MARINE POLLUTION RESEARCH PTY LTD

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

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AQUATIC ECOLOGY ASSESSMENT

PROPOSED DECK, BOATSHED REFURBISHMENT AND RAMP AT 214 HUDSON PDE, CLAREVILLE.

Figure 1 SixMap aerial view of Refuge Cove, Pittwater showing location of 214 Hudson Pde, Clareville.

1 INTRODUCTION

Marine Pollution Research Pty Ltd (MPR) was requested by **Utz Sanby Architects** to provide an aquatic ecology impact assessment for proposed refurbishments and ramp extension at 214 Hudson Pde, Clareville. The site is located at the north-western end of Refuge Cove, Clareville (**Figure 1**). The property faces SW and is open to winds from the south through to the west, and the largest fetch is approximately 2.1km SW across to Bayview. The seabed offshore from the site slopes from the inshore intertidal rock rubble to a depth of 14m below ISLW approximately 300m offshore. The site is open to passing vessel wakes plus wind waves particularly from the south west.

Figures 2 to 4 provide drone and photographic views of the existing facility which comprises a jetty plus sea-stairs and mooring pen to be retained, an enclosed boatshed structure over a concrete ramp and slipway facility and associated reclamations.

Figure 2

Drone view of present facility showing the relationship of jetty, mooring pen, slipway boathouse and associated reclamations.

Figure 3 Oblique, low drone view showing concrete ramp plus slipway and boat cradle extending into the boatshed, the block sandstone seawalls and concrete plus sandstone flagged reclamations at the property.

Figure 4 Sandstone seawall and reclamation on eastern side of present facility.

1.1 Available Aquatic Habitat Information

In terms of existing aquatic ecological habitat information, the Fisheries NSW 2019 marine vegetation habitat map 2019 for Pittwater indicates a small bed of mixed *Posidonia* and *Zostera* seagrass off the front of the two jetty facilities to the east of the site and a continuous and extensive mixed *Posidonia* and *Zostera* seagrass bed along the Clairville shore to the north of the site (**Figure 5**).

