

Marine Habitat Survey

41 Robertson Road, Scotland Island

Prepared For: Copley Marine Consulting

Report Date: 23 June 2023



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Document Details

Report Title	Marine Habitat Survey
Project Title	41 Robertson Road, Scotland Island
Prepared For	Copley Marine Consulting
Report Date	23 June 2023
Project Team	David Cummings, Alex Swanson

Document Control

Version	Author	Reviewer	Date
R0	Alex Swanson BMarBiol	David Cummings BSc (Hon) PhD	23/06/2023

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Background

H2O Consulting Group was engaged by Copley Marine Consulting to provide a Marine Habitat Survey of the seabed and surrounding marine habitat at 41 Robertson Road, Scotland Island. The property adjoins the Pittwater and falls within the Local Government Area of Northern Beaches Council.

The purpose of the Marine Habitat Survey is to support a development application for modification of the existing waterfront structures at the above-mentioned property. Under Part 4 of the *Environmental Planning and Assessment Act 1979*, NSW Department of Primary Industries (NSW DPI) is a 'determining authority' for integrated developments such as this, where there is potential that marine vegetation may be harmed.

In NSW, the *Fisheries Management Act 1994* (FM Act) provides conservation and protection of fisheries resources, fish habitat and threatened aquatic species in NSW waters. Under the FM Act as well as the New South Wales *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) there are requirements for the protection of estuarine vegetation such as mangroves, saltmarsh and seagrass.

NSW DPI may make further assessment, evaluations and recommendation that may include stipulating additional mitigation measures as a consent condition for the proposed development after review of this report.

This survey at 41 Robertson Road, Scotland Island has been conducted in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (Fairfull 2013).

Objectives

The objectives of this Marine Habitat Survey are to:

- Provide a clear description of the proposal, marine environment including presence of threatened and/or invasive species and any relevant hydrological features.
- Where present identify, describe (species & density) and map marine vegetation in the area effected and adjacent areas.
- Identify potential impacts from the proposed development and where appropriate recommend mitigation measures to ameliorate any environmental effects on the marine environment.

Regional Context

Pittwater Estuary (hereafter Pittwater) is a drowned valley estuary north of Sydney that adjoins Broken Bay at the mouth of the Hawkesbury River. It is approximately 10 km in length and 1 km in width (WBM 2006), with an estuary area of 18.4 km² and a total catchment area of 50.8 km² (NSW DPE 2023). Pittwater is a distinctive natural asset of the Northern Beaches and comprises of numerous estuarine habitats including beaches, rocky shores, mangroves, saltmarsh and mud flats (NBC 2023). The Subject Site is located on the northern shore of Scotland Island, with a northerly aspect across Pittwater to Morning Bay that lies along the western shore of Pittwater (Figure 1).

The nearest protected aquatic habitat is the Barrenjoey Head Aquatic Reserve located at the confluence of the Hawkesbury River and the ocean, extending around from Palm Beach to Station Beach, which is approximately 6.9 km from the Subject Site. There are no aquaculture activities within the vicinity of the Subject Site, and commercial fishing activities in Pittwater no longer occur.

