

MARINE POLLUTION RESEARCH PTY LTD

Marine, Estuarine and Freshwater Ecology, Sediment and Water Quality Dynamics

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SMJ Property Investments Pty Ltd

967 Barrenjoey Rd,

Palm Beach, NSW

13 August 2021

AQUATIC ECOLOGY ASSESSMENT

PROPOSED EXTENSION OF JETTY, RAMP AND PONTOON AT 967 BARRENJOEY ROAD, PALM BEACH.



Figure 1 Drone view of 967 Barrenjoey Rd, Palm Beach existing facility (middle jetty).

1 INTRODUCTION

Marine Pollution Research Pty Ltd (MPR) was requested by SMJ Investments Pty Ltd (SMJ) to provide an updated aquatic ecology impact assessment for proposed pontoon and ramp extension works at 967 Barrenjoey Rd, Palm Beach. The proposal is shown on a drawing provided by SMJ (see plan attached at **Annexure A**), the present facility is shown in **Figure 1** above and **Figure 2** shows the relationship of the site to other facilities in the area.

The site is located on the eastern shore and at the northern end of Careel Bay, Pittwater. The distance across Careel Bay to the southern headland at Stokes Point is about 1.4 km, and the seabed slopes from a wide sandy intertidal beach to a depth of 17.4 m below ISLW.

The location is generally sheltered from winds in the quadrant from north-west to south-east with limited exposure to southerlies due to the short fetch of Careel Bay. It is exposed to high to moderate wind wave action from the south-west (fetch more than 4 km to Scotland Island) and moderate wind wave action from the west (± 1.5 km fetch).



Figure 2 Aerial view showing the existing jetty and similar facilities in the locality

1.1 Available Aquatic Habitat Information

In terms of existing aquatic ecological habitat information, DPI Fisheries have prepared a marine vegetation habitat map for Pittwater (No 37) and **Figure 3** provides an annotated portion of this map with the present facility and the facility to the north indicated:

- There are major *Posidonia* and *Zostera* seagrass beds in the shallows in Careel Bay with *Zostera* beds inshore and *Posidonia* beds in deeper waters to the -5m Chart Datum contours. Since the original survey in 2005, *Posidonia australis* beds in the Sydney region are listed as an Endangered Ecological Community (EEC) under the NSW Fisheries Management Act 1994 (FMA).