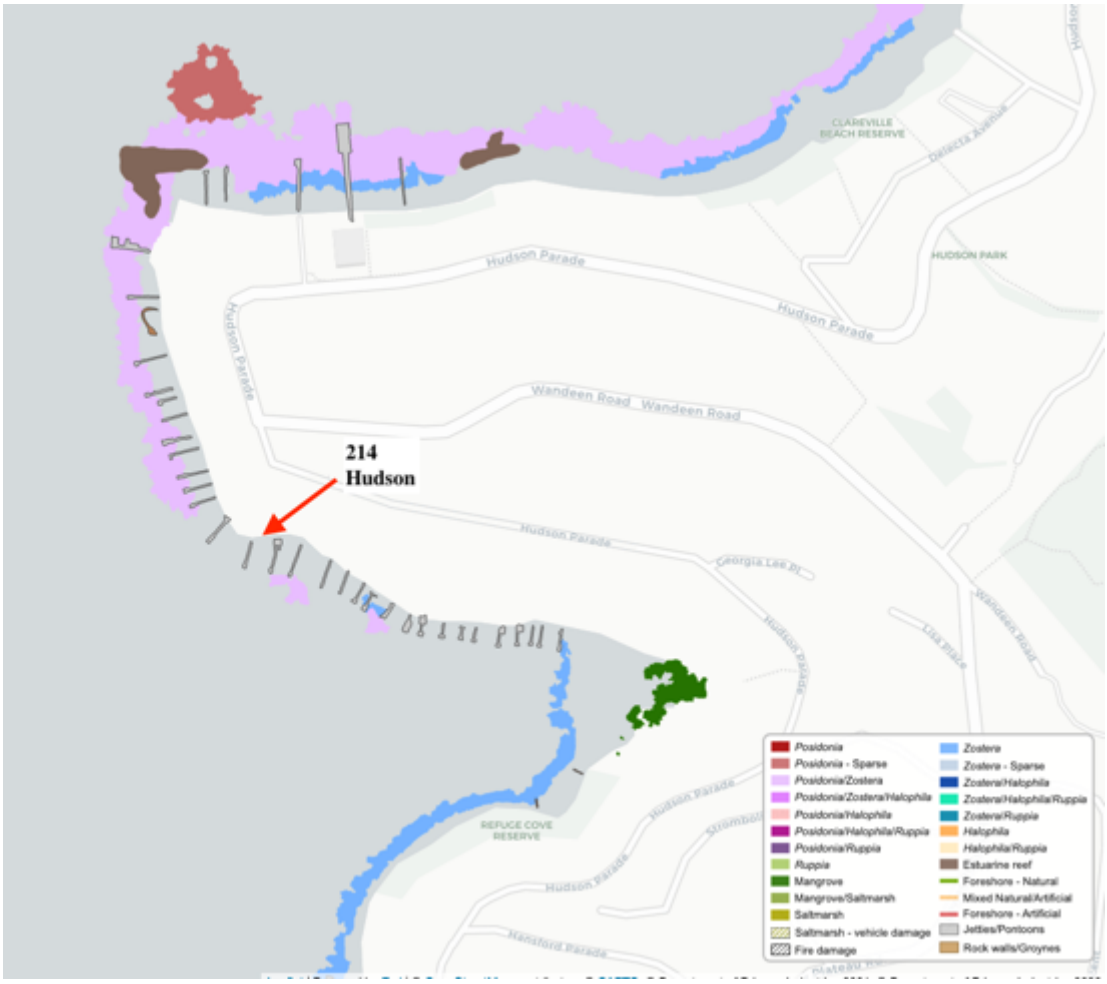

Figure 5 Portion of DPI Fisheries NSW Marine Vegetation Map 2019 for Pittwater showing *Posidonia/Zostera* seagrass (pink) to the north and east of the site. There is a mangrove stand (green) at the head of Refuge Bay and a band of *Zostera* seagrass (blue) offshore from the mangroves and the Refuge Bay southern shore.

1.2 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 specific protected or threatened fish species that could occur at the site, the Black Cod *Epinephelus daemelii,* which is 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 *endangered* under the FMA plus protected pipe fish are known from seagrass beds and macro-algae reefs:
- From the dive inspection 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.
- Specific searches were also made for Sygnathid fish, specifically sea-horses. None were found during specific searches of the site habitats. The *Zostera* and *Posidonia* seagrass present, is much too sparse for Sygnathid habitat.
- No other species listed as threatened under the FMA were seen nor were any expected.

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. However, 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.

2 AQUATIC HABITAT FIELD SURVEY RESULTS

A drone, walkover and dive survey was undertaken on 21 September 2022. The weather was sunny with a slight north-easterly breeze and water clarity was fair to good. **Figure 6** shows the main aquatic habitats with the approximate outline of the proposed ramp and stairs indicated by the dashed red line.