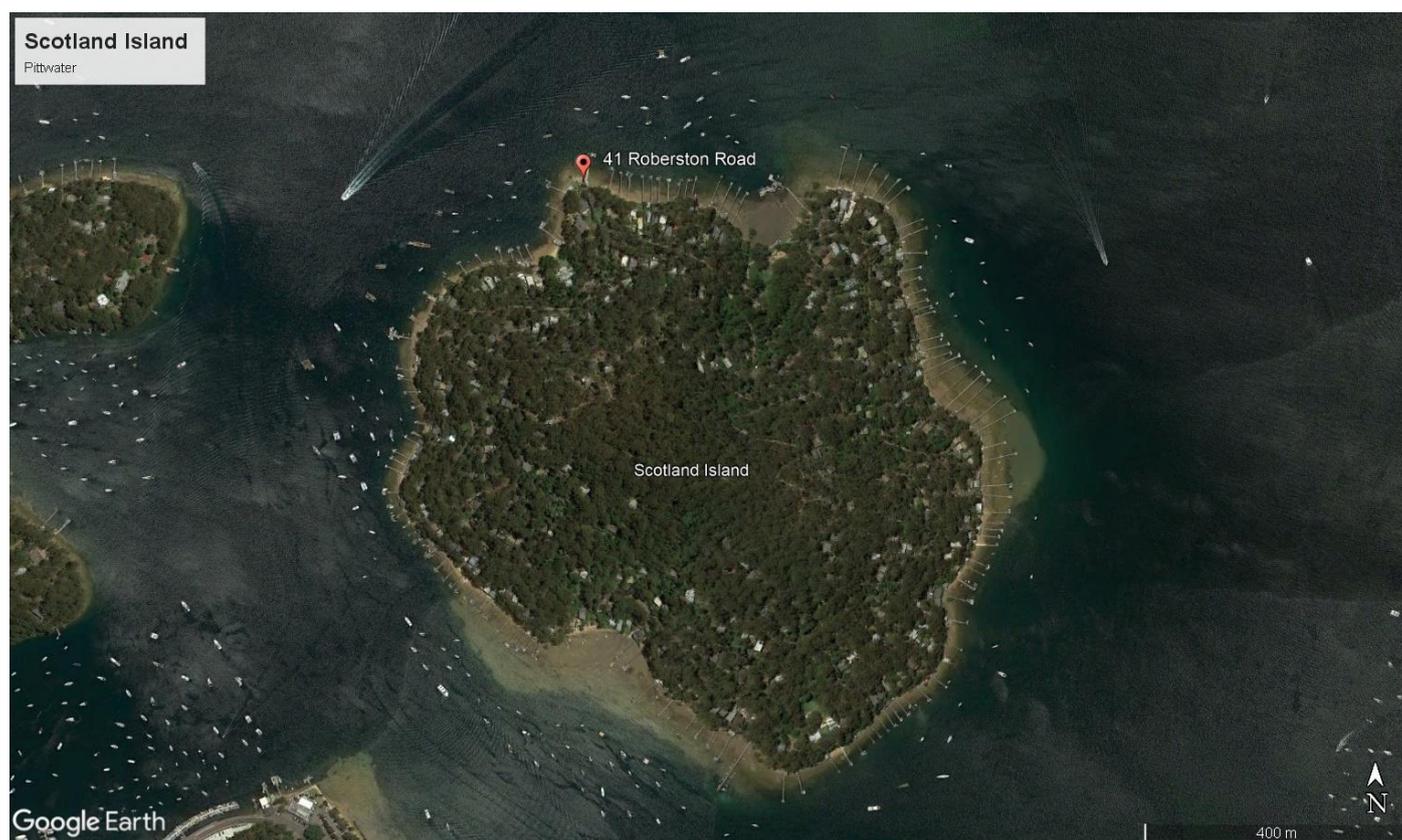


Figure 1: Locality of the proposed development at Scotland Island.

Existing Information

Mangroves, saltmarsh and seagrasses are common and important to estuarine productivity and ecological function in Pittwater. Extensive development of the surrounding catchment and accommodation of over 3000 moorings has had a significant impact on aquatic vegetation, especially seagrass beds in Pittwater (WBM 2006). Controlling developments, urban storm water runoff and stream line erosion in the upper

catchment remain key management actions in preserving the aquatic environment of Pittwater (Pittwater Council 2005).

NSW DPI habitat maps indicate the common occurrence of seagrasses *Posidonia australis*, *Zostera capricorni* and *Halophila ovalis*, mangroves and salt marsh communities in Pittwater. In six NSW estuaries including Pittwater, *P. australis* has been listed as an Endangered Population and added to Threatened Species Schedules under the FM Act (NSW DPI 2012), while more recently *P. australis* seagrass meadows of the Manning-Hawkesbury Ecoregion Ecological Community have been listed as Endangered under the EPBC Act. Additionally, Coastal Saltmarsh has been listed as an Endangered Ecological Community on the NSW North Coast, Sydney Basin and South East Corner Bioregions under the BC Act, which also corresponds with the listing of Subtropical and Temperate Coastal Saltmarsh as a Vulnerable Ecological Community under the EPBC Act. Previous mapping conducted by NSW DPI indicates the presence of extensive sparse *P. australis* fringing seagrass beds and smaller isolated *Z. capricorni* seagrass beds in shallow waters around Scotland Island nearby the Subject Site, as well as some small mangrove stands to the east. A moderately sized bed of sparse *P. australis* has been mapped to the northeast of the Subject Site, however, does not occur within the Study Area (Figure 2).

