Seagrass (*Halophila* sp.)

APPENDIX D SPECIES LIST

FLORA				Survey June 2010		Survey December 2015	
Scientific name		Common name		Location			
<i>Phaeophyta</i>		Brown algae					
<i>Dictyota dichotoma</i>				Rocky reef		Rocky reef	
<i>Padina elegans</i>				Rocky reef, wharf piles		Rocky reef, wharf piles	
<i>Ecklonia radiata</i>		Kelp		Rocky reef, wharf piles		Rocky reef, wharf piles	
<i>Sargassum vestitum</i>				Rocky reef		Rocky reef	
<i>Sargassum linearifolium</i>				Rocky reef		Rocky reef	
<i>Rhodophyta</i>		Red algae					
<i>Ceramium flaccidum</i>				Rocky reef		Rocky reef	
<i>Delisea pulchra</i>				Rocky reef		Rocky reef	
<i>Corallina officinalis</i>				Rocky reef		Rocky reef	
FAUNA							
Scientific name		Common name					
Chordata							
<i>Gymnothorax prasinus</i>		Moray eel		Rocky rubble below wharf			
<i>Tetractenos hamiltoni</i>		Smooth toad fish		Seabed below wharf			
<i>Acanthopagrus australis</i>		Bream		Below wharf		Rocky reef, around wharf piles	
<i>Monacanthus chinensis</i>		Fanbelly leather jacket		Below wharf		Rocky reef	
<i>Girella tricuspidata</i>		Luderick		Below wharf		Around wharf piles	
<i>Hyperlophus vittatus</i>		Sandy sprat		Below wharf			
<i>Hippocampus whitei</i>		White's seahorse		Below wharf			

<i>Botrylloides sp.</i>	Ascidians	Wharf piles	Wharf piles
<i>Pyuria stolonifera</i>	Cunjevoi	Wharf piles and seawall	Wharf piles and seawall
Echinodermata			
<i>Anthenea sidneyensis</i>	Starfish 1	Seabed below wharf	
<i>Astropecten polyacanthus</i>	Starfish 2	Seabed below wharf	
Mollusca			
<i>Sepia sp.</i>	Cuttelfish	Rocky rubble below wharf	
<i>Austrocochlea porcata</i>	Gastropod 1	Intertidal areas	Intertidal areas
<i>Morula marginalba</i>	Gastropod 2	Intertidal areas	Intertidal areas
<i>Bembicium nanum</i>	Gastropod 3	Intertidal areas	Intertidal areas
<i>Nodolittorina unifasciata</i>	Periwinkle	Intertidal areas	Intertidal areas
<i>Patella sp</i>	Limpet	Intertidal areas	Intertidal areas
<i>Mytilus edulis</i>	Mussel	Intertidal areas	Intertidal areas
<i>Saccostrea glomerata</i>	Oysters	Intertidal areas	Intertidal areas
Arthropoda			
<i>Tetraclitella purpurascens</i>	Barnacle 1	Intertidal areas	Intertidal areas
<i>Chtamalus antennatus</i>	Barnacle 2	Intertidal areas	Intertidal areas
Cnidaria			
<i>Unidentified species</i>	Hydroids	Wharf piles, rocky rubble	Wharf piles
Porifera			
<i>Siphonochalina sp.</i>	Sponge 1	Wharf piles, rocky rubble	Wharf piles, rocky reef
<i>Haliclona sp.</i>	Sponge 2	Wharf piles, rocky rubble	Wharf piles, rocky reef
<i>Unidentified species</i>	Sponges	Wharf piles, rocky rubble	Wharf piles, rocky reef