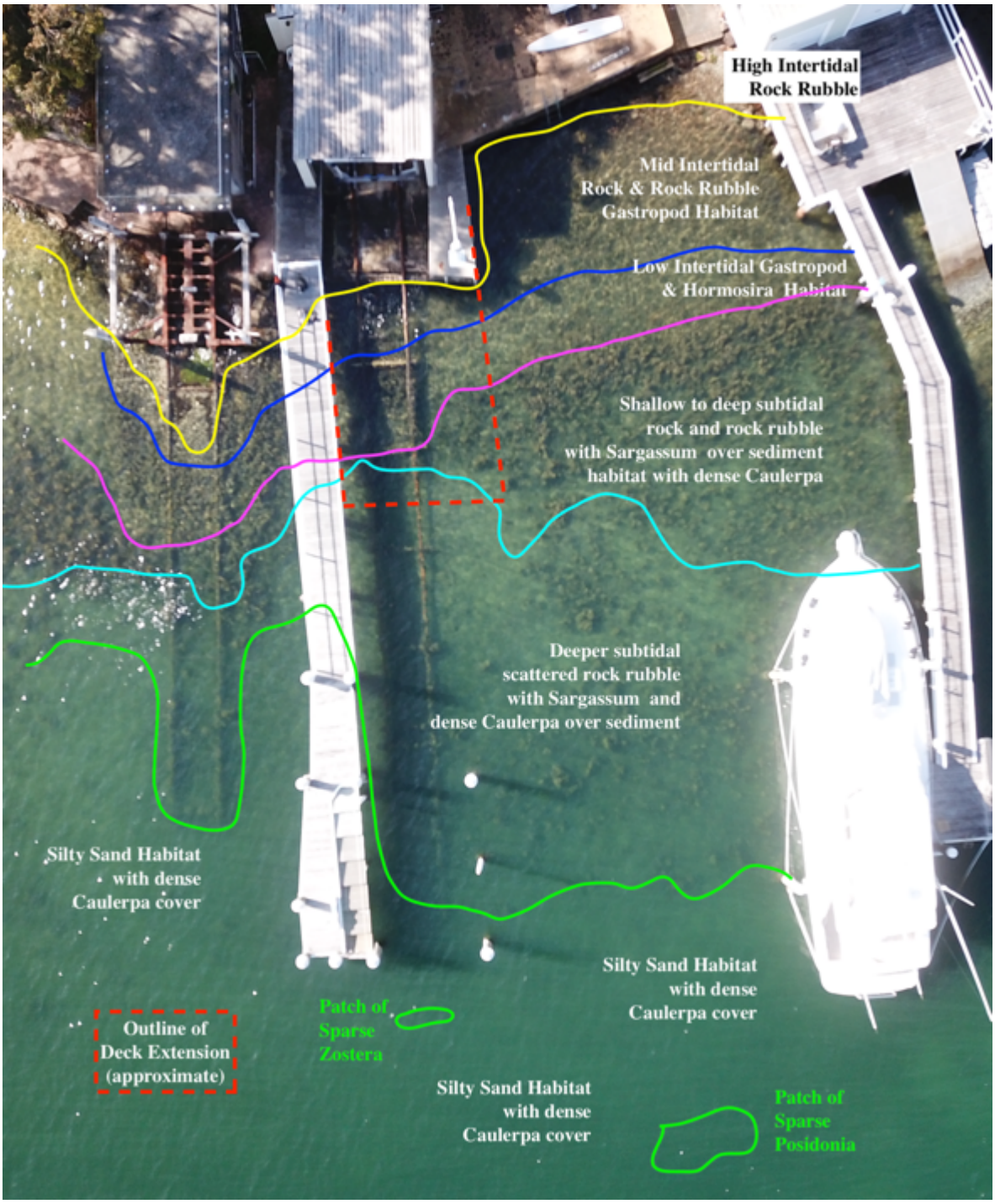

Figure 6 Drone image showing the present habitats and ramp/stair proposal overlaid.

Figures 7 to 18 provide photographs of the various aquatic habitats and the aquatic habitats at the site are described as follows:

- The riparian zone comprises reclamations with concrete decks on either side of the sloping concrete ramp (**Figure 3**) and stone flagged decking over a sandstone block seawall to the east of the concrete ramp structures (**Figure 4**).
- The intertidal wetted surfaces of the concrete and sandstone seawall and a small inshore section of rock rubble at the eastern corner rock rubble (inshore of the yellow line in **Figure 6**) supported an oyster-based assemblage with no macro algae (**Figure 7**).
- The mid-section of intertidal rock rubble over basement rock habitat (yellow to dark blue lines in **Figure 6**) supported a variety of gastropods (*Morula sp., Bembicium sp.* and *Austrocochlea sp.*) and this gastropod assemblage extended into the lower intertidal habitat (dark blue to purple lines) along with patches of Neptune's necklace *Hormosira banksia,* patches of oysters with short form *Sargassum sp.,* some *Colpomenia sp.* and bleached coralline algae (**Figures 8 and 9**).
- The upper to mid subtidal rock rubble over basement rock habitat (blue to green lines in **Figure 6**), supported a *Sargassum* dominated cover on the rock and rubble surfaces with the listed pest green algae *Caulerpa taxifolia* established on the basement rock between rubble and boulders (**Figure 10**). The proportion of *Caulerpa* cover increased offshore as the proportion of exposed rock rubble decreased (**Figure 11**) and lower subtidal sediment seabed habitat supported a dense *Caulerpa taxifolia* cover that extended out offshore from the study area (**Figures 12 & 13**).
- Detailed searches were made throughout the study area for seagrasses with two patches found (**Figure 6**); a patch with four shoots of *Zostera sp.* was located approximately 3m offshore from the end of the sliprails (**Figure 12**), and a group of six shoots of *Posidonia* was located approximately 20m offshore to the south from the end of the jetty (**Figure 13**).
- The slipway rails supported oysters in the intertidal with *Sargassum* and *Colpomenia* algae habitat sub-tidally (**Figures 14 & 15**).
- The jetty piles supported oyster bands in the intertidal with barnacles, bryozoans, *Sargassum* and *Dictyota* algae below (**Figures 16 & 17**).

Figure 7 *Morula sp*. and *Bembicium sp*. within intertidal oyster-based assemblage.