Along the New South Wales coastline, Black Rockcod (*Epinephelus daemeli*) may utilise deeper shoreline areas along rocky drop-offs where ledges, overhangs and caves occur. The Black Rockcod has been listed as a Vulnerable fish species under the FM Act as they have been historically overharvested and risks remain from fishing, climate change and water pollution (NSW DPI 2012b). More recently White's Seahorse (*Hippocampus whitei*) and the Cauliflower Soft Coral (*Dendronephthya australis*) have been listed as an Endangered species under the FM Act. The natural habitats of the White's Seahorse include sponge gardens, seagrass meadows and soft corals, while it is also known to use artificial habitats such as protective swimming net enclosures and jetty pylons (NSW DPI 2019). The Cauliflower Soft Coral occurs sporadically in estuaries including Port Stephens and Brisbane Water, where they grow in abundance, typically in areas with a sandy seabed and high current flow (NSW DPI 2021).

The Pittwater State of the Environment Report (Pittwater Council 2005) indicates the management and control of the spread of the invasive green algae *Caulerpa taxifolia* as a significant ecological issue for aquatic habitats within Pittwater. *C. taxifolia* is a fast growing alga endemic to tropical waters of Australia that has rapidly colonised areas outside its natural range including within Pittwater. Mapping conducted in Pittwater by NSW DPI indicates that *C. taxifolia* is widespread around Scotland Island and occurs in the vicinity of the Subject Site (NSW DPI 2015).



Figure 2: NSW DPI Fisheries mapping in the vicinity of the Subject Site (Source: NSW DPI 2023).

● Subject Site

Description of the Proposed Development

The proposed modifications include the following:

- Removal of all existing wave attenuators and associated piles,
- Removal of existing ramp, pontoons and stairs, and associated piles,
- Modification of by partial removal of existing timber jetty to connect to new timber ramp,
- Construction of new timber ramp (2.0 x 6.0 m) connecting existing timber jetty to new pontoon,
- Construction of new t-shaped large pontoon (67.65 m²) with four new timber piles; and
- Construction of two new mooring pens (4.0 x 6.0 m each).

The proposal utilises some of the footprint of the existing structures, including the stone jetty and part of the timber jetty, while also retaining two jetty piles and two mooring piles at the Subject Site (Figure 3 and 4).



Figure 3: Existing jetty, pontoon, mooring pens and wave attenuator at the Subject Site.

