

**MARINE HABITAT SURVEY**  
**316 Hudson Parade, Clareville**



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## INTRODUCTION

Marine vegetation comprising saltmarsh, mangroves, seagrasses, and macroalgae are essential to coastal and estuarine systems. Marine vegetation provides food, habitat and nursery for many species including fish, crustaceans and birds, and also plays a role against erosion of the shoreline by stabilising bottom sediments (Butler and Jernakoff, 1999).

There have been large-scale declines of marine vegetation within NSW estuaries, especially concerning seagrass meadows (Smith and Pollard, 1998) and in some cases, these declines have been permanent (West *et al.*, 1990). Increased turbidity, siltation and the growth of epiphytic and benthic algae all have the potential to reduce the distribution and abundance of seagrass meadows.

Artificial structures such as wharves and jetties have the potential to adversely affect marine vegetation either directly through construction activities or indirectly by causing shading to the bottom.

The introduction of the exotic algae *Caulerpa taxifolia* in recent times has added new problems for managers of estuaries. The genus *Caulerpa* is highly invasive (Davis *et al.*, 1997) and direct disturbance associated with dredging and construction has the potential to exacerbate its spread. *Caulerpa taxifolia* can now be found in a number of NSW estuaries, and DPI (Fisheries) require that prior to any disturbance (e.g. construction of jetties) an assessment for the presence or absence of this noxious marine algae be done.

The study area is located at Avalon, on the tide-dominated Pittwater “estuary”, part of the Hawkesbury River, which is the largest estuarine system of NSW (Creese *et al.*, 2009). The Hawkesbury River system encompasses a large range of benthic habitats, such as mangroves, seagrass beds (*Zostera capricorni*, *Posidonia australis*, *Halophila*

sp.) and algae (Creese *et al.*, 2009), un-vegetated areas (beaches and mudflats) and also hard bottoms (natural and artificial). The invasive and noxious *Caulerpa taxifolia* has been recorded in Pittwater since 2001 (<http://www.dpi.nsw.gov.au/fisheries/pests-diseases/marine-pests/nsw/caulerpa-taxifolia>).

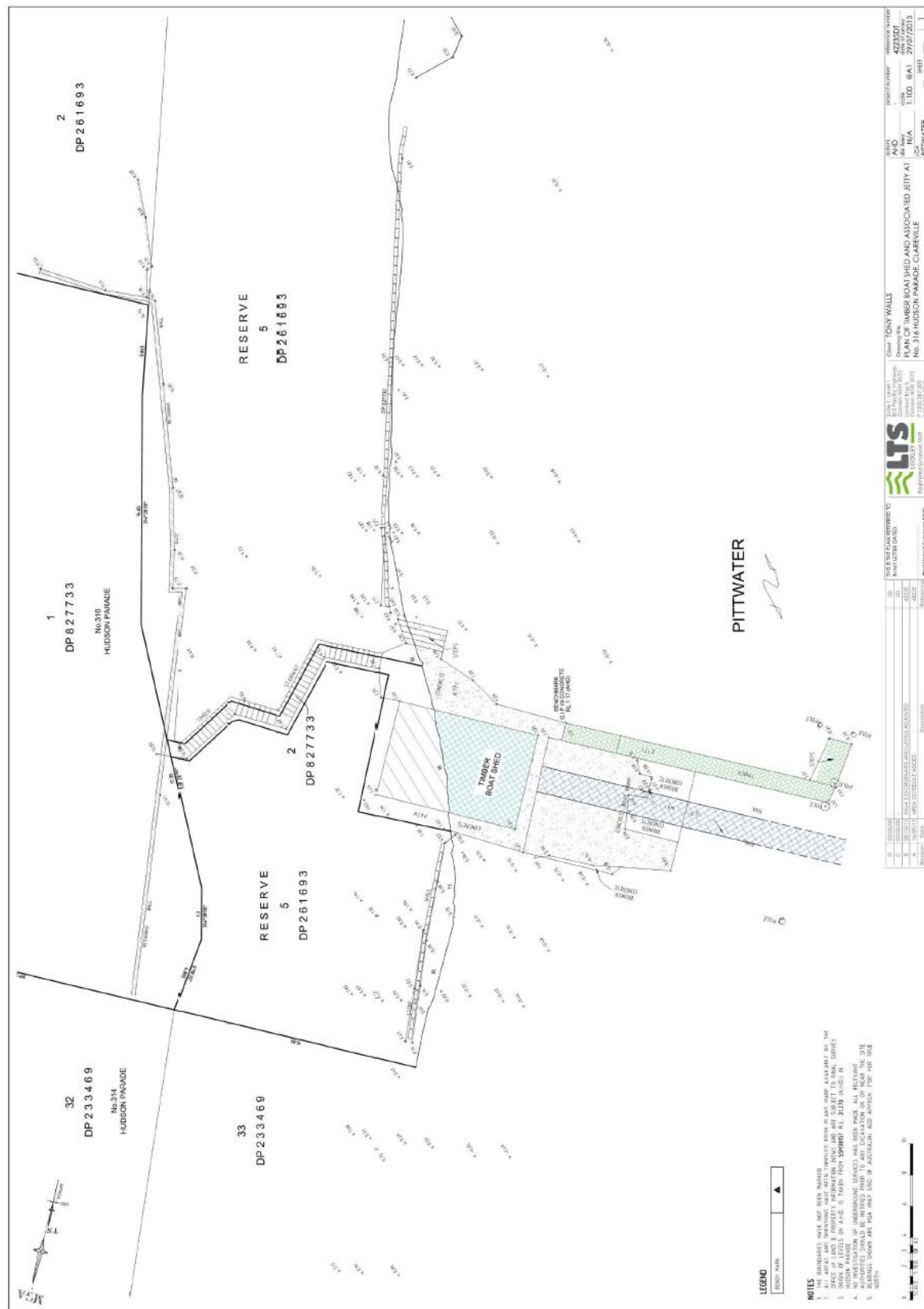
Pittwater is considered class 1 (major key fish habitat) following the NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update).