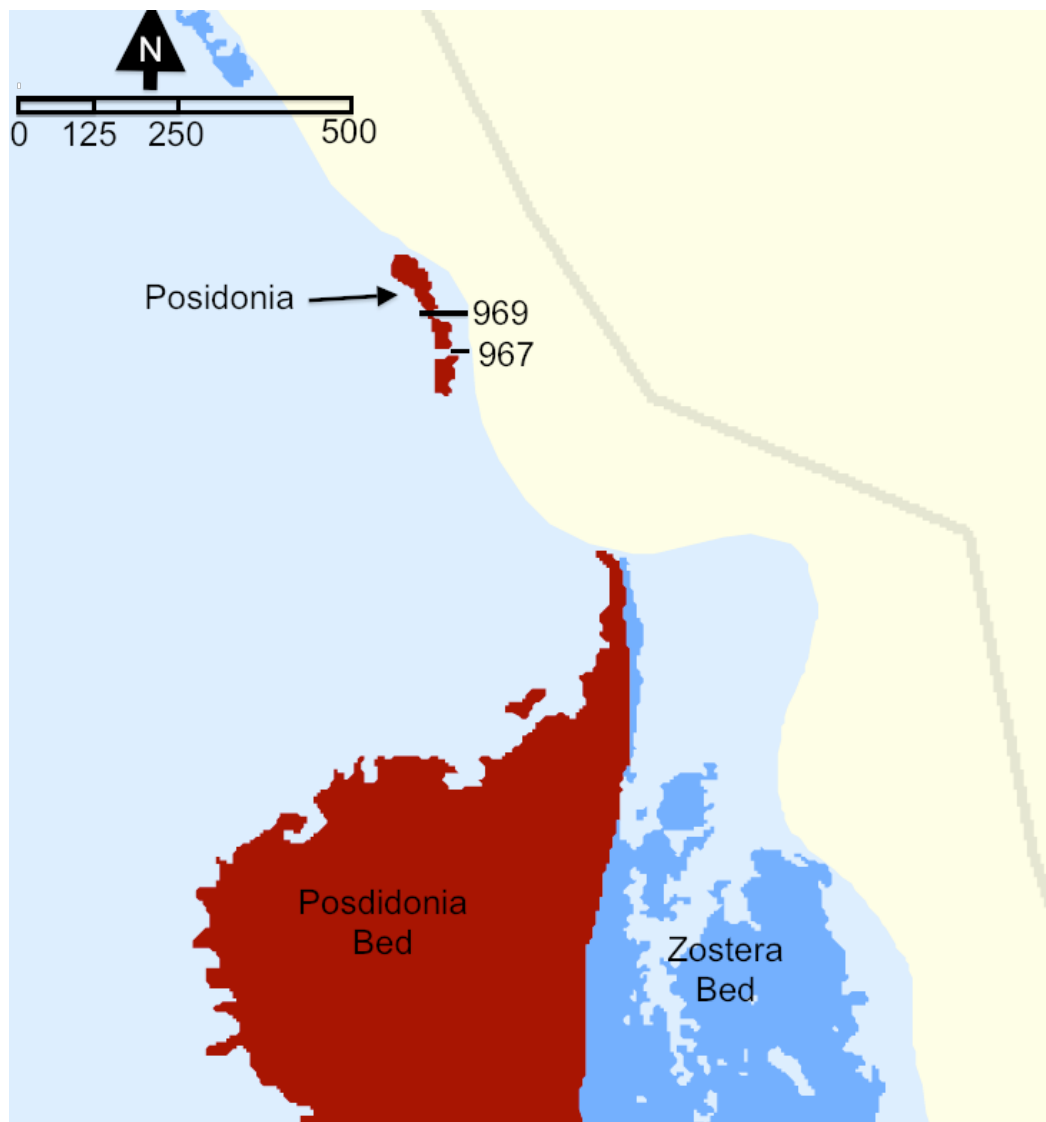
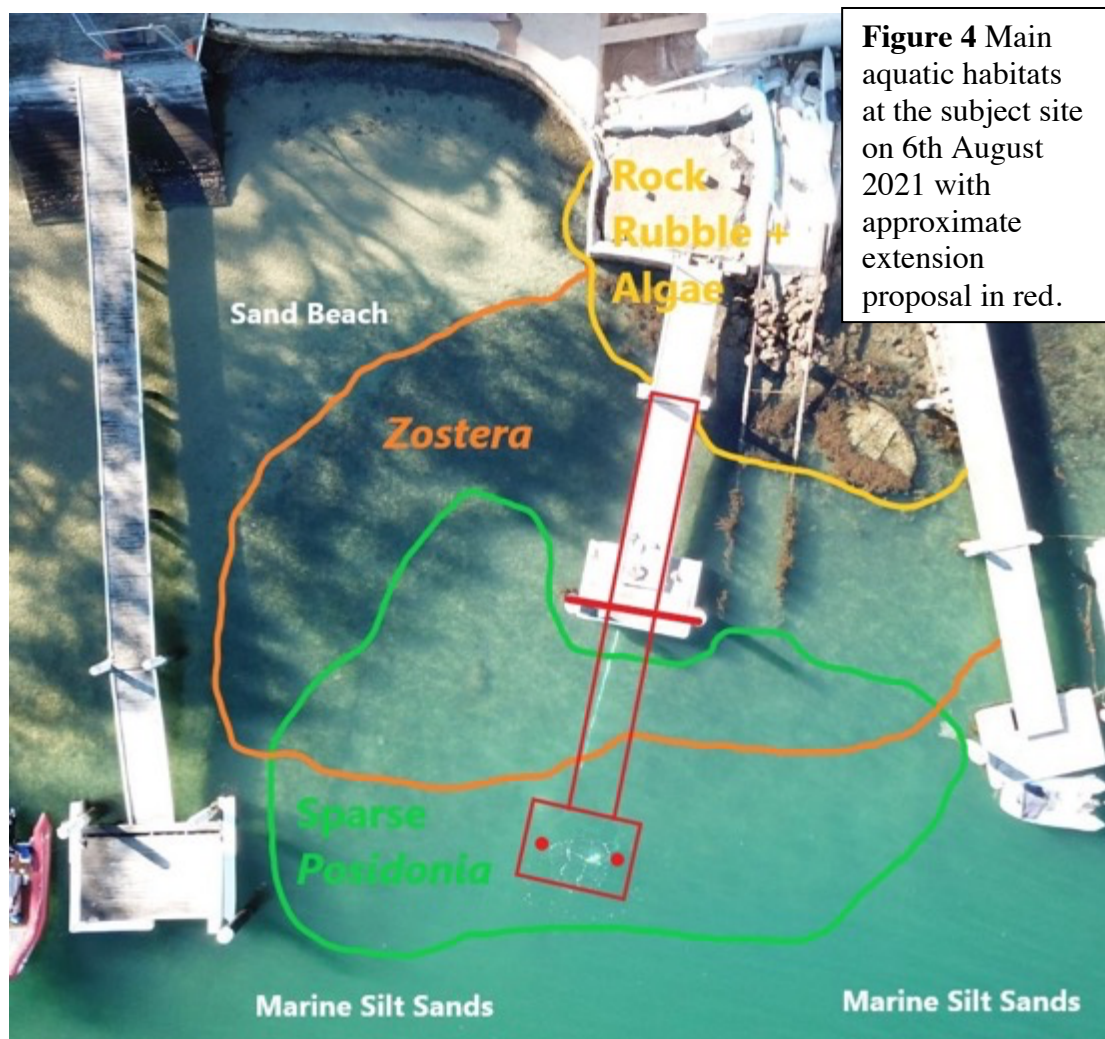


Figure 3 Portion of the Fisheries NSW marine vegetation map for Pittwater (No 37) showing the north-eastern shore of Careel Bay and the distribution of the two main seagrass species in the location.