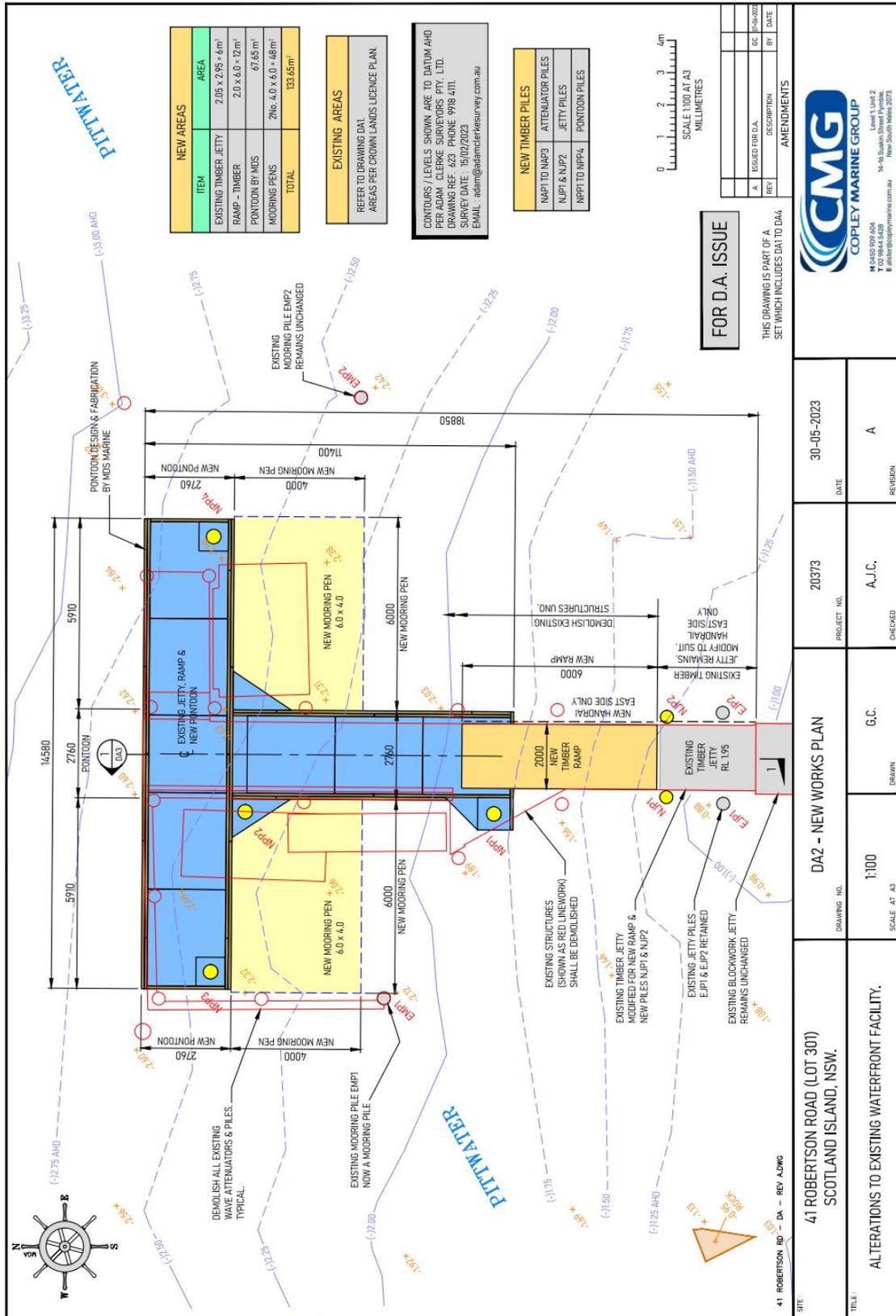


Figure 4: Proposed modifications to the waterfront structures at the Subject Site.

Study Methods

The site survey was undertaken at 1330 hrs on the 27th January 2023 at the top of the flood tide. Tidal predictions for Scotland Island on the day was a 1.43 m high tide at 1323 hrs. Weather conditions were overcast, with moderate south-easterly winds, while in-water visibility was good at 2 m.

The Study Area was limited to the potential habitat within 10 m of the proposed works. The survey was conducted by inspection from the shore and an in water (snorkel/ freediving) inspection. Marine habitat and features of interest were photographed using a digital camera. Marine habitat was described based on dominant flora and fauna observed. For seagrass habitat, density (abundance) and patchiness (sociability) were estimated using categories for each seagrass species present as per King and Barclay (1986) (See Table 1).

Table 1: Seagrass categories for density and patchiness developed from King and Barclay 1986.

Density	
Low	Sparse growth, up to 15% cover
Medium	Moderate growth 15 – 50% cover
High	Abundant growth greater than 50% cover
Patchiness	
Clumps	Individual strands or clumps (less than 1 m ²)
Patches	Patches of between 1 and 5 m ²
Beds	An area of relatively continuous seagrass greater than 5 m ²

Data obtained during the site survey along with aerial imagery was used to develop habitat maps for the Study Area.

Survey Results

The adjoining shoreline is a moderately sloping, modified domestic waterfront amongst dense vegetation on the northern shore of Scotland Island, with a northerly aspect across Pittwater to Morning Bay. Waterfront structures at the Subject Site include a sandstone block seawall approximately 1.5 m in height, an existing stone jetty with a timber ramp and sea stairs, two pontoons and mooring pens, and a wave attenuator on the western pontoon. To the east and west of the Subject Site, waterfront structures include a combination of natural shoreline and sandstone block seawalls, with stone jetties, pontoons, mooring pens and boatsheds (Figure 5).