## SCOPE OF WORKS

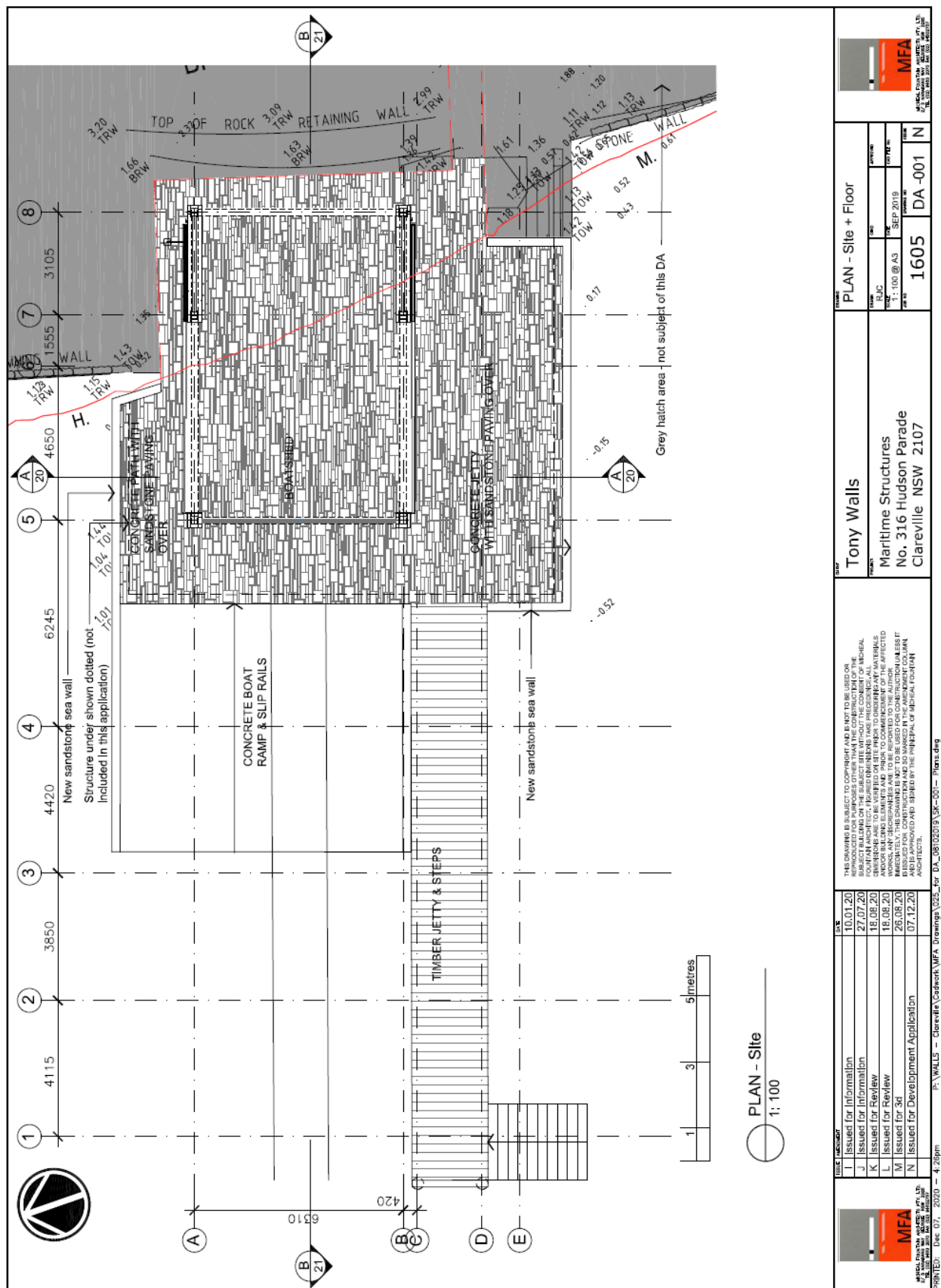
A marine habitat survey (MHS) was conducted with regards to proposed works at 316 Hudson Parade, Clareville. The proposed works consist of reconstructing a concrete jetty, boatshed and boat ramp with slip rails, as well as reconstructing a timber jetty and steps (Fig. 1a and b). In addition, four wooden piles offshore (structures from a former jetty) are to be removed as part of the proposed new works (Fig. 1b). Based on Royal Haskoning DHV report (2019), the demolition works and the construction of foundation walls were conducted under a Complying Development Certificate (CDC) issued in 2016 and later modified in 2017. Northern Beaches Council issued a “stop work order” and required further information to assess the Development Application (DA) submitted in 2020, including an MHS/Aquatic Ecology Report (Council communication in relation to DA2020/1762 dated of the 17/03/2021). The present MHS has been done after demolition and preliminary works were already completed at the site, including the construction of foundations walls around the perimeter of the previous concrete jetty, boatshed and associated fill (see Figs. 4 and 5).

As part of the DA process, an assessment of the marine habitat at the site was required to fulfil NSW DPI requirements for reviewing foreshore developments (DPI Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update) (Fairfull, 2013)).

The scope of work was therefore to identify the presence of wetland and marine vegetation and to estimate its relative abundance as well as ascertain whether or not the introduced algae *Caulerpa taxifolia* was present at the site. Additionally, an assessment of the occurrence of threatened and protected species, as listed under the Fisheries Management Act 1994, NSW Biodiversity Conservation Act 2016 (BC Act) and the Environment Protection and Biodiversity Conservation (EPBC) Act 1999, was to be made. Based on the available background information and the site survey, an assessment of potential impacts on the marine environment is provided.



