



H2O Consulting Group Pty Ltd

(Trading As H2O Ecology)

Email: info@h2oconsultinggroup.com.au

Web: <https://h2oconsultinggroup.com.au>

Ph: 0414 848 105



Marine Habitat Survey: 23 and 25 – 33 Robertson Road, Scotland Island

February 7, 2018

Disclaimer:

The information used in this document is based on knowledge, understanding and field records at the time of survey. H2O Consulting Group Pty Ltd accepts no liability or responsibility for contents of this report in respect of any use of, or reliance upon, by any third party or for any use other than the purpose of this study.

© 2017 H2O Consulting Group Pty Ltd Trading as H2O Ecology.
This report is copyright.

Table of Contents

I.	Background.....	2
II.	Description of the Proposed Development.....	5
III.	Study Methods	8
IV.	Survey Results	9
V.	Conclusions and Recommendations.....	14
VI.	References	16

Version	Author	Signature	Qualification	Date
R0	David Cummings		BSc (Hon), PhD	22.11.2017
R1	David Cummings		BSc (Hon), PhD	07.02.2018

Background

H2O Ecology was engaged by SDG to provide a Marine Habitat Survey of the seabed and surrounding marine habitat at 23 and 25-33 Robertson Road, Scotland Island, NSW. The property adjoins Pittwater and falls within the Local Government Area of Northern Beaches Council Shire.

The purpose of the Marine Habitat Survey is to support a development application for construction works to raise existing boatsheds and jetties at the subject site. 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 seagrasses.

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 23 and 25-33 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). The subject site is located on the north-western shore of Scotland Island in Pittwater (Figure 1).

The nearest protected aquatic habitat is the Barrenjoey Head Aquatic Reserved located on the southern side of Broken Bay, which is approximately 4 km from the subject site (Figure 1).

There are no aquaculture activities, including priority oyster areas within the vicinity of the subject site (NSW DPI 2014).