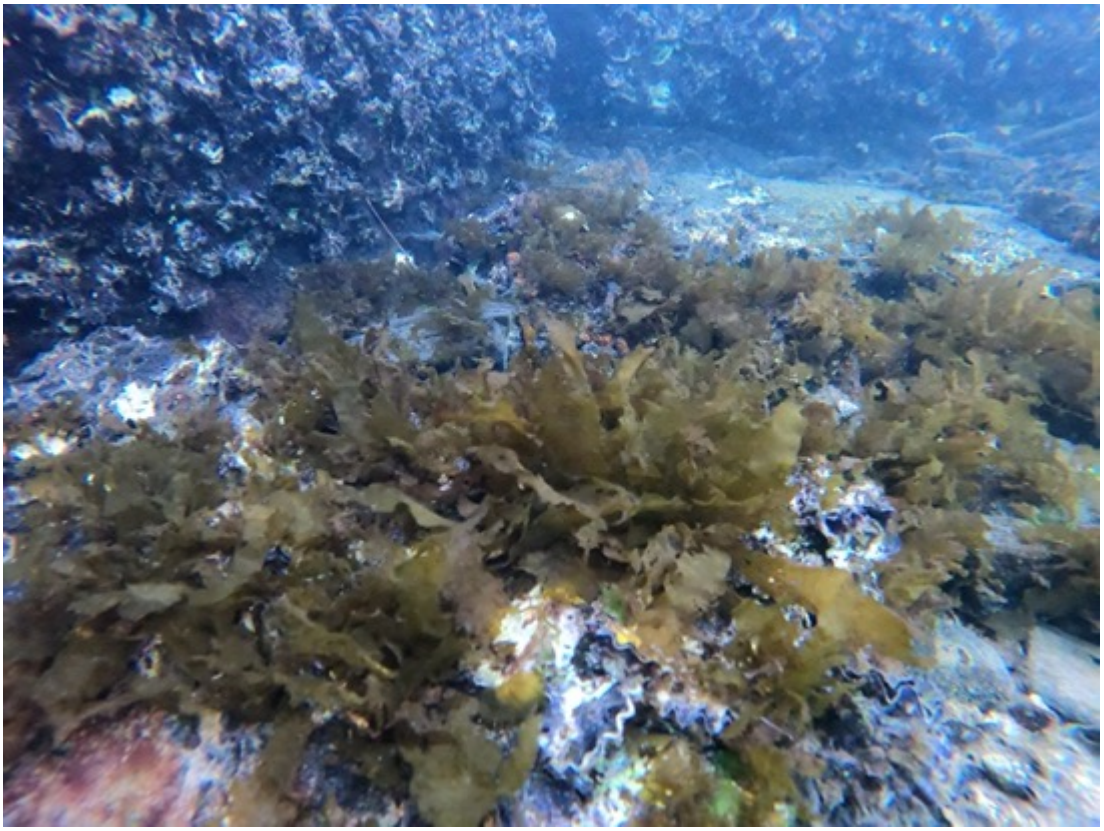

Figure 8 Intertidal oysters on bottom of concrete ramp with an isolated patch of short form *Sargassum*.

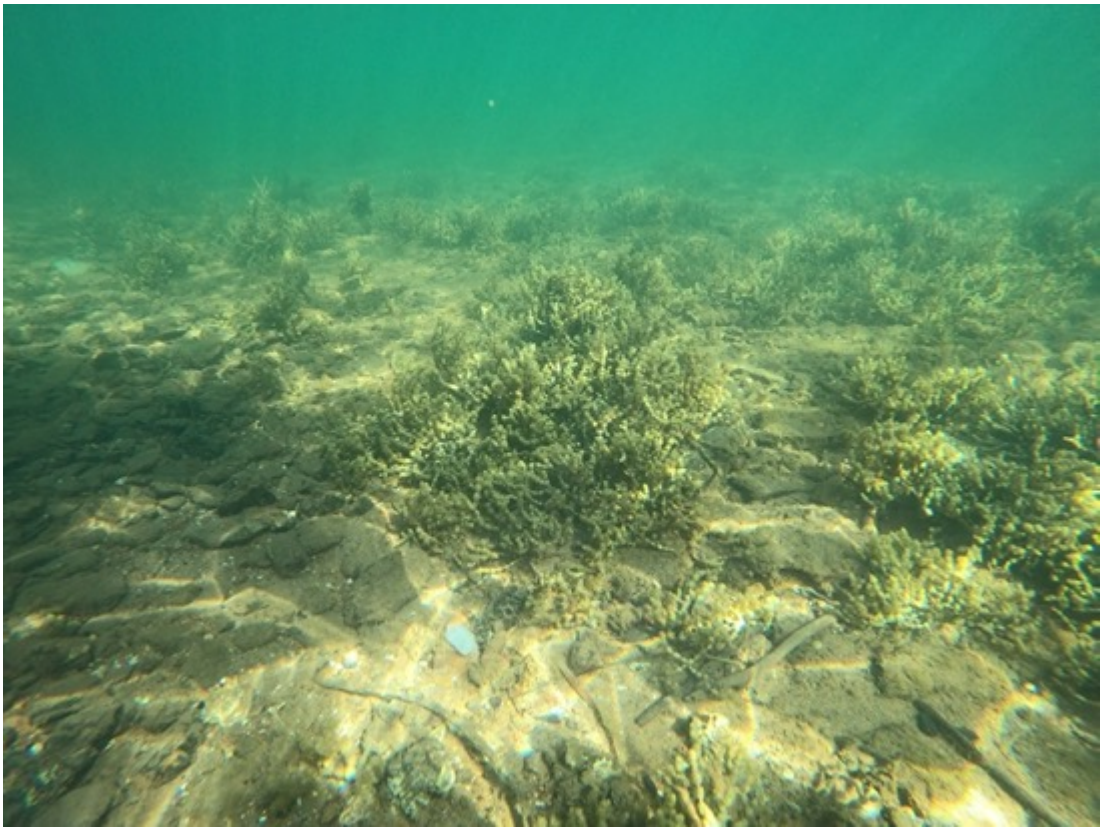

Figure 9 Neptune's necklace and gastropod habitat on lower intertidal basement rock with rock rubble habitat.

Figure 10 *Caulerpa taxifolia* patches in-between upper sub-tidal basement rock *Sargassum* habitat confined to larger rocks and rubble.

Figure 11 *Sargassum sp*. on deeper subtidal sediment and rock rubble seabed habitat with dense *Caulerpa taxifolia* cover between rubble.