**Figure 1a.** Plans of the former structures dated from July 2015.



**Figure 1b. Plans of the proposed alterations designed by MFA.**



## METHODOLOGY

### Definitions

**Proposal** means the temporary works and the permanent structures below the MHWS (walls, jetties, ramp and rails and boatshed) proposed to be reconstructed and foreshore works as described in “the scope of work” section of this report.

**Subject site** means the area directly affected by the proposal. In the case of this assessment the subject site corresponds to the proposal area and a 5 m buffer.

**Survey area** corresponds to the study area plus an additional 10 m buffer to encompass important habitat features during the field survey.

**Study area** means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account. In the case of this assessment the study corresponds to the survey area plus an additional buffer (up to 10 km) to take into accounts the potential presence of threatened species, populations and ecological communities based on database searches (Table 1).

### Desktop Review

The desktop review consisted of searches of relevant databases and consultation of maps and other documentation in relation to the study area. Only estuarine and marine species and communities were considered in the assessment of habitat and likelihood of occurrence of threatened species, populations and ecological communities. The databases and resources consulted for the desktop review are listed in Table 1. The results of the database searches are summarised in the Appendix. An evaluation of presence of habitat and likelihood of occurrence of threatened species, populations and ecological communities as well as the potential for impacts are provided in the Appendix.

**Table 1.** Database and existing documentation consulted for the desktop review.

Source	Objective	Search area
BioNet Atlas – DPIE website	Threatened and protected aquatic flora and fauna and populations	10 km radius of site
EPBC Act Protected Matters Search	Threatened aquatic flora and fauna, endangered populations and ecological communities and migratory species	1 km radius of site
NSW Department of Primary Industries (DPI) fisheries website	Listed aquatic threatened species, populations and ecological communities; protected species – Species FactSheets and PrimeFacts	5 km radius of site
NSW DPI Fisheries Spatial Data Portal	Critical habitats, estuarine habitats, key fish habitats	1 km radius
DPIE website	Critical habitats Threatened Species Profiles	1 km radius
NSW DPI website	Aquatic pests and diseases	1 km radius
SIX Maps, NSW Government – Spatial services	Aerial photographs	1 km radius
The Atlas of Living Australia	Threatened species occurrences	1 km radius

### Field Survey

An inspection of the site was done on the 10/04/2021. The survey started at 2:00 pm on the incoming tide (low tide was at 1:26 pm with a height of 0.2 m at Pittwater South Beach). Weather conditions were good (moderate easterly wind and clear skies). The visibility of the water was average (~3 m). The area of the proposed works and an additional 10 m in all directions were inspected by snorkelling.

### Limitations

This Marine Habitat Survey and report considered only the potential impacts to the aquatic environment, i.e. below the MHWS (Mean high water springs).

The species detected during the survey are only an indication of the species that potentially occur within the study area. Marine species can be highly mobile and the field surveys provide only a snapshot of the assemblages at a time of the year and under certain climatic conditions, therefore this list is not exhaustive.

Based on the desktop review and the field survey findings, the information gathered is considered sufficient to produce habitat maps and make an assessment of potential impacts of the proposal.



This present assessment focuses on the potential impacts of the proposed works on threatened species, populations and ecological communities found in estuarine and marine environments. This assessment does not include terrestrial or avian species (such as albatross and similar birds that would occur within the study area only rarely, if at all, and are not likely to be affected by the proposal).

## RESULTS

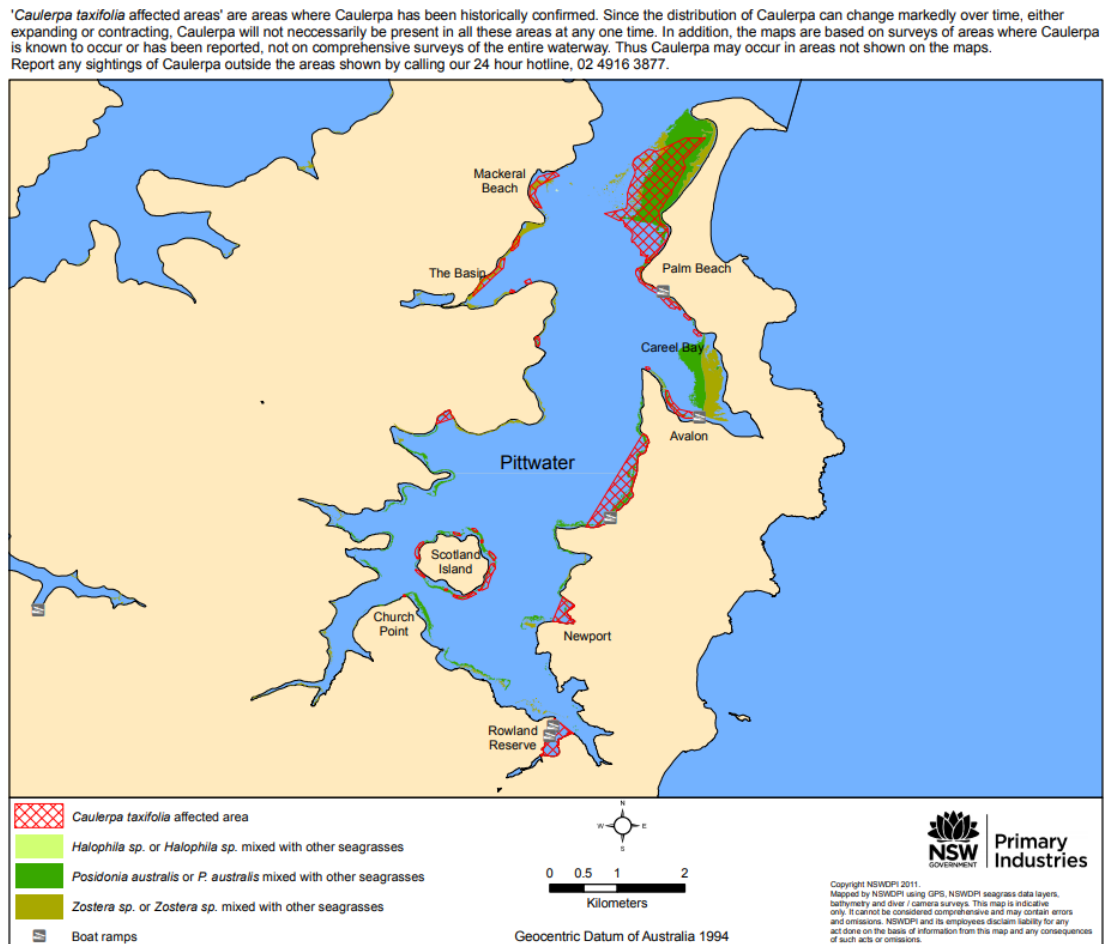
### Existing environment/available information on aquatic habitats