2 SITE AQUATIC HABITATS

A dive and walk-over inspection survey was undertaken on the morning of 7 August 2021. The weather was sunny with a slight north-westerly breeze and water clarity was fair to good. Drone aerial views were also recorded for the site and used for present habitat mapping. **Figure 4** shows the main aquatic habitats at the site in relation to an approximate outline of the proposed facility extension, and the main habitats are as follows:

- Intertidal to shallow sub-tidal sand habitat.
- Intertidal to shallow sub-tidal rock rubble habitat.
- *Zostera* seagrass in shallow sand habitat.
- Patchy and fragmented *Posidonia* distribution overlapping the outer part of the *Zostera* bed and extending offshore from the *Zostera* bed.
- Attached biota on wetted surfaces of piles and pontoons.



Figures 5 to 16 provide photographs of the various aquatic habitats and the aquatic habitats

at the site are described as follows:

- The intertidal sand beach inshore is comprised of clean marine sands plus sections with an overlaying rock rubble toe at the sandstone seawall (**Figure 5**).
- The lower intertidal portion of the seawall plus the intertidal rock rubble supports an oyster-base assemblage (*Saccostrea commercialis*) plus grazing molluscs (mainly *Bembicium*) (**Figure 6**).
- The subtidal rock rubble reef inshore under the existing jetty and around the front of the property rock and concrete slipway supports a fringe of tufted algae (*Padina* and *Dictyota*) with coralline algae and small amounts of *Colpomenia*. Larger macro algae (*Sargassum* and kelp, *Ecklonia radiata*) species were present on the deeper sections of the subtidal rock rubble (**Figure 7**), with high *Sargassum* algae cover on the slip rails extending offshore from the concrete ramp (**Figure 8**).
- The wetted surface areas of the deck and jetty support piles provided habitat for intertidal assemblages comprising oysters and associated molluscs, barnacles and tubeworms and the sub-tidal portions of the piles supported small amounts of kelp with *Sargassum*, plus an assemblage of encrusting fauna (mostly tunicates and bryozoans) (**Figures 9 & 10**).
- The wetted surfaces of the pontoon supported a dense assemblage of tufted and frondose algae, tunicates and a suite of molluscs and encrusting fauna (**Figure 11**).
- The low gradient sediment habitat supports a mixed *Zostera* and *Halophila* seagrass bed. The *Halophila* occurs scattered throughout the *Zostera* bed. Whilst the *Zostera* cover is even, it occurs at relatively low density (**Figure 9 & 12**).
- There is an overlap of *Zostera* and *Posidonia* at the deeper end at the alignment of the existing pontoon (see **Figures 4 & 13**).
- The scattered and fragmented patches of *Posidonia* shoots continue down-slope offshore from the *Zostera* distribution, with the deepest *Posidonia* shoots offshore from the proposed pontoon occurring a depth of approximately -3.4m (AHD) - which is -2.5m (ISLW) (**Figure 14**). The seabed is bare sandy habitat offshore from the *Posidonia* limits as indicated on **Figure 4**.
- Specific searches were made throughout the survey area for *Caulerpa taxifolia* (a pest algae species listed under NSW Fisheries Management Act 1994 (FMA) and known from Pittwater. Whilst there was no *C. taxifolia* observed within the seagrasses, there was a very small amount found on an isolated rock just off from the existing pontoon (**Figure 15**).



Figure 5 Sand beach plus rock rubble toe at the sandstone seawall.



Figure 6 Oyster-based assemblage on intertidal section of the seawall, with *Sargassum* algae on the subtidal rock rubble.



Figure 7 Shallow sub-tidal rock rubble with *Ecklonia* and *Sargassum*



Figure 8 *Sargassum* on sliprails.



Figure 9 *Kelp* and *Sargassum* growth on inshore jetty piles. Note also *Zostera* seagrass growth around the pile.



Figure 10 *Kelp* and *Sargassum* plus encrusting fauna attached to existing piles.



Figure 11 Attached frondose algae and encrusting fauna upon existing pontoon.