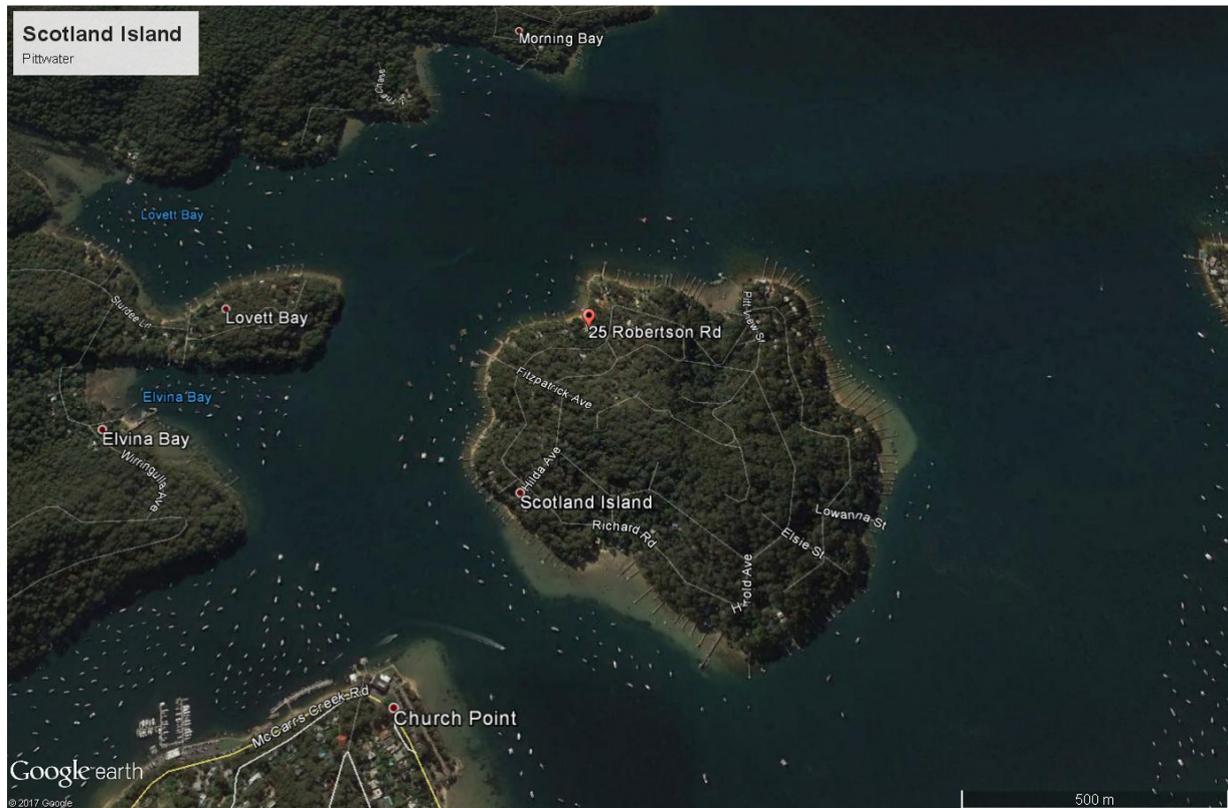


Figure 1: Locality of the proposed development in Scotland Island.

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 Coastal Saltmarsh communities in Pittwater (Creese *et al.* 2009). 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. Around Scotland Island

previous mapping indicates fringing beds of the seagrass *P. australis* are common, including in areas adjacent to the subject site (Creese *et al.* 2009).

The Pittwater State of the Environment Report (Pittwater Council 2005) indicates the management and control of the spread of the invasive green alga *Caulerpa taxifolia* as a significant ecological issue for aquatic habitats within Pittwater. *Caulerpa 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 done of *C. taxifolia* by NSW DPI in Pittwater indicates that *C. taxifolia* is common around Scotland Island, but does not appear to have been previously mapped at the subject site (NSW DPI 2015).

Description of the Proposed Development

The proposed works include raising and maintenance of the existing waterfront structures at the 23 and 25-33 Robertson Road. These works will include:

- ❖ Raising of the boatshed
- ❖ Raising of the jetties
- ❖ Replacement of timber coverings on the jetties and associated decked areas
- ❖ Replacement of existing pylons, beams, joists and, runners
- ❖ Removal of any redundant structures

The works are proposed on two adjacent water front land parcels (Figure 2), with individual plans provided for both 23 Robertson Road (Figure 3) and 25-33 Robertson Road (Figure 4).



Figure 2: Photo of the subject site.

Study Methods

The site survey was undertaken at 1100hrs on 28th October 2017 during the middle of the ebb tide. Tidal predictions for Scotland Island on the day was a 0.75 m low tide at 0845 hrs. Weather conditions were sunny with light north-east winds, while water visibility was good at 3 m.

The survey area was around and between the existing structures at the subject site and extended approximately 50 m from the shore. The area surveyed included all marine habitat within 10 m of the proposed works. The survey was conducted by inspection from the shore and in the water using snorkeling equipment. A combination of GPS positions and measurements taken with a survey tape was used to record data on the position of features of interest. Marine habitat and features of interest were photographed using an underwater digital camera. Water depth was recorded using a handheld depth sounder. Pylons and structure associated with the proposal within the water was visually inspected for protected fish of the Syngnathidae family.

Marine habitat was described based on dominant flora and fauna observed. For seagrass habitat, density (abundance) and patchiness (sociability) was 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 moderately sloping and well vegetated with a mixture of native and ornamental trees. The site includes a boatshed on both No: 23 and 25-33, each with a jetty that extends seaward to a pontoon, and an additional landing structure and seastairs on No: 25-33 (Figure 5).

There is a stone seawall 1 m in height along the northern section of the subject sites shoreline, which gradually transitions into a beach and low-lying lawn towards the middle of the subject site. At the southern end of the subject site, along the waterfront of No: 23 there is an unprotected embankment behind the boat shed, resulting in some shoreline erosion. Numerous boatsheds, jetties, pontoons and were observed along the waterfront to the north and south of the subject site (Figure 6).



Figure 5: Existing jetties for (a) No: 23 and (b) No:25-33 at the subject site.



Figure 6: Neighboring waterfront structures to the (a) north and (b) south of the subject site.

Description of the Marine Habitat

The intertidal zone was predominantly a protected sandy beach and extended 10-15 m from the shoreline. Hard substrate was limited to artificial structures provided by the pylons and piers for the existing water front structures, meshing under the jetties, and a small area of sea wall at the northern end of the site (Figure 7). These structures were dominated by Sydney rock oysters (*Saccostrea glomerata*) and oyster limpets (*Patelloida mimula*).