The seagrass (*Posidonia australis*) listed as endangered ecological communities under the EPBC “*Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion” (Department of the Environment (2018)) has been mapped in the vicinity of the survey area (Fisheries NSW Spatial Data Portal ; Creese *et al.*, 2009). The seagrass *Zostera capricorni* has been reported within the survey area (NSW DPI - Creese *et al.*, 2009) (Fig. 2).



**Figure 2.** Estuarine macrophytes mapped by NSW DPI. The red rectangle delimits the survey area. Blue polygons: *Zostera capricorni*. Purple polygons: *Posidonia australis* and *Zostera capricorni* (Source: NSW DPI - Fisheries NSW Spatial Data Portal 25/04/2021).

The invasive and noxious algal species *Caulerpa taxifolia* is known to occur within Pittwater since 2001 (NSW DPI website: <https://www.dpi.nsw.gov.au/fishing/pests-diseases/marine-pests/found-in-nsw/caulerpa-taxifolia>), including within the vicinity of the survey area (Fig. 3).



**Figure 3.** Distribution of *Caulerpa taxifolia* in Pittwater mapped by NSW DPI in 2001 (Source: NSW DPI, accessed 25/04/2021).

## Field survey results

### *Intertidal area*

The intertidal area consisted of an artificial sandstone retaining wall, which extended parallel to the shoreline and the foundation walls (Dintel) supporting the proposed structures (jetties, boatshed and ramp) (Figs. 4 to 6). Furthermore, intertidal areas consisted of a natural sandstone platform partially covered by pebbles and fine sand and silt to the south of the foundation walls, and boulders and sand to the north of the proposal (Figs. 4 to 6). A sandy beach was present further to the south. In addition, four piles were present offshore (Fig. 5). The natural hard substratum (sandstone platform and boulders) was colonised by Sydney rock oysters (*Saccostrea glomerata*), various gastropods and macroalgae (mainly *Hormosira banksii*) (Figs. 4 to 7).

### *Subtidal area*

The subtidal habitat extended seaward in the form of a sandstone platform, boulders, pebbles and sand patches, up to 20 m (south side) and 17 m (north side) from the foundation walls (Figs. 8 and 9).

Further offshore, the seabed consisted of soft sediment, fine sand and silt, with the proportion of the latter increasing with depth (Fig. 10). Scattered small boulders were found on the soft sediment (Fig. 11). The offshore piles (remnants from the former jetty) were colonised by sessile fauna (ascidians and bryozoans) and by algal turf (Fig. 12). The subtidal hard substratum and soft sediment were colonised by marine vegetation (see “marine vegetation section”).

### *Marine Vegetation*

Macroalgae were found growing on the sandstone platform and boulders and included an algal turf, whilst the main macroalgal species was *Hormosira banksia* in the shallows (up to 10% cover) (Fig. 7 and 8) and *Sargassum* sp. in deeper water (up to 5% cover) (Fig. 9). *Sargassum* sp. was also present on the scattered boulders (Fig. 10).

Three species of seagrasses were present within the survey area. Sparse *Zostera capricorni* (5% cover) was present in the subject site, seaward of the partially demolished ramp in front of the western foundation wall (Figs. 10, 13 and 14). In this area, *Zostera capricorni* appeared in poor condition and scattered among the live plants there was evidence of dead rhizomes. This indicates the presence of former plants and potential degradation of the seagrasses. Further offshore and north and south of the proposal, *Zostera capricorni* was found to be forming a continuous seagrass bed with percentage covers ranging from 20-30% (offshore) and up to 40-70% inshore (0.4 to 1.2 m depth) (Figs. 14 to 15). *Zostera capricorni* leaf-length was ~15 cm in the shallow dense bed and ~20 cm in the deeper bed. The epiphyte load on the seagrass was medium (Figs. 13 and 15).

*Posidonia australis* and *Halophila* sp. were found mixed within the offshore *Zostera capricorni* bed. *Posidonia australis* was present in the form of sparse rhizomes from ~3 m depth, with leaf-length of 30 - 40 cm and a medium epiphyte load (Figs. 14 and 17). *Halophila* sp. was sparse (5 - 10%) with a leaf-length averaging ~8 cm (Fig. 17).

The invasive algae *Caulerpa taxifolia* was present from ~1.7 m depth (cover 5%) within the sparse *Zostera* bed whilst its cover increased (cover 40%) in deeper areas from ~3.2 m depth (Fig. 14). *Caulerpa taxifolia* was also found colonising the soft substratum as well as the old jetty piles and the scattered boulders (Figs. 11, 12 and 18). No mangroves, wetlands or saltmarshes were identified at the site or in close proximity to the survey area.