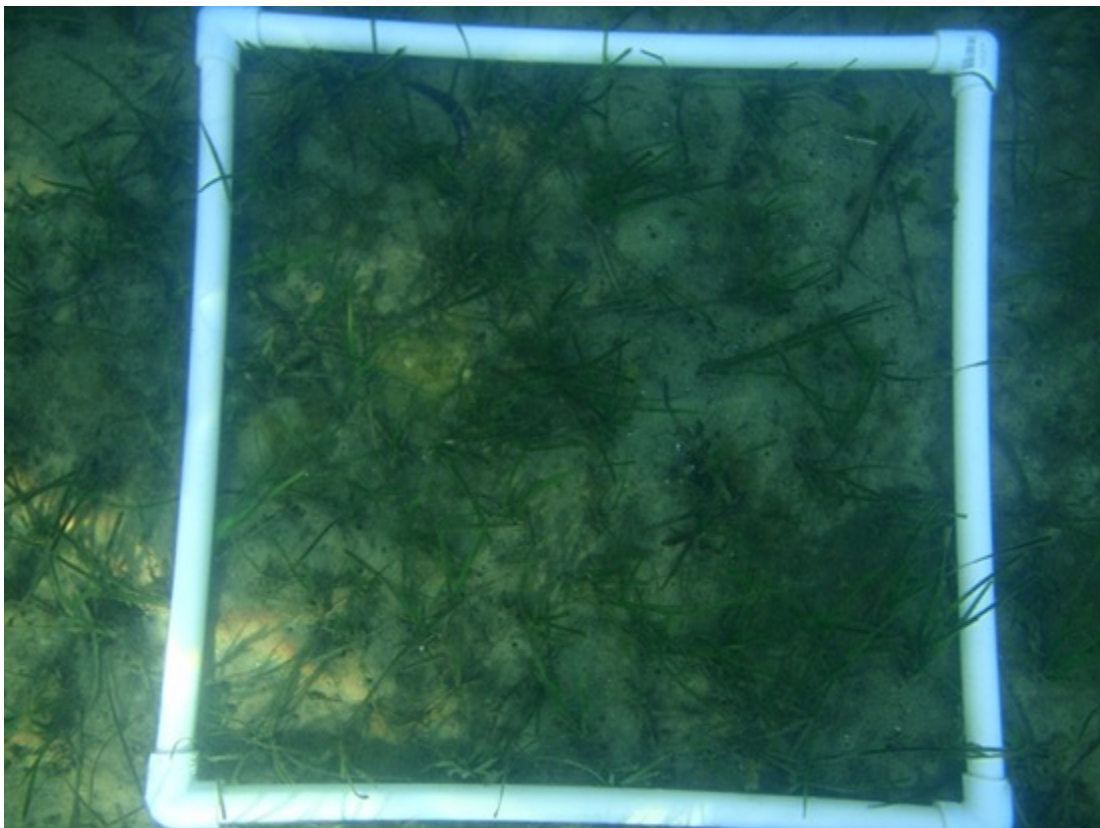


Figure 12 *Zostera* and *Halophila* cover in one of the quadrats at location 7.



Figure 13 Sparse *Posidonia*, *Zostera* and *Halophila* seagrass.

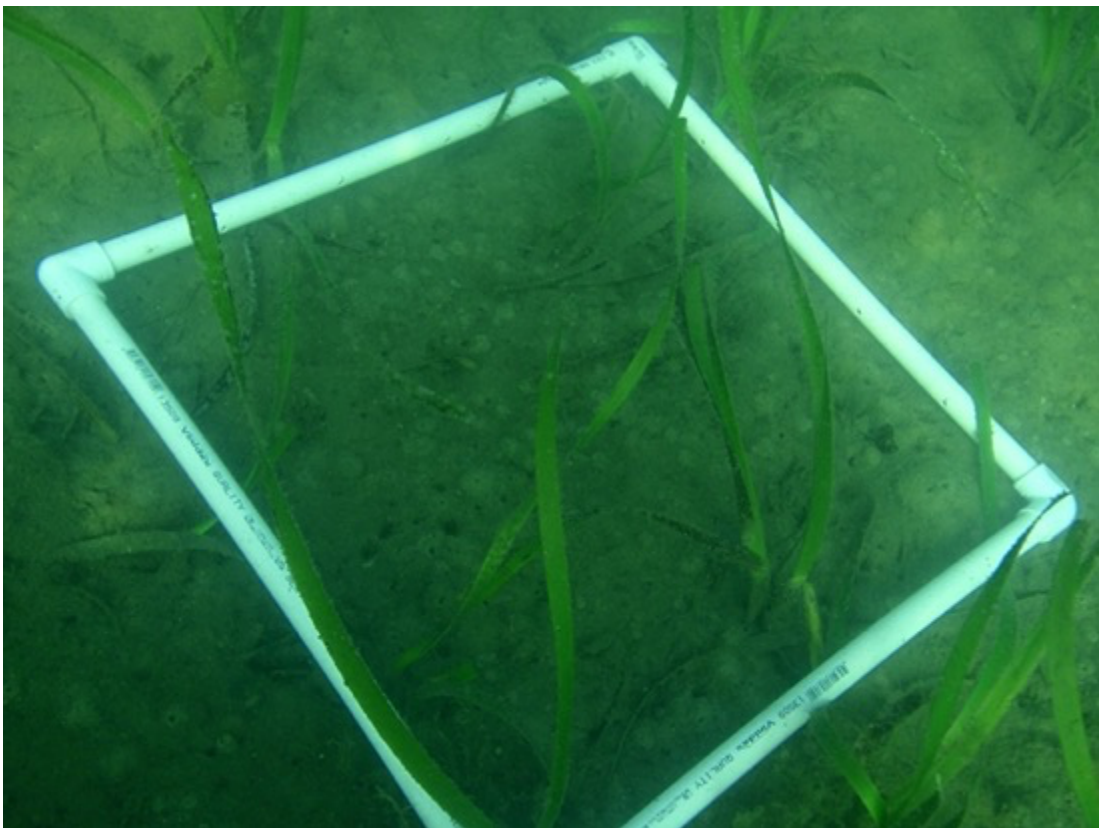


Figure 14 Sparse *Posidonia* within one of the quadrats at location 3.