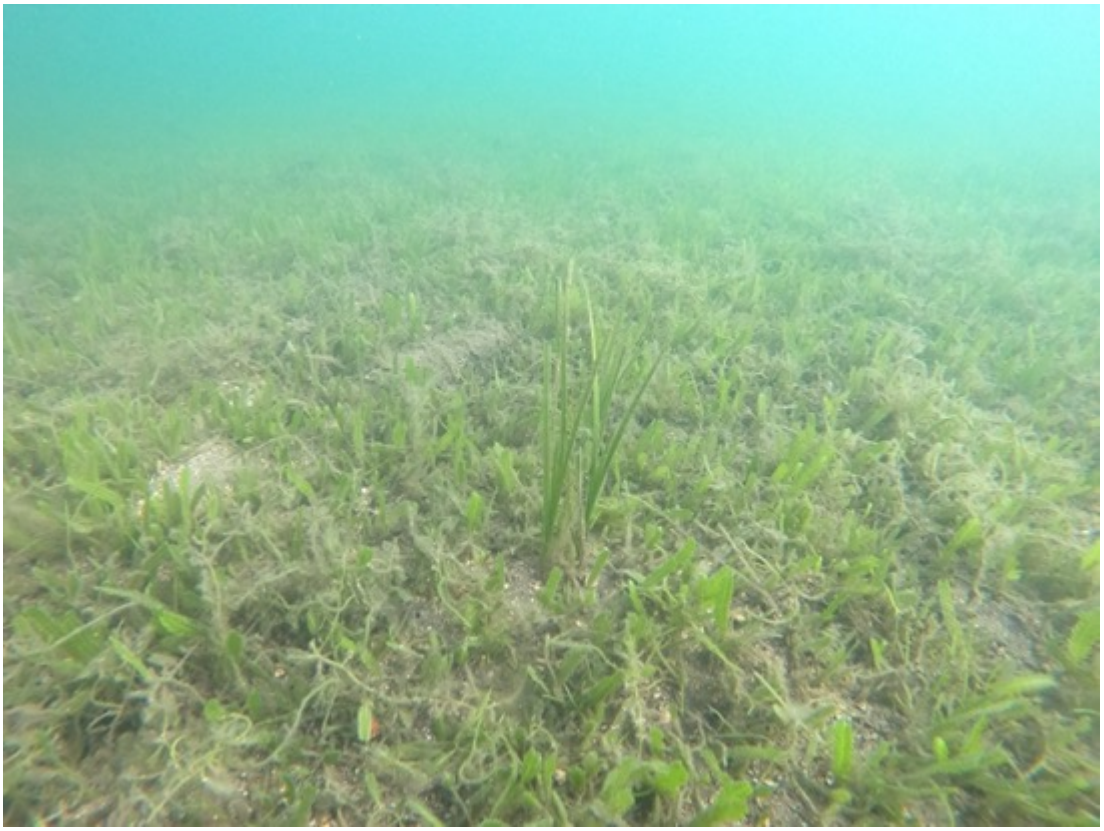

Figure 12 Only one isolated *Zostera* seagrass patch with four shoots was discovered within the dense *Caulerpa taxifolia* offshore from the sliprails.

Figure 13 Only one patch of *Posidonia* seagrass (with 6 shoots) was located within the dense *Caulerpa taxifolia* bed offshore from the existing facility.