Figure 5: Waterfront structures to the (a) east and (b) west of the Subject Site.

Intertidal Habitat

Intertidal habitat comprised of a combination of sand, rubble and shallow rock shelf, with artificial habitat provided by the existing sandstone block seawall and jetty sides, stairs and piles. In higher intertidal areas on the stone seawall, stairs and rockshelf, intertidal species were limited to Blue Periwinkles (*Nodilittorina unifasciata*), whilst upper sections of existing piles and the along the water line of existing pontoons, common intertidal organisms included Rose Barnacles (*Tesseropora rosea*) and False Limpets (*Siphonaria denticulata*). Mid and lower intertidal zones on stone walls and natural rock and rubble habitat were dominated by dense assemblages of Sydney Rock Oysters (*Saccostrea glomerata*), with other common intertidal invertebrates including Pacific Oysters (*Crassostrea gigas*), Oyster Limpets (*Patelloida mimula*), Striped-mouth Conniwinks (*Bembicium nanum*) and Mulberry Whelks (*Morula marginalba*). Lower intertidal sections existing structures were also found to support Blue Mussels (*Mytilus edulis*).

Intertidal zones near the Low Water Mark (LWM) among the sand and rubble sediment to the west of the existing jetty supported a small patch of medium-density *Zostera capricorni* seagrass, that was observed to have leaf length of approximately 5-10 cm. Areas near the LWM on both sides of the jetty also included the common macroalage, Neptune's Necklace (*Homosira banksia*). No mangroves or saltmarsh were observed on the Subject Site; however, one Grey Mangrove (*Avicennia marina*) was present on the adjacent property, approximately 15 m to the west of the proposal footprint.



Figure 6: Typical intertidal habitat at the Subject Site showing (a) sandstone block seawall and jetty, with rockshelf, sand and rubble shoreline, (b) *T. rosea*, *S. denticulata* and *M. edulis* on the pontoon sides, (c) assemblages of *C. gigas* and *T. rosea* on upper sections of stairs; and (d) *M. marginalba* and *B. nanum* on the lower intertidal rock platform with *S. glomerata* footings.

Subtidal Habitat

The subtidal habitat consisted of moderately sloping (20°) seabed, which in shallow areas comprised of rubble, boulders and a small amount of rock platform, transitioning to soft sandy, silty sediment in deeper areas. Artificial habitat was provided by the pontoon underside, piles, lower seastairs, attenuator, and sandstone block jetty.

Shallow subtidal areas of rock and rubble were vegetated with occasional patches of the common macroalgae species Neptune's Necklace (*Homosira banksii*) and *Padina crassa*, with a high density of mobile invertebrates including Mulberry Whelks (*Morula marginalba*) and Mud Whelks (*Batillaria australis*). On the eastern side of the jetty, rock and rubble continued approximately 25 m seaward, with *H. banksii* and Dead Man's Fingers (*Codium fragile*) growing in dense populations in deeper areas. Extending seaward past the rock and rubble, the seabed transitioned to sand and silt dominated soft sediment, with

high-density beds of the invasive *Caulerpa taxifolia* seagrass species choking the available substrate (Figure 7). A fringing stretch (approximately 15.0 x 3.0 m) of very sparse *Zostera capricorni* was recorded to occur within this *C. taxifolia*, with the eastern side of the bed mixed with very sparse stands of the Endangered *Posidonia australis* seagrass (Figure 7; Figure 8). To the west of the jetty, *Z. capricorni* beds were present across much of the seabed between the shore and the inner reaches of the western mooring pen. Seagrass beds started within 2-3 m of the jetty wall and extended to the west, with a large medium-density bed closer to shore, a fringing low-density bed approximately 15 m from shore and two smaller low-density beds on the southern border of the mooring pen (Figure 8). In deeper waters, a small bed of low-density *P. australis* was recorded approximately 10 m to the north of the existing wave attenuator, while a long fringing bed of very sparse *P. australis* was recorded approximately 12 m north of the existing structures (Figure 8). A majority of the native seagrass stands were observed to have been displaced by the extensive growth of *C. taxifolia* throughout the Subject Site, which has evidently prevented high density growth for these species.