No intertidal vegetation, other than turfing algae amongst oysters was present.



Figure 7: Typical intertidal habitat around the boatsheds at (a) No: 23 and (b) No: 25-33, within the study area.

The subtidal habitat consisted of sandy sediments with seagrasses and the green alga *Caulerpa taxifolia* (Figure 8). Seagrasses included beds of *Zostera capricorni* in shallower areas. The *Z. capricorni* was growing in good health, high density and with long leaf lengths to 30 cm in some places, while in poorer health, lower density and in competition with *C. taxifolia* in other places (Figure 9). In deeper areas, the seagrass *Halophila ovalis* was more common, typically growing along the 2 to 3m depth contour and seaward of the *Z. capricorni*. The *H. ovalis* at the subject site was also in typically good health, but very variable densities that ranged from low to medium and a patchy distribution, and also was competing with *C. taxifolia* in places (Figure 10). There were also some remnant beds of *Posidonia australis* present in the study area, these appeared to be typically restricted to the southern end of the subject site, on the southern side of the pontoon for No: 23 (approximately 3 m from) and typically growing seaward in medium density into deeper water (Figure 11). There were also some small patches of medium density *P. australis* growing 3 m north west of the pontoon for No: 23 and 2m south of the seastairs for No:25-33 (Figure 8). The *P. australis* at the subject site was typically growing in association with other seagrasses, and in competition with *C. taxifolia*.

The mesh below the jetties also created additional subtidal habitat that was covered with both Oysters in shallower areas and the alga *C. taxifolia* in deeper areas (Figure 12).



Figure 8: Map of benthic habitat in the study area.

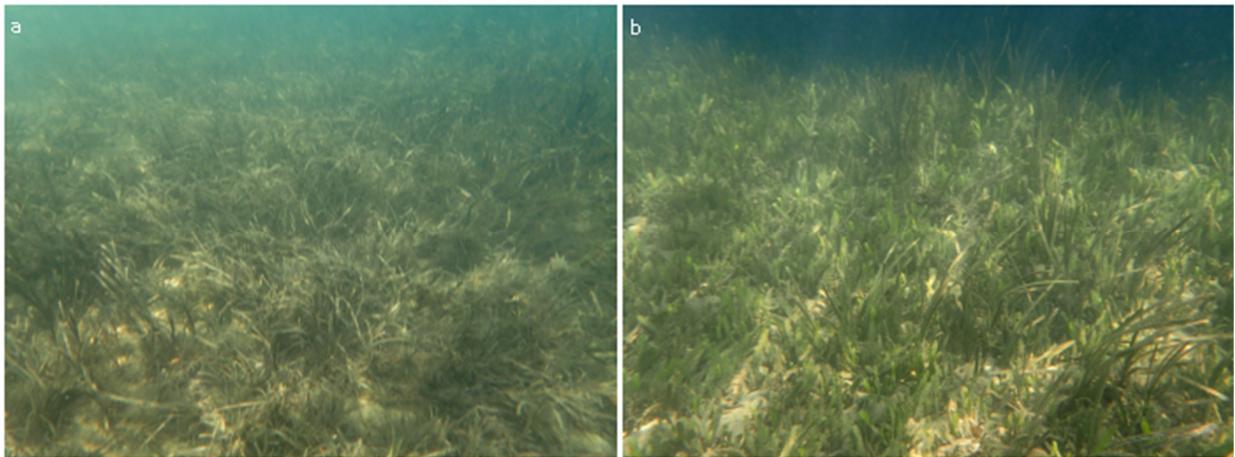


Figure 9: Seagrass *Zostera capricorni* (a) growing in high density, and (b) in lower density with *Caulerpa taxifolia*, in the study area.