Figure 15 Small amount of *Caulerpa taxifolia* on isolated rock offshore from pontoon.

2.1 Seagrass Cover Estimates

Posidonia seagrass shoot densities plus percent cover for *Zostera* and *Halophila* seagrass were measured using a 0.5m by 0.5m square quadrat at nine sites, with three random 0.25m² quadrats measured at each site for a total of 27 quadrat counts. The nine sites were located under the existing timber ramp and either side, under the proposed ramp and either side and under the proposed pontoon and either side, see **Figure 5**. *Posidonia* shoot density and other seagrass percent cover data are provided in **Table 1** below, and the data are summarised as follows:

- *Zostera* cover was generally low with highest average cover inshore ($11 \pm 2\%$ cover), $6.3 \pm 1.8\%$ mid-depth and less than 1% offshore.
- *Halophila* occurred as a very minor component with all cover estimates below 3.6%.
- *Posidonia* shoot counts were also low, with around 3 shoots average offshore and mid shore (sites 1 to 6).
- Of the nine quadrats at and around the existing jetty (sites 7 to 9) there were no *Posidonia* shoots under the jetty, and only 2 shoots noted from two of six quadrats either side.

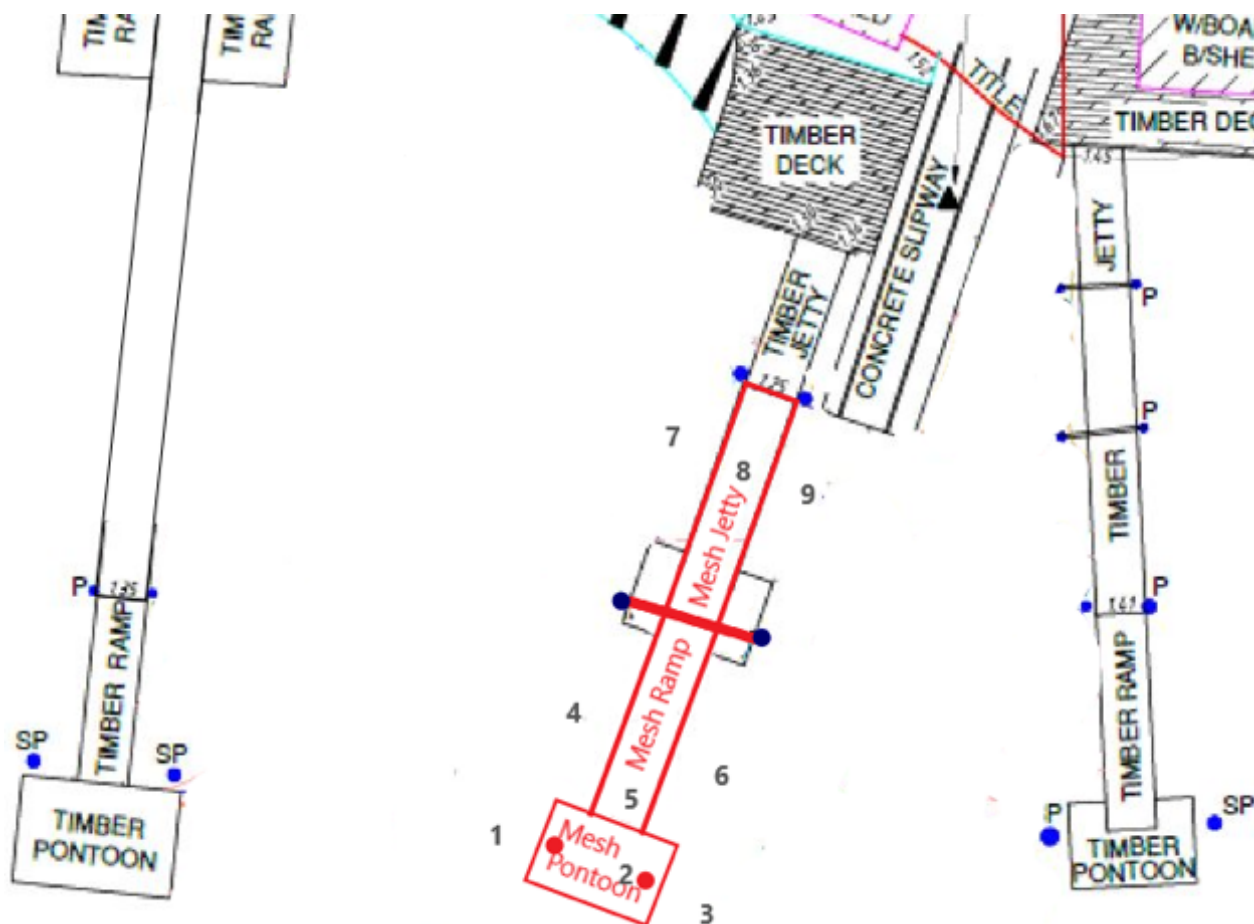


Figure 5 Nine sites for *Posidonia* shoot count and other seagrass density measurements

2.2 Threatened Species and Endangered Ecological Communities

The *NSW Fisheries Management Act 1994* (FMA) and the *Commonwealth EPBC Act 1999* 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.