### ***Ichthyofauna***

Adult yellowfin bream (*Acanthopagrus australis*) and luderick (*Girella tricuspidata*) were observed during the survey. These species are of commercial and recreational importance. No pipefish or seahorses (Syngnathids) were recorded during the survey, however they are known to be in Pittwater and the Hawkesbury River and its tributaries. The NSW Government has listed all seahorses, pipefish, pipehorses and seadragons as protected under the NSW Fisheries Management Act 1994.

Threatened species of fish that are unlikely to be present within the subject site and/or be affected by the proposal include: Macquarie Perch (*Macquaria australasica*) is a freshwater species and is very unlikely to occur within the subject site; the survey area presents very limited habitat for the Black Rockcod (*Epinephelus daemeli*) such as little caves and crevices in the boulder area, potentially suitable for juveniles or small individuals. Threatened sharks and rays might opportunistically venture into this part of the estuary (e.g. occasional visit and foraging); however, the study area offers poor habitats for these species.

### ***Other fauna***

Threatened marine mammals (seals, whales, dolphins) are known to occur in the Hawkesbury River, Pittwater and nearby coastal areas. Dolphins may occasionally occur in the area of the subject site. Seals and whales are unlikely to pass through and visit the study area. The Hawkesbury River and tributaries including Pittwater do not offer suitable habitats for dugongs. Threatened marine turtles are present in Hawkesbury River system and nearby waters and may occasionally venture into the study area or explore the greater area, but the proposed works site offers very little suitable habitats to support marine turtles.

### ***Key threatening processes***

No Key threatening processes listed under the Fisheries Management Act 1994 or BC Act 2016 were identified associated with the proposal and related activities.





**Figure 4.** Foreshore: artificial sandstone retaining wall and foundation wall, natural sandstone platform (southern side).



**Figure 5.** Foreshore: artificial sandstone retaining wall, foundation walls and pile of boulders (northern side). Four piles of the former jetty were present offshore.





**Figure 6.** Foundation walls and pile of boulders (western side).



**Figure 7.** Hard intertidal substratum was colonised by macroalgae (*Hormosira banksii*) and sessile fauna (oysters).

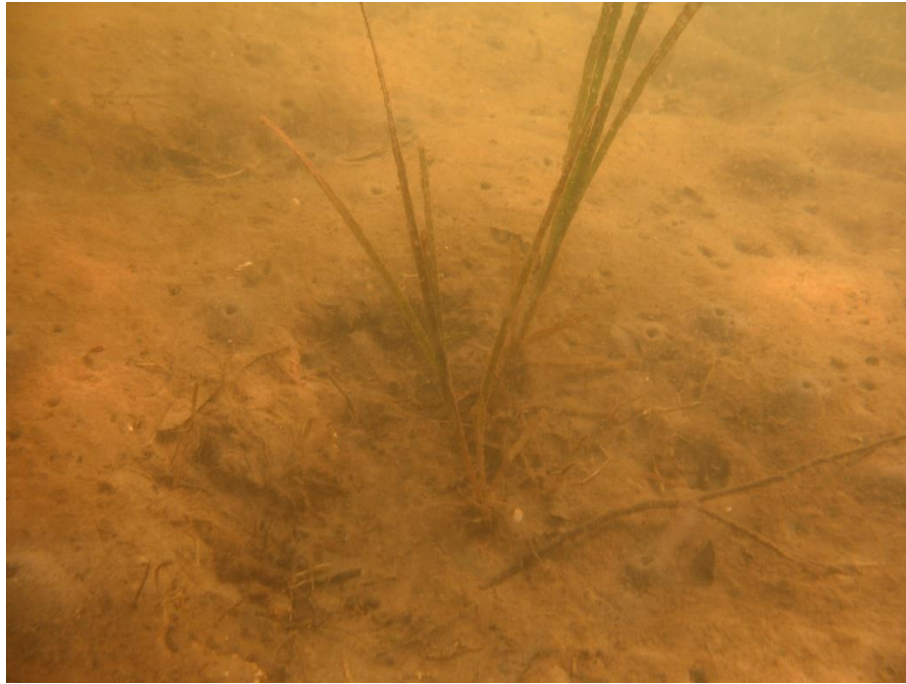


**Figure 8.** Boulders colonised by *Hormosira banksii* and algal turf.



**Figure 9.** Subtidal boulders colonised by *Sargassum* sp. and algal turf.





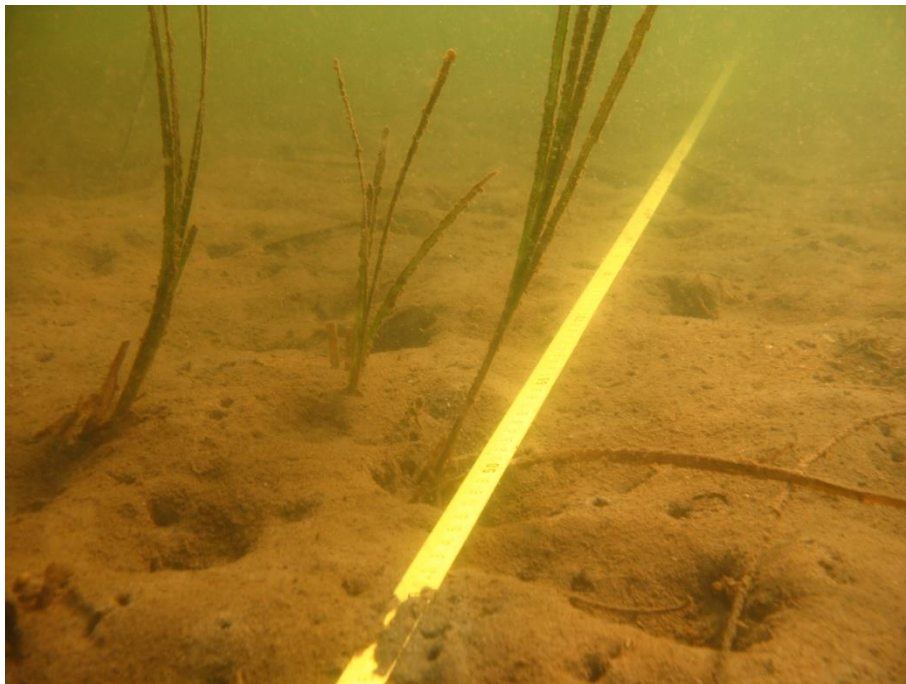
**Figure 10.** Soft sediments with sparse seagrass (*Zostera capricorni*) and dead *Zostera* rhizomes.