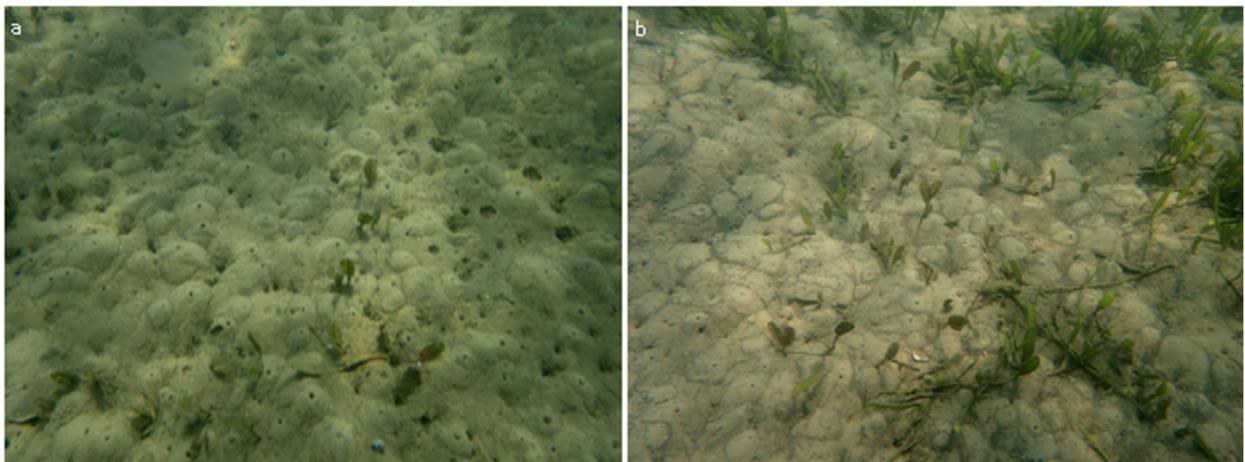


Figure 10: Seagrass *Halophila ovalis* (a) growing in low density, and (b) with *Caulerpa taxifolia*, in the study area.

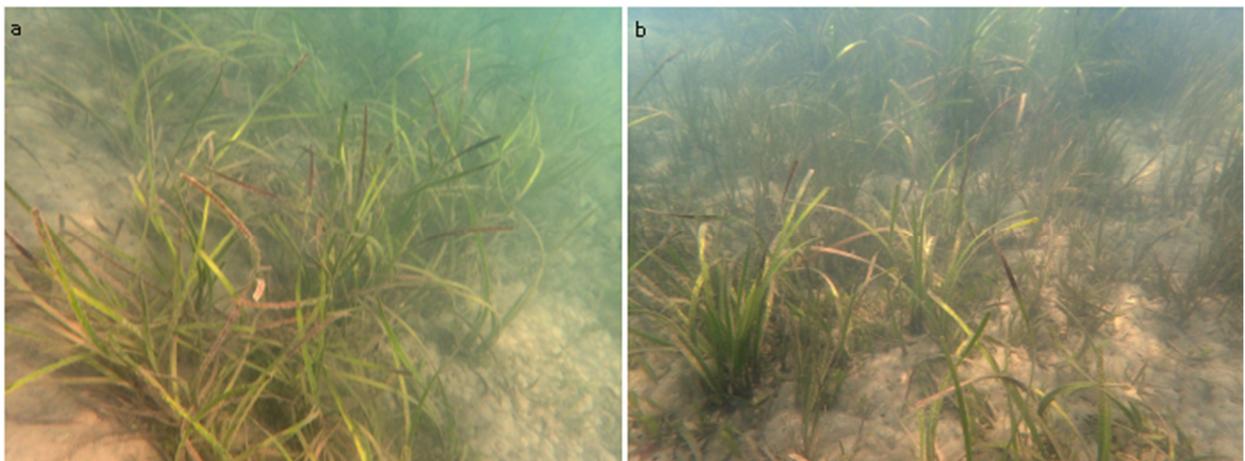


Figure 11: Seagrass *Posidonia australis* (a) growing in medium density, and (b) in lower density with *Zostera capricorni* in the study area.

During the site survey fishes recorded included yellow fin bream (*Acanthopagrus australis*), luderick (*Girella tricuspidata*), sand whiting (*Sillago ciliata*), and eastern hula fish (*Trachinops taeniatus*). Inspection

of the pylons and meshing under the structures did not find any protected fish of the Syngnathidae family.