Artificial subtidal habitat provided substrata for a high diversity of marine biota. Artificial habitat was observed to have heavy fouling from turfing brown algae (likely *Ectocarpus* sp.), with growths of *P. crassa* and *C. taxifolia* common across all artificial substrata (Figure 7). The underside of pontoons, wave attenuator and piles were observed to support a rich biodiversity with varied macroalgae including *C. fragile* in addition to those aforementioned, solitary ascidians, high densities of various bryozoans including the Common Bugula (*Bugula neritina*) and Encrusting Bryozoans (*Watersipora subtorquata*) and sporadic occurrences of Purple Encrusting Sponges (*Haliclona permollis*) in deeper areas (Figure 7).

During the survey, fish species observed included Yellowfin Bream (*Acanthopagrus australis*), Luderick (*Girella tricuspidate*), Eastern Haulfish (*Trachinops taeniatus*), Tarwhine (*Rhabdosargus sarba*), Stripeys (*Microcanthus strigatus*), Yellowfin Leatherjacket (*Meuschenia tracylepis*) and Diamondfish (*Monodactylus argenteus*). It is likely that Sea Mullet (*Mugil cephalus*), Silver Belly (*Gerres sabfasciatus*), Common Toadfish (*Tetractenos glaber*) and Tailor (*Pomatomus saltatrix*).

Invasive Species

The invasive green alga species *Caulerpa taxifolia* was observed in the Study Area in extensive high-density beds, both on the seabed and on artificial habitat such as piles and the wave attenuator.

Threatened Species

The EEC of Coastal Saltmarsh does not occur in the Study Area.

The seagrass *Posidonia australis*, which is considered an Endangered Population in nearby Sydney Harbour under the FM Act and EEC in this region under the EPBC Act was observed to occur within the Study Area in low and sparse densities, approximately 10 m to the east and north of the proposed works.

The Study Area had minimal potential habitat for the Vulnerable Black Rockcod (*E. daemellii*) given the absence of suitable drop-offs, crevices and overhangs. Furthermore, the proposed works have minimal potential to pose a threat to this species.

The Endangered White's Seahorse (*H. whitei*) was not observed during the survey; however, moderately suitable habitat exists for this species amongst the subtidal section of the attenuator and nearby seagrass beds. With consideration of *H. whitei*'s preference for *P. australis* seagrass beds, the low-density and

sparse *P. australis* beds along with the built structures, especially the attenuator, at the Subject Site provide potential habitat for the species. Thus, it is possible that the species may still transiently use habitat within the Study Area.

The Endangered Cauliflower Soft Coral (*D. australis*) was not observed during the survey.