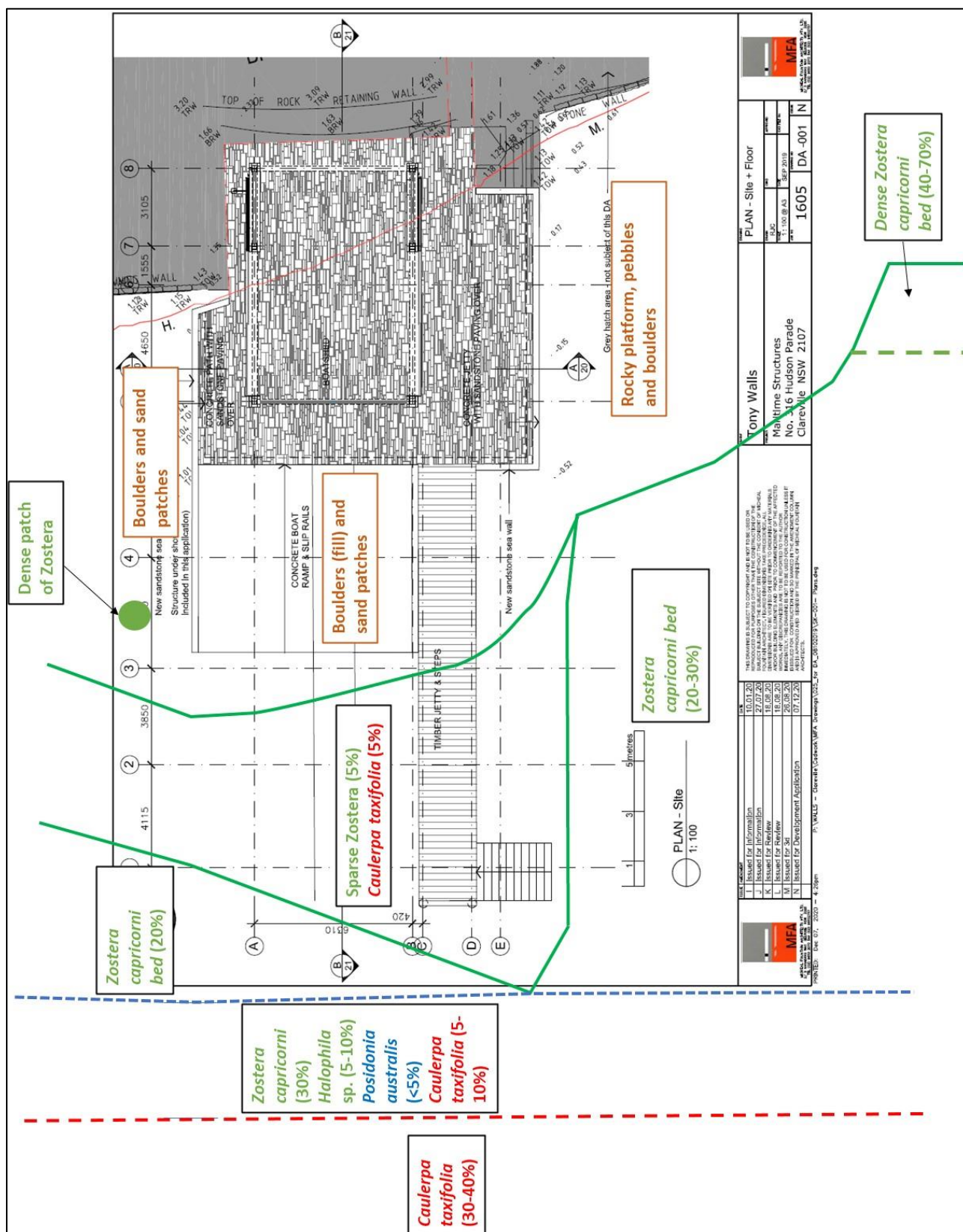
**Figure 11.** Soft sediments with sparse boulders colonised by *Sargassum* sp. and *Caulerpa taxifolia* (bottom left) and the seagrass (*Zostera capricorni*) at the back.



**Figure 12.** Old jetty pile with sessile fauna (ascidians and bryozoans), algal turf and the noxious *Caulerpa taxifolia*.