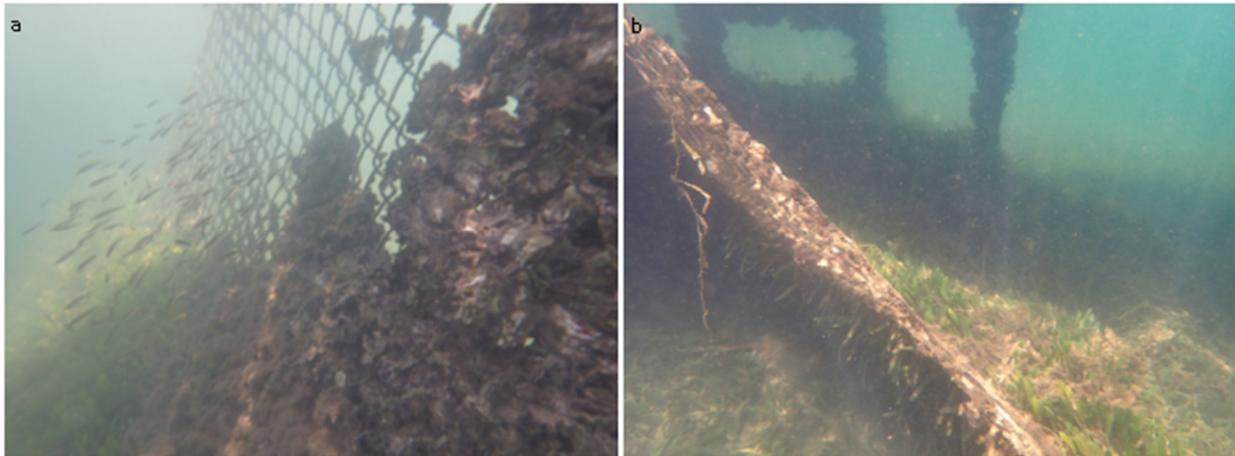


Figure 12: The mesh under the jetties with (a) oysters and eastern hula fish, and (b) with *Caulerpa taxifolia*.

Threatened species

The endangered seagrass community *P. australis* was present at the subject site (Figure 8). Although it was predominately restricted to deeper areas on the southern side of the site. In other areas it appears to have been displaced by *C. taxifolia* and potentially other seagrass species, which are earlier colonizers. The *P. australis* at the subject site was in good health growing with moderate density and leaf lengths to 40 cm (Figure 11).

Introduced Species

The invasive green alga *C. taxifolia* was very abundant at the subject site and appeared to extend into deeper water (+5m depth) on the northern side of the subject site (Figure 8). In many areas it was growing in high density forming monocultures and appearing to displace/ restrict the spread of seagrass species. It was also noted growing amongst the meshing under the jetties and on the pylons (Figure13).

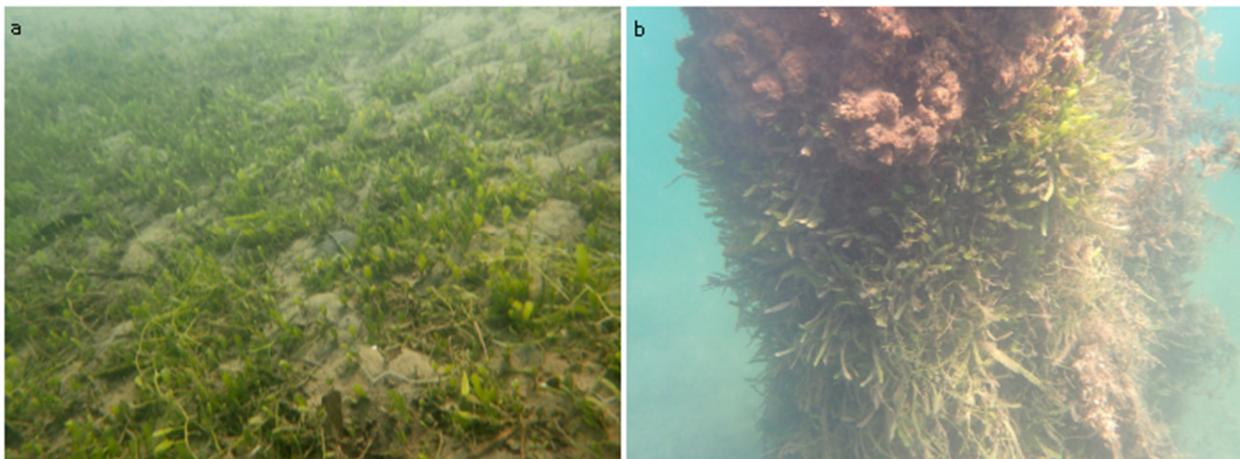


Figure 13: *Caulerpa taxifolia* (a) growing in dense monocultures, and (b) with on the pylons, in the study area.