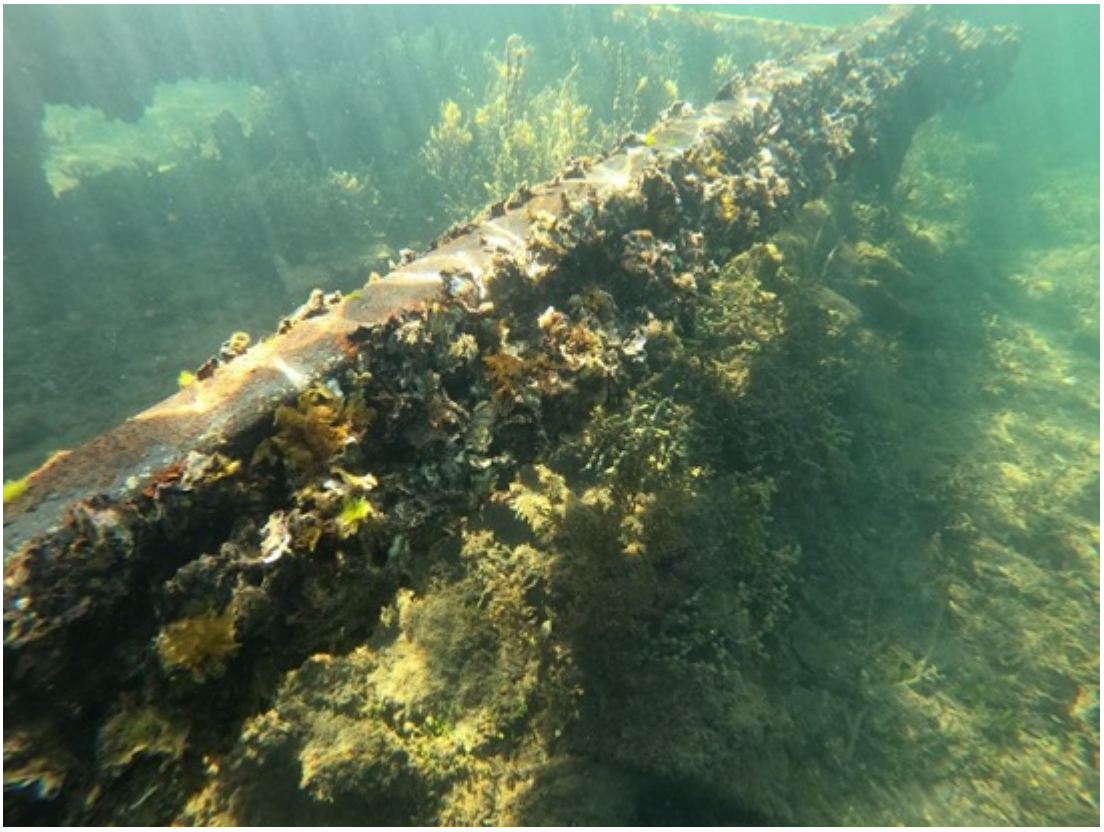

Figure 14 The lower intertidal portion of the sliprails supports an oyster based assemblage.

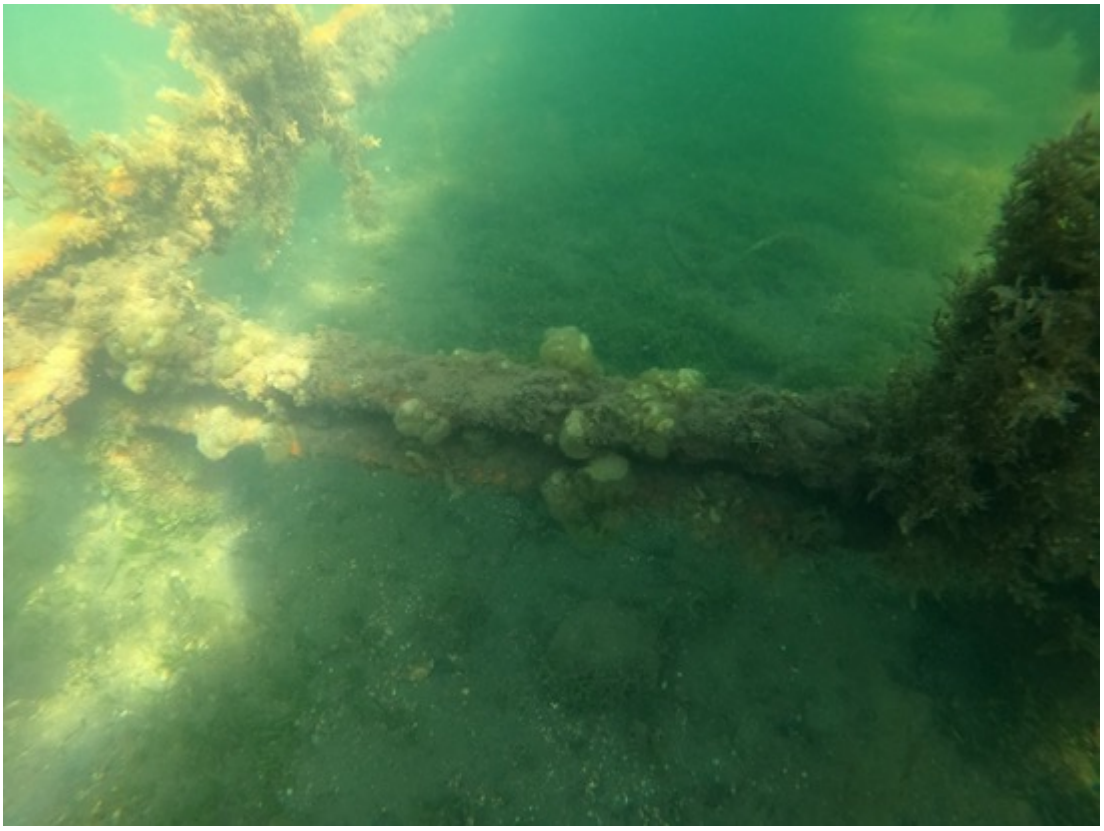

Figure 15 Subtidal sections of the sliprails support mixed brown algae, mainly *Sargassum* and *Colpomenia*.

Figure 16 Oysters on intertidal pile sections with *Sargassum* in the shallow subtidal below.

Figure 17 Barnacles, bryozoans and *Dictyota* algae on deeper subtidal pile sections.