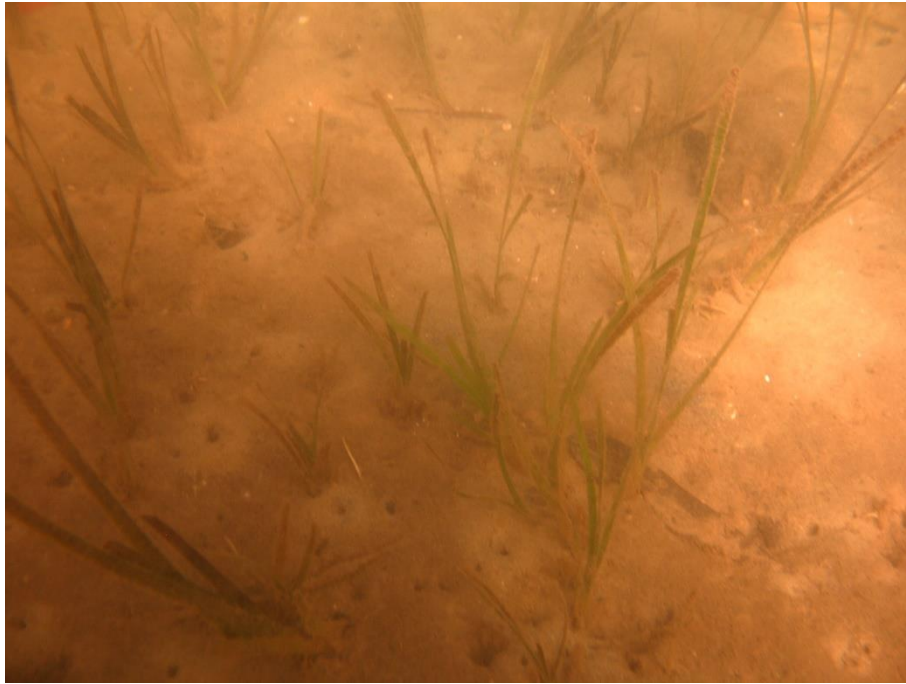


**Figure 13.** Sparse *Zostera capricorni* found in front of the exiting stockpile of boulders.



**Figure 14.** Distribution of the seagrasses and *Caulerpa taxifolia* present in the survey area.





**Figure 15.** *Zostera capricorni* in deeper water to the north and south.



**Figure 16.** Dense *Zostera capricorni* in shallow water to the north and south.





**Figure 17.** Isolated rhizome of *Posidonia australis*.



**Figure 18.** The invasive and noxious algae *Caulerpa taxifolia*.

## Assessment of impact

*In terms of addressing the matters to be taken into consideration in relation to biodiversity, ecology and environment protection and to assess the potential impacts of the proposal, the following can be stated:*

Three species of seagrasses were found in the survey area, *Zostera capricorni*, *Halophila* sp. and *Posidonia australis*. The *Zostera capricorni* seagrass bed located 15 - 20 m offshore of the foundation wall appeared to be degraded compared to adjacent seagrass beds to the north and south of the proposed works. Dead *Zostera capricorni* rhizomes and also those in poor health were also recorded in this area.

*Posidonia australis* was also recorded in the survey area but outside the direct footprint of the proposal. *Posidonia australis* was sparse in the survey area and was mostly in the form of isolated rhizomes. *Posidonia australis* is known to form large dense seagrass beds in Pittwater and are most likely present in the vicinity but outside of the survey area (i.e. > 10 m away from the proposed works). *Posidonia australis* is listed as endangered ecological communities under the EPBC “*Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion”.

In terms of impacts to marine vegetation from the proposed works it must be considered that there are existing disturbances to the site, i.e. demolition of the former structures, including construction of foundation walls with fill and remnant boulders.

It is possible that the degraded seagrasses present in the direct vicinity of the proposed works may be further impacted as well as the healthier continuous beds present in the vicinity.

It is recommended that the foundations walls not be removed as this will expose the fill that was beneath the now demolished boatshed and concrete jetty to tidal and wave action that may cause the fill to be deposited on the surrounding seagrass beds.

It is recommended that during the different construction work phases, any potential direct and indirect impacts on seagrasses such as anchoring, heavy equipment laid/dragged and the deposition of material on the seafloor should be avoided in vegetated areas.

In addition, there will be a localised impact on the quality of water entering the waterways as a result of the works. An increase in turbidity is expected locally during the construction phase and the foreshore works, especially with the present seabed containing a high proportion of silts. The deployment of booms and silt curtains during the construction works would minimise the effects of turbidity and run-off on the seabed. It is expected that the marine vegetation including seagrasses present within the subject site and contained within the boom and silt curtain would be highly impacted. Booms and silt curtains should restrict the impact of turbidity and siltation on the marine vegetation (seagrasses included) located outside the proposed development (e.g. outside the curtain). It is expected that the siltation will resettle mostly in the area and that tidal movements will disperse the finer sediment plumes.

The proposed works may locally alter flows, currents and/or waves back to hydrodynamism that existed around the previous structures. Sand accretion may occur as a result in local changes in hydrodynamism, and potentially impact the seagrasses present. Seagrass beds play an important role in sediment stabilisation and against shore erosion (Butler and Jernakoff, 1999).

Additional shading impacts on marine vegetation is expected due to the proposed timber jetty to be replaced. The jetty should be designed to allow sunlight penetration

to minimise shading effect to the marine vegetation. NSW DPI fisheries should be consulted to fulfil their requirements.

The noxious algae *Caulerpa taxifolia* was found within the survey area, including where the new works are to occur. Great attention should be made to minimise further dispersion of this invasive species during the works. Barge anchorage, removal of old structures, pile driving, and dragging equipment across the bottom should be avoided in the areas where *Caulerpa taxifolia* is present. It will be important to inspect anchors, chains and other equipment that could have been in contact with *Caulerpa taxifolia* and, if found, remove and dispose of any fragments of this algae using adequate methods approved by NSW DPI to avoid contamination of other areas.

No wetlands (apart from seagrass beds), mangroves, or saltmarsh were found at the site or in adjacent areas.

## PERMIT REQUIREMENTS

Based on the background information, the site survey and the communication with Northern Beaches Council, NSW DPI Fisheries permit(s) would be required prior resuming the works. It is advisable to consult NSW DPI Fisheries prior to applying for any permits.