Conclusions and Recommendations

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

- ❖ Potential for short term increases in turbidity during the replacement of any piers or footings or removal of any redundant structures. Elevated levels of turbidity will likely be short-term, minimal and can be minimised through the use of silt curtains.
- ❖ Some disturbances and possible loss of intertidal and benthic habitat during replacement of pylons and footings, and removal of any redundant structures. Area of disturbance will be confined to the existing footprint of the structures, biota will also rapidly recolonize structures which are replaced.
- ❖ Disturbance and potential removal of cryptic fish fauna during the replacement of or removal of any redundant structures. No protected fish of the Syngnathidae family were observed on the structures.
- ❖ Disturbance of adjacent seagrass habitat. The majority of seagrass habitat in close proximity to the existing structures has been displaced by *C. taxifolia*. There is 2-3 m distance to any of the endangered *Posidonia australis* at the subject site, while the works will likely be minimal and restricted to the existing footprint.

The proposed development is not expected to have a negative impact on any threatened or endangered species or communities in the area. The endangered seagrass *P. australis* is present in the study area, however there remains a 2-3m buffer between it and the structures, while the proposed improvement works will not result in a change in the footprint or increased shading.

Impacted habitat is confined to that within the existing footprint, which is typically *C. taxifolia* dominated habitat and biota attached to or residing amongst the structures to be removed from the water. Seagrasses are present in the study area, along with the invasive green alga *C. taxifolia*, which is very abundant. Thus, the following environmental management practices are recommended during construction works:

- ❖ Silt curtains be used to reduce impacts of turbidity on nearby seagrasses during works with potential to mobilize sediments.
- ❖ The works should include no excavations below the LWM. All piling should be done by driving, and structures should be lifted from the water.
- ❖ On removal of structures from the water, a seawater wash-down should be implemented to wash any cryptic mobile fauna back into the water.
- ❖ No anchoring and/or grounding of construction vessels or storing of materials on the seafloor in seagrass habitat.
- ❖ Disposal of all materials removed from the water at an appropriate landfill site. No materials removed from the water at this site should be returned to the water at other sites due to the presence of *C. taxifolia*.

- ❖ Construction equipment should be cleaned and washed down before leaving site to prevent the spread of *C. taxifolia* to new sites.

In summary the proposed improvement works at 23 and 25-33 Robertson Road Scotland Island are restricted to the footprint of the existing structures. Thus, impacts on the marine environment or biodiversity are expected to be minimal, however thorough environmental management practices during construction are recommended to ensure impacts remain minimal and the further spread of *C. taxifolia* does not occur.

References

- Creese, R. G., Glasby, T. M., West, G. and Gallen, C. (2009). *Mapping the habitats of NSW estuaries*. Industry & Investment NSW Fisheries Final Report Series 113. Port Stephens, NSW.
- Faithfull, S. (2013), *Policy and guidelines for fish habitat conservation and management*. NSW Department of Primary Industries, Fisheries, Woolongbar, NSW.
- Fitzpatrick, J. and Kirkman H. (1995). Effects of prolonged shading stress on growth and survival of seagrass *Posidonia australis* in Jervis Bay, New South Wales, Australia. *Marine Ecology Progress Series* 127: 279-289.
- King, R. J. and Barclay, J. B. (1986). Aquatic angiosperms in coastal saline lagoons of New South Wales II. Quantitative assessment of *Zostera capricorni*. *Proceedings of the Linnean Society of NSW* 109: 41-50.
- NSW DPI (2014). *NSW Oyster Industry Sustainable Aquaculture Strategy*, NSW Department of Primary Industries, Second Edition.
- NSW Department of Primary Industries (2015b) *Caulerpa (Caulerpa taxifolia)*, accessed online 15 January 2015, <http://www.dpi.nsw.gov.au/fisheries/pests-diseases/marine-pests/nsw/caulerpa-taxifolia>
- NSW Department of Primary Industries (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, NSW.
- Pittwater Council (2005). *Pittwater State of the Environment Report 2005*. Pittwater Council, Mona Vale, NSW.
- WBM (2006). *Pittwater Estuary Management Study 2006*. Prepared for Pittwater Council, Mona Vale, NSW.