3 IMPACT ASSESSMENT

The proposal is shown on a plan prepared by UTZ Sanby Architects (2101 DA-01and in relation to aquatic ecology impact includes a ramp extension over marine habitat plus placement of four ramp support piles

3.1 Habitat losses and gains

In terms of potential aquatic ecological impact, the proposed timber decking to be placed shoreward of the outer edge of the existing concrete ramp (i.e., over the existing concrete apron) will have no direct impact on aquatic habitats and will not result in any additional shading impact on aquatic habitats.

With regard to the impact of the extension works on fish habitat values the following losses and gains are expected:

- The new proposed timber ramp plus sea-stair facility will extend out from the new decking, it is some 40m^2 and the facility will shade a 10m^2 portion of the slipway rails and inner intertidal oyster-based and gastropod assemblage, some 15m^2 shading of mid intertidal rock with patchy and sparse density *Hormosira* and gastropod

habitat, and a 15m^2 portion of the outer facility will be placed over shallow sub-tidal rock with *Sargassum* and dense *Caulerpa* habitat.

- The timber ramp/sea-stair facility will require placement of four piles, two in lower intertidal habitat and two in shallow sub-tidal habitat. Placement of these piles will not result in any additional macroalgae habitat loss, and the additional wetted surface areas will provide some 0.25m^2 of wetted surface area that would support an oyster-based assemblage.
- In terms of marine algae fish habitat loss to shading, the proposed ramp will shade an estimated 5m^2 of intertidal *Hormosia* habitat, about 5m^2 of shallow subtidal *Sargassum* habitat and some 12m^2 of pest algae *Caulerpa taxifolia* growth, with the balance being rock with oyster and gastropod habitat - that are not impacted by shading.

The loss of the 12m^2 of *Caulerpa* to shading is considered a net benefit for fish habitat protection and the loss of the 17m^2 of intertidal to shallow sub-tidal marine algae habitat will be offset by the total 40m^2 of shaded based rock and rock rubble area becoming an oyster and gastropod based intertidal to shallow sub-tidal fish habitat which, by virtue of the protection from desiccation during sunny low tides will have an overall greater oyster density and therefore higher diversity of fish habitat more akin to oyster reef habitat - which is considered a high value fish habitat (see for example Giles et al 2015 and NSW DPI 2019).

3.2 Construction Related Impacts

Construction works will likely require a barge plus crane and pile driving rig 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. A barge will also be needed for material delivery for the proposal. Holding a barge in place for construction/demolition 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.

Construction piling works are associated with turbidity and sediment/rock displacement impacts and, for this project, piling works are associated with the disturbance and mobilisation of the pest algae *Caulerpa taxifolia* for placement of the two outer ramp support piles:

- Piles are to be driven of screwed into the seabed and pile driving is associated with pulse turbidity, caused partly by rig and pile driving head lateral vibration, and also

via compression of sediments, whereby the laterally-compressed sediments compress waters in adjacent benthic fauna burrows jetting turbid water up out from burrows. As the local waters are full marine salinity, these sediments rapidly fall back to re-settle on the seabed.

Given that the piling works are located over basement rock with rock rubble habitat there is a low risk of aquatic ecology harm from turbid plumes associated with pile placement.

In terms of overall construction impacts, the main potential impacts relate to the manoeuvring of work vessels and barges over the rock rubble algae habitats which has the potential to directly damage aquatic habitats via vessel or propeller strike, propeller wash. Damage to marine 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. Further, and as noted above, construction activities will disturb and mobilise *Caulerpa taxifolia* plants:

- Potential impacts from construction related pile placement in intertidal and shallow sub-tidal rock habitats and from vessel movements (propeller wash, cable scouring, damage to inshore habitats) can be mitigated by inclusion of specific aquatic ecology impact mitigation measures into the project **Construction Environment Management Plan (CEMP)**. These are set out in **Section 3.3.1** below.
- Whilst mobilised *Caulerpa taxifolia* fragments could be carried to other parts of the estuary, this listed pest algae is now well established throughout Pittwater and therefore the mobilisation of fragments is unlikely to impact on the overall infestation of *Caulerpa taxifolia* in Pittwater. Notwithstanding, fragments can also adhere to equipment (ropes, cable, anchors) that can then be transported to other estuaries to infest these estuaries when the equipment is re-deployed. This risk can be mitigated by inclusion of a *Caulerpa* Management protocol as per **Section 3.3.2** below.

3.3 Aquatic Ecology CEMP Requirements

The following aquatic ecology Construction Management CEMP requirements are to be included in the overall project CEMP.