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, seadragons, pipefish, pipehorses and seamoths) are protected, under both the EPBC Act and the FMA. Seagrasses are protected under the FMA, and *Posidonia australis* seagrass is listed under both the FMA and EPBC Act as an *Endangered Ecological Community* in Pittwater. With respect to species listed as threatened under the NSW Fisheries Management Act 1994 (FMA), the Black Cod *Epinephelus daemeli*, a fish species listed as 'Vulnerable' under the Fisheries Management Act 1994, is known to inhabit rock caves and crevices in marine and estuarine locations and White's Seahorse *Hippocampus whitei* (listed as threatened) is known from seagrass beds and dense algae beds in Pittwater.

Table 1 Seagrass Measurements					
Location	Site	Quadrat	Posidonia Shoots	Zostera %cover	Halophila %cover
Offshore	1	1	6	0	3
		2	5	1	3
		3	1	0	2
	2	1	2	0	0
		2	4	0	3
		3	0	0	1
	3	1	5	0	2
		2	1	3	0
		3	5	3	5
Mid Bed	4	1	2	8	3
		2	3	6	3
		3	5	0	3
	5	1	3	0	5
		2	1	4	3
		3	3	7	5
	6	1	3	17	3
		2	0	11	3
		3	3	4	0
Inner Bed	7	1	0	18	3
		2	0	22	4
		3	2	15	3
	8	1	0	8	2
		2	0	8	4
		3	0	7	7
	9	1	2	11	2
		2	0	3	2
		3	0	7	5
Summary Statistics			Pos	Zos	Hal
Offshore	Mean		3.22	0.78	2.11
	Std Error		0.74	0.43	0.54
Mid Bed	Mean		2.56	6.33	3.11
	Std Error		0.47	1.79	0.48
Inner Bed	Mean		0.44	11.00	3.56
	Std Error		0.29	2.04	0.56

From the dive inspections there was no suitable rock crevice or cave habitat for Black Cod in the locality. This was confirmed by specific searches and no specimens of Black Cod were observed during the field work for this study. Searches were made for syngnathids, specifically seahorses, in the dense algae habitats on inshore piles, rock rubble and sliprails plus in the seagrass beds but none were found. The dense algae beds are considered to be too shallow to support seahorses and the seagrass beds are too sparse to provide the necessary camouflage protection for these species.

No other species listed as threatened under the FMA were seen nor were any expected. It is concluded that the existing facilities and the aquatic habitats in the locality do not constitute specific habitat for threatened aquatic species as currently listed under the *Fisheries Management Act 1994* (FMA).

With regard to other aquatic species or ecological communities and migratory species listed under the *Biodiversity Conservation Act 2016* (BCA) and under the EPBC Act, Little Penguins are observed fishing and feeding throughout Pittwater and could be expected to visit the aquatic habitats of 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 Pittwater and are known to penetrate the estuary to and beyond the study area, and there is a growing colony of seals (mainly New Zealand fur seals) at Barrenjoey, with consequent more frequent sightings of seals throughout Pittwater.

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 proposal and that the proposal site and the locality do not constitute specific habitat for other threatened aquatic species as listed under the FMA, BCA and EPBC Act.

3 IMPACT ASSESSMENT

With regard to aquatic ecology impact, the proposed pontoon and refurbishment works include replacement of the existing ramp and pontoon with a jetty extension that would be supported on a bearer between the existing pontoon locator piles, thus requiring no pile demolition or replacement for the jetty extension. There will then be a new mesh ramp connecting to a new mesh-covered pontoon which will require two new locator piles.

3.1 Shading and Direct Habitat Losses and Gains

The proposal results in the overall structure being extended seaward by 8 metres. In terms of seabed shading potential, the areas shaded are as follows:

- The inshore existing timber jetty section (6.2m^2) is to remain as is, so there is no net change in seabed shading.
- The new mesh jetty is $1.6\text{m} \times 6.8\text{m} = 10.9\text{m}^2$ which will replace the existing timber ramp (9.2m^2). Provided the mesh decking results in at least 60% light penetration (as required by DPI Fisheries letter Ref C20/724 dated 7 December 2020), it would be considered by DPI Fisheries as no net increase in shading for the sparse *Zostera* bed, and as it replaces the solid ramp, it results in a *decrease* of 9.2m^2 of present shading impact. As *Zostera* is a colonising species, it can be expected that the *Zostera* in the locality would grow into this newly unshaded habitat, with a potential *increase* of 9.2m^2 of *Zostera* seagrass habitat.
- The New ramp is $1.6\text{m} \times 7.0\text{m} = 11.2\text{m}^2$. Provided the mesh decking results in at least 60% light penetration (as required by DPI Fisheries), it would be considered by DPI Fisheries as no net increase in shading, thus there is no shading impact on the *Posidonia* bed below.
- The new mesh/concrete pontoon is $2.4\text{m} \times 3.6\text{m} = 7.2\text{m}^2$. The pontoon is to be provided with a centre mesh section and there will be two new pontoon locator piles required. As at least half the pontoon will be concrete, there will be at least 3.6m^2 shading of sparse *Posidonia* habitat resulting from the proposed pontoon placement that represents a potential loss of about 46 *Posidonia* shoots.
- If the two locator piles are 400mm diameter, there is a further direct loss of 0.25m^2 *Posidonia* habitat to the pile placement (± 4 shoots) and a potential 0.75m^2 of disturbance around the pile hole with a potential loss of a further 12 shoots.
- The two new locator piles will provide an additional minimum of 2m depth wetted surfaces for colonisation by marine algae and encrusting fauna as indicated in **Figures 9 and 10** above with the potential for an additional 2.5m^2 of good quality macroalgae habitat, and the wetted surfaces of the pontoon will provide good

replacement habitat for marine algae and attached biota similar to the existing pontoon as indicated in **Figure 11** above. As the pontoons are the same size this represents no net change in pontoon wetted surface habitat.

3.2 Potential Construction Impacts

Placement of new piles will cause some temporary pulse turbidity which is not considered a risk for the marine habitats and biota at the site.

Construction will require a barge plus crane and pile driving equipment for the demolition and construction works and the work barge will most likely need to be manoeuvred into position using towing and/or pushing vessels and may need to be kept *in-situ* over multiple tide cycles:

- Holding a barge in place for construction works is generally done using one or more barge-mounted stub piles pushed into the seabed to hold the barge in place or by using barge mounted winches and wires connected to pre-placed mooring blocks.
- In terms of overall construction impacts, the main potential impacts relate to the manoeuvring of work vessels and barges over the inshore and offshore seagrass beds which has the potential to directly damage aquatic habitats via vessel or propeller strike, propeller wash. Damage to seagrass habitats can also occur via mooring or anchoring apparatus deployed in on or over these habitats via direct crushing or scalping from wires laid across the seabed.

These potential construction impacts can be mitigated by the inclusion of the following conditions in the project Construction Environment Management Plan (CEMP):

- Construction works will need to include measures to ensure no damage to seagrass and inshore rock rubble habitat identified in **Figure 4** to this report. These measures are to include the following provisions:
 - There will be no stockpiling of demolition or construction materials on the seabed
 - By virtue of the shallow depths over the marine vegetation habitats, no vessel is to be taken over the indicated marine vegetation unless there is sufficient depth to prevent vessel strike, propeller strike or scouring damage from propeller wash.
 - No vessel is to be moored with anchor or other bottom tackle located in the indicated marine vegetation habitats.
 - To ensure minimum disturbance of seabed habitats during barge mobilisation, barge movement operations will need to be done during

favourable tide and wind combinations, with the pushing vessel operated in such a manner as to minimise sediment disturbance and prevent strike or disturbance to seabed aquatic habitats. These manoeuvres should also be timed with the tides and low wave/wash periods to minimise seabed disturbance.

- Barge mounted spuds cannot be used in seagrass or rock reef habitat areas as indicated in **Figure 4**.
- If winches and anchor/mooring blocks are to be used, the anchor/mooring blocks and any associated chain are to be placed in such a manner that there is no direct damage to the identified habitats from the anchors/mooring blocks or chain, and anchors/blocks must be placed so that there is no risk under any tide or tide/wind combination of scalping the identified habitats from anchor chain or from cables sagging between the barge and anchor/mooring blocks or from the barge to other shore mooring points. If there is a sagging and scalping risk, the use of floating rope or suitable buoyancy for cables must be adopted.
- All construction offcuts must be removed from the site and no construction materials are to be placed or stored on the seabed. Any dropped offcuts are to be retrieved from the seabed immediately for appropriate on-site disposal.
- Any moorings or anchors that are used or piles/structures that are removed, should be inspected for the pest algae *Caulerpa taxifolia* once on the barge deck. If the alga is present, it should not be returned to the water and should be disposed of as normal construction waste into bins for appropriate shore disposal.

3.3 Key Fish Habitat Assessment

With regard to the DPI Fisheries waterway classification scheme as shown in Table 2 of the NSW Fisheries 2013 Policy and Guidelines, the site is a Class 1 “Major key fish habitat” (KFH) by virtue of it being an estuarine waterway. In regard to the sensitivity classification of the specific habitats within the site (as defined in Table 1 of Fisheries NSW 2013):

- The inshore seagrass habitat is Type 1 “Highly sensitive KFH” by virtue of the presence of seagrass species *Zostera*, *Halophila* and *Posidonia*.
- The rock rubble reef habitat inshore is classed as a Type 2 habitat “moderately sensitive KFH” by virtue of the presence of the macroalga *Ecklonia* and *Sargassum* species.
- The un-vegetated marine-sand habitat offshore from the facility is Type 3 “minimally sensitive” KFH.