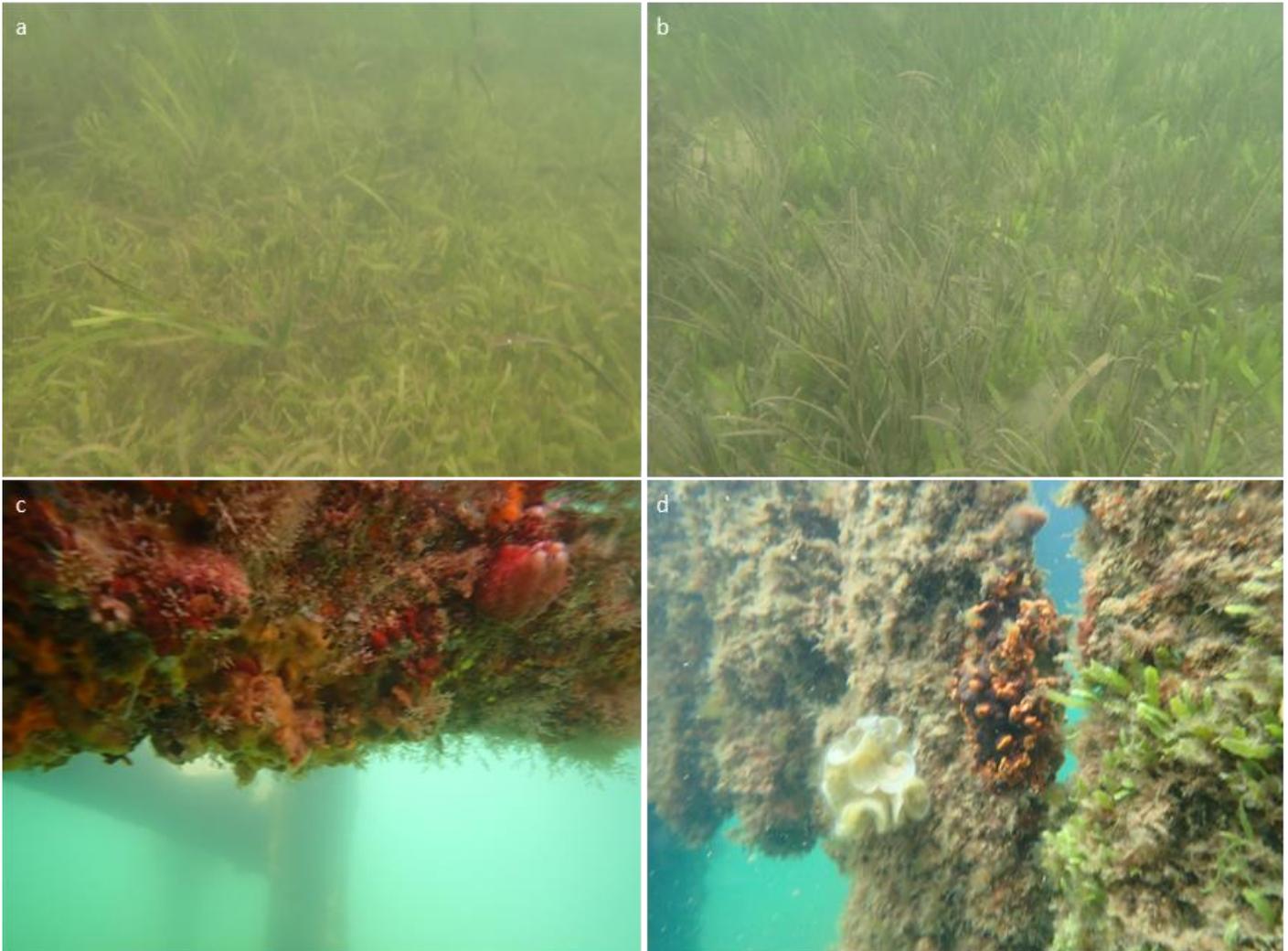


Figure 7: Typical subtidal habitat within the study area, showing (a) sparse *P. australis* stands amongst dense *C. taxifolia*, (b) medium-density bed of *Z. capricorni*, (c) high biodiversity on the underside of pontoons, including varied macroalgae and bryozoans; and (d) diverse species on the wave attenuator, showing *P. crassa*, *W. subtorquata*, *H. permollis* with turfing algae and some *C. taxifolia*.



Marine Habitat Survey - 41 Robertson Road, Scotland Island

Version 1.0, 2 February 2023
 Projection: GDA 2020 Zone 56S
 Aerial Imagery: Nearmap 28/07/22

0 2 4 8 12 16 20 Metres

Figure 8: Habitat map showing seagrass presence within the Subject Site.

Conclusions and Recommendations

Effects on the marine environment from the proposed works are likely to include:

- Increased potential for siltation on nearby habitats during construction works with potential to mobilise sediments. The sedimentation generated from this proposal is expected to be minimal and can be further mitigated with the use of suitable sediment controls.
- Increased short-term turbidity during works to construct new piles. This may result in some short-term reductions in water quality and very localised potential for increased sedimentation. These impacts will be minimal and short-term and will likely dissipate quickly during the normal tidal regime.
- Disturbance of subtidal habitat during removal of existing piles. This habitat on the east of the jetty consists of rock, rubble and silty soft sediment with occasional vegetation. Vegetation in these areas is limited to common macroalgal stands and would be expected to recolonise on new structures. On the west of the jetty, two piles to be removed are within 4 m of low-density *Zostera capricorni* seagrass beds.
- Disturbance of habitat associated with the piles, wave attenuator and pontoons proposed to be removed. These artificial structures were found to have marine growth common to structures in the locality, including sessile invertebrates, ascidians, bryozoans and common macroalgae. Disturbance of sessile fauna habitat they may provide is expected to result in a short-term reduction of biota, however, species would be expected to recolonise on new structures and remaining structures.
- Disturbance of subtidal habitat during piling works. Subtidal habitat where new piles are proposed is limited to rock, rubble, and soft silty sediment with occasional common macroalgae vegetation.
- Generation of underwater noise during piling works. This may have behavioural and physiological impact on any marine fauna in close proximity to the piling works.
- Increased permanent and temporary shading of benthic habitat from the enlarged footprint of the jetty and mooring pens. Habitat within the footprint of the proposal is restricted to unvegetated silty soft sediment and common macroalgal stands, which are less susceptible to shading impacts. The new footprint is not expected to increase shading of nearby seagrass beds, given it uses in most part the footprint of existing structures at the Subject Site.
- Creation of artificial habitat from the permanent presence of additional in-water structures. This may increase fish presence and provide additional substrate for sessile invertebrates, ascidians and bryozoans. Given the presence of numerous nearby structures it is expected that these structures would be colonised by biota similar to that found on the nearby structures.

Impacted habitat from the proposal is confined to areas of rock, rubble and silty sediment vegetated by common macroalgae and short-term disturbances of biota associated with artificial habitat. These structures, especially the attenuator, provide some potential habitat for the Whites Seahorse. While the species was not observed during the site survey, it is possible, given the nearby preferential natural habitats that include the seagrass *P. australis*, that it may potentially utilise artificial habitat in the Study Area at times. The removal of these structures has some potential to disturb the habitat for this species should it be found to occur at the time of construction. Any disturbances that occur outside of the immediate vicinity of proposal footprint have potential to disturb nearby seagrasses and disturbance of seagrass rhizomes. Given the proximity of surrounding seagrasses, including the Endangered *P. australis* a series of recommendations to minimise the potential for impacts on seagrasses during construction has been provided.

The invasive green alga *Caulerpa taxifolia* was observed in high densities at the Subject Site. The proposed works may facilitate the further spread of this species. It is essential that care is to be taken to ensure construction equipment is clean before leaving site and does not facilitate the spread of this species to new sites. Given that *C. taxifolia* was observed to be growing on artificial structures that are proposed to be removed, it is essential that all structures removed are appropriately disposed of on land.

There remains some potential that construction works as part of this proposal could impact on adjacent or nearby marine habitat. To manage these potential impacts during construction the following safeguards are recommended for adoption:

- Appropriate sediment and erosion control measures should be implemented in accordance with the 'Blue Book' (Landcom 2004).
- Hydrocarbon booms should be in place to contain any unplanned spills from construction barges or other mechanical equipment used on the site.
- Construction equipment should be washed down and thoroughly cleaned prior to mobilisation and de-mobilisation from the site.
- A pre-construction inspection of the structures to be removed for any Endangered White's Seahorses or other cryptic protected fishes should be undertaken within 2 weeks of removal.
- Piling should include a soft start procedure to allow marine fauna such as fish to move away from the areas safely. This should consist of a start at 50% piling impact energy increased gradually over 10 minutes.
- No materials should be stored or placed on the seabed.
- All materials, debris and rubbish should be removed from the site at the end of construction works.
- All construction equipment should be checked regularly for leaks, a spill kit should be kept on site.

In summary, the proposed development at 41 Robertson Road, Scotland Island is not expected to directly impact on sensitive marine habitat such as seagrasses. Those impacts that do occur will be confined to some short-term disturbance to areas of rock, rubble and silty sediment vegetated with common macroalgae, and artificial habitat. However, there remains some potential for disturbances of biota associated with the existing structures and seagrasses that occur adjacent to the proposed works during construction, thus adoption of measures identified in this report can minimise and mitigate any further potential additional impacts on aquatic habitat and species.

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