3.3.1 Minimising Potential impact from Construction Vessels

All contractors undertaking construction work associated with the project shall ensure that their activities do not cause any harm to the marine vegetation habitats, as identified on **Figure 6 a**bove (specifically the two enclosed green seagrass patches and all the habitats

shorewards of the green line in **Figure 6**). In order to achieve this aim, contractors shall implement the following precautions:

- By virtue of the shallow depths over the inshore vegetated habitats, no vessel is to be taken over the indicated marine vegetation areas unless there is sufficient depth to prevent vessel or propulsion damage, including damage from wash.
- There will be no stockpiling of construction materials on the seabed.
- No vessel is to be moored with anchor or other bottom tackle located in the marine vegetation habitats located inshore of the green line or inside the two enclosed green line seagrass habitat patches shown on **Figure 6**.
- Mooring lines or cables must not be laid across the marine vegetation habitats if there is any risk of these cables reaching the bottom due to wave action or low tides.
- If cables are deployed, they must be suitably buoyed prior to laying, and kept buoyed once laid, to prevent cable drag and cable swing damage (scalping) to marine vegetation areas. Where this is impractical, contractors should use floating rope.
- In order to minimise wash and prevent bottom scouring of the marine vegetation habitats, towing or pushing vessels must not use excessive power to manoeuvre barges into place near the designated marine vegetation habitats. Scouring damage can also be minimised by 'working the wind and tides', i.e., only moving floating plant into place on high tides and under favourable or no winds.
- The potential for demolition and construction materials and liquids to be accidentally spilt into the waters can be minimised by the use of best practice construction management procedures to be included in the overall Project Construction Environmental Management Plan (CEMP).

3.3.2 Pest Algae *Caulerpa* taxifolia Management

Construction activities may also disturb and mobilise *Caulerpa taxifolia* fragments and fragments can adhere to equipment (ropes, cable, anchors) that can then be transported to other estuaries to infest these estuaries when the equipment is re-deployed (see **Figure 18**).

This risk will be mitigated by inclusion of the following *Caulerpa* Management protocols:

- The need for *Caulerpa* management will be included in inductions.
- Mooring lines or cables are not be laid across any marine vegetation habitats where there is any risk of these cables reaching the bottom and disturbing, fragmenting and mobilising the pest algae species *Caulerpa*. Where they are deployed, they will need to be monitored to ensure that they cannot reach the seabed as there is a 100% cover of *Caulerpa taxifolia* beyond the indicated marine habitats. i.e., to *at least* 50m offshore from the shoreline.

- In order to prevent mobilisation of the pest algae *Caulerpa*, towing or pushing vessels must not use excessive power to manoeuvre barges into place near or over the designated marine vegetation habitats.
- All the wetted surface areas of demolition or construction related materials taken from the waters must be inspected for attached *Caulerpa taxifolia* plants and these must be collected and disposed of into plastic bags then placed into garbage bins on shore (i.e., in the manner recommended in the NSW Fisheries' *Caulerpa* Management Plan 2004).
- All construction related equipment that comes in contact with the seabed (including mooring tackle, cables, ropes and anchors), must be inspected for attached fragments of the declared pest algae species *Caulerpa taxifolia* and any fragments found must be collected and disposed of into plastic bags then placed into garbage bins on shore.
- 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, inspected for *Caulerpa* fragments that are to be picked off and disposed to shore garbage facilities for appropriate off-site disposal

Figure 18 The pest algae *Caulerpa taxifolia* attached to a segment of chain.

3.4 Fisheries Management Act Permit 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 Fisheries NSW Policy and Guidelines (NSW Fisheries 2013). With respect to estuarine activities, permits are required *inter alia* for the "*taking or harming of marine vegetation"* or for "*reclamation or dredging works"*.

There is no dredging or reclamation required for the project and the loss of intertidal and shallow sub-tidal reef marine vegetation habitat to piling and shading, is offset by the loss of a larger area of shaded *Caulerpa* algae habitat and by the creation of high habitat value oyster reef habitat throughout the shaded rock and rubble habitat area.

Whilst residual risk of construction related harm for intertidal rock marine vegetation habitats can be minimised by appropriate construction safeguards as set out in **Section 3.3** above, it is concluded that the project may still require a Section 205 Permit under the FMA to ensure that the construction related risks are properly managed for the construction phase.

4 CONCLUSIONS

The construction of a boat-shed and ramp facility at 214 Hudson Parade Clareville can be undertaken with no significant impact on overall fish habitat values of the locality as intertidal to shallow sub-tidal native marine vegetation losses will be balanced against larger losses of pest algae habitat and an overall gain in shallow oyster reef fish habitat assemblages. The Fisheries fish habitat mapping indicated no *Posidonia* or *Zostera* seagrass beds offshore from this site, and extensive searching only yielded two very small and sparse patches of each seagrass species located well offshore from the proposed works.

Construction related risks including risk of transport of mobilised *Caulerpa taxifolia* pest algae to other estuaries on construction related equipment can be mitigated and managed by the use of appropriate and specific aquatic habitat protection measures that can be incorporated into the project Construction Environment Management Plan (CEMP).

Whilst it is concluded that the project can be constructed and used with no measurable alteration of residual risk for the protection of marine fish habitats of Pittwater and can meet the aims of aquatic ecological conservation of the *Fisheries Management Act* (1994) and of the Northern Beaches Council DCP (Pittwater 21). the project may still require a Section 205 Permit under the FMA to ensure that the construction related risks are properly managed for the construction phase.

5 REFERENCES

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