3.4 Summary and Conclusions for Habitat Losses and Gains

The proposal results in the following calculated habitat losses and gains:

- An *increase* of 9.2m² of *Zostera* seagrass habitat that can be expected to be re-colonised by *Zostera*.
- A *direct loss* of 0.25m² *Posidonia* seagrass habitat to pile placement plus a potential 0.75m² indirect *Posidonia* disturbance risk around the piles for pile placement works (4 shoots direct loss and 12 shoots at risk). From observational experience, pile placement generally only displaces and compresses seabed sediments laterally, with seagrasses just pushed sideways so this indirect loss is considered a *low risk*.
- A potential indirect loss of 3.6m² *Posidonia* habitat to pontoon shading which represents about 46 shoots at risk. From observational experience shading impacts under a pontoon are concentrated around the centre portion of the footprint as there is generally sufficient angled plus refracted, and reflected sunlight penetration around the margins of the pontoon shade footprint. As the proposed pontoon will have a centred mesh portion to allow at least 60% sunlight penetration to this centre shaded portion, the risk of total loss of the 46 shoots is considered *low* and should be discounted by half to around 23 *Posidonia* shoot loss predicted.
- New wetted surface areas on the two piles will provide an *additional* 2.5m² of good quality macroalgae habitat.
- The existing pontoon current sits in approximately -0.8m ISLW water depth and the proposed pontoon would have a depth greater than -2m ISLW, which will markedly reduce the [present risk to inshore mixed *Posidonia* and *Zostera* seagrass of vessel propeller scouring during docking.

3.5 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 Fisheries Revised Policy and Guidelines (NSW Fisheries 2013). With respect to estuarine activities, permits are required for reclamation or dredging works and for the taking or harming of marine vegetation.

The proposal does not include activities that fall under the definition of *dredging or reclamation* but piling operations will result in the disruption of some *Posidonia* habitat and the potential loss of additional *Posidonia* habitat to shading. These potential losses are offset by the recovery of some previously shaded *Zostera* habitat and of some new hard substratum habitat on the wetted vertical surfaces of the pontoon locator piles. Owing to the identified actual and potential marine vegetation losses, the project will require a permit under the FMA to “take or kill marine vegetation” as detailed in the DPI Fisheries letter Ref C20/724 dated 7 December 2020.

4 SUMMARY AND CONCLUSION

This survey has indicated that there is rock rubble algae habitat inshore, a shallow *Zostera* seagrass bed on the seabed fronting the foreshore of 967 Barenjoey Road, Palm Beach and a fragmented and patchy *Posidonia* strapweed seagrass bed within and offshore from the *Zostera* bed. It is concluded that the extension of the jetty and the proposed ramp and pontoon facility plus the proposed pontoon locator piles would meet the aquatic ecological conservation requirements of the *Fisheries Management Act (1994)* provided mitigation and compensation measures are incorporated into the design and operation to the facility:

- Construction of the facility can be undertaken with no significant direct impact on seagrass beds, intertidal rocky rubble and rock shore habitats or other aquatic habitats in the locality, provided the Construction Environmental Management Plan (CEMP) prepared for the project includes the construction safeguards outlined in this report.
- Piling would result in the loss of up to 0.25m² *Posidonia* habitat. This loss would be offset by both the creation of some 2.5m² of hard substratum habitat that would support a marine algae-based aquatic assemblage, and by the recovery of 9.2m² of previously shaded *Zostera* habitat. This compensation could satisfy the Fisheries' NSW 2013 Guideline Section 3.3.3 environmental compensation measures including the minimum 2 for 1 criteria.
- Provision of at least 60 % light penetration mesh decking on the jetty, ramp and part of the pontoon would allow increased light penetration to the seabed, lowering the risk of shading impacts. on the *Posidonia* seagrass habitat and there is a residual

4.4m² of *Posidonia* habitat with a *low risk* for shading and pile driving operations.

- There would be no shading impacts from use of the facility for mooring provided the pontoon is not used to moor vessels permanently at the pontoon and is only used for short periods for loading or disembarking of vessels.
- The risk of contact or propeller wash damage to the *Posidonia* seagrass bed from use of the facility would be less than the risk for the present in-shore facility.

As a consequence of the residual construction related risks to marine vegetation, the project will require a Section 205 permit under the NSW Fisheries Management Act 1994 to *harm marine vegetation*.

5 REFERENCES

Fisheries NSW (2012)

Endangered Populations in NSW: *Posidonia australis* in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie. Fisheries

Ecosystems Unit, Port Stephens Fisheries Institute. DPI Fact Sheet Publication 12/107

Fisheries NSW (2013)

Policy and Guidelines for Fish Habitat Conservation and Management (2013 update), NSW Department of Primary Industries, June 2013.

APNNEXURE A

CLIENT'S PROPOSAL PLAN