## CONCLUSIONS

- The seagrass *Zostera capricorni* was recorded in the footprint of the proposed works as well as in the vicinity of the subject site;
- The seagrasses *Posidonia australis* and *Halophila* sp. were also recorded in the survey area;
- Macroalgae were recorded within and in the near vicinity of the subject site;
- The noxious algae *Caulerpa taxifolia* was present in the survey area and any proposed works should be careful not to disturb this noxious algae;
- There were no mangroves, saltmarsh or protected wetlands found at the site or in adjacent areas;
- No threatened fauna were found during the survey and the proposal is unlikely to have an impact on threatened fauna that may venture into the subject site;
- Potential impacts are possible on matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), Fisheries Management Act 1994 (FM Act) and NSW Biodiversity Conservation Act 2016 (BC Act) as a result of the proposal, due to the presence of seagrass beds, including *Posidonia australis* beds within or adjacent to the proposed works. NSW DPI Fisheries should be consulted prior to applying for any permits. Northern Beaches Council should be consulted as the proposed development will occur with 50m from seagrasses;

- The proposed works should have an impact on the aquatic environment, however this should be limited to the area where the works will occur if caution is taken to avoid further impacts to the seagrasses within close proximity of the proposal and to avoid dispersion of the noxious algae *Caulerpa taxifolia*.

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## APPENDIX

Summary of threatened/protected/migratory aquatic fauna species with the potential to occur within the study area (primarily terrestrial or primarily avian species not included).

Species	FM/BC Act Status	EPBC Status	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
<b>Fish (Teleosts)</b>					
<i>Epinephelus daemeli</i> Black Rockcod	V	V	Limited suitable habitat for juveniles and small individuals in the study site	Very low	Low
<i>Macquaria australasica</i> Macquarie Perch	E1	E	None, mostly occurs in freshwater. Juveniles may occur in estuaries.	Unlikely	Unlikely
<i>Prototroctes maraena</i> Australian Grayling	E	V	None, mostly occurs in freshwater. Juveniles may occur in estuaries.	Recorded in the Hawkesbury-Nepean catchment but unlikely within this section of the estuary	Unlikely
Syngnathiforms (seahorses, sea dragons, pipefish)	Collection and possession prohibited	Listed as marine species	Present, seagrasses, macroalgae and piles present at site	Likely, especially within seagrasses	Low
<b>Fish (rays)</b>					
<i>Manta alfredi</i> Reef Manta Ray		M	Poor foraging habitat	Vagrant, unlikely within this section of the estuary	Very unlikely
<i>Manta birostris</i> Giant Manta Ray		M	Poor foraging habitat	Vagrant, unlikely within this section of the estuary	Very unlikely
<b>Fish (sharks)</b>					
<i>Carcharias taurus</i> (east coast population) Grey Nurse Shark (east coast population)	E4A	CE	Absent, occurs in gutters or in rocky caves around inshore rocky reefs and islands.	Vagrant, no known critical habitat or aggregation site within 10 km radius	Very unlikely

Species	FM/BC Act Status	EPBC Status	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
<i>Carcharodon carcharias</i> Great White Shark	V	V, M	Very poor potential foraging habitat	Vagrant, unlikely within this section of the estuary	Very unlikely
<i>Lamna nasus</i> Porbeagle, Mackerel Shark		M	Poor potential foraging habitat	Vagrant, unlikely within this section of the estuary	Low Very unlikely
<i>Rhincodon typus</i> Whale Shark		V, M	No suitable foraging habitat	Vagrant, unlikely within this section of the estuary	Low Very unlikely
<b>Mammals (seal)</b>					
<i>Arctocephalus forsteri</i> New Zealand fur-seal	V		Absent, prefers rocky parts of islands with jumbled terrain and boulders.	Vagrant.	Low Very unlikely
<i>Arctocephalus pusillus doriferus</i> Australian Fur-seal	V		Absent, prefers rocky parts of islands with jumbled terrain and boulders.	Vagrant	Low Very unlikely
<b>Mammals (whales, dolphins, dugong)</b>					
<i>Balaenoptera bonaerensis</i> Antarctic Minke Whale		M	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Balaenoptera edeni</i> Bryde's Whale		M	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Balaenoptera musculus</i> Blue Whale	E1	E	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Caperea marginata</i> Pygmy Right Whale		M	Very poor potential foraging habitat	Vagrant	Very unlikely

Species	FM/BC Act Status	EPBC Status	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
<i>Dugong dugon</i> Dugong	E1	M	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Eubalaena australis</i> Southern Right Whale	E1	E	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Lagenorhynchus obscurus</i> Dusky Dolphin		M	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Megaptera novaeangliae</i> Humpback Whale	V	V, M	Very poor potential foraging habitat	Vagrant	Very unlikely
<i>Sousa chinensis</i> Indo-Pacific Humpback Dolphin		M	Poor potential foraging habitat	Vagrant	Very unlikely
<b>Reptiles</b>					
<i>Caretta caretta</i> Loggerhead Turtle	E1	E, M	May be present	Vagrant	Unlikely
<i>Chelonia mydas</i> Green turtle	V	V, M	May be present,	Vagrant	Unlikely
<i>Dermochelys coriacea</i> Leathery Turtle, Leatherback Turtle, Luth		E, M	May be present	Vagrant	Very unlikely
<i>Eretmochelys imbricata</i> Hawksbill Turtle		V, M	May be present	Vagrant	Very unlikely
<i>Natator depressus</i> Flatback Turtle		V, M	May be present	Vagrant	Very unlikely
<b>Birds (restricted list)</b>					
<i>Eudyptula minor</i> Little Penguin	E2		No breeding habitat present. Potential foraging habitat.	Vagrant (foraging)	Very unlikely
<b>Vegetation</b>					

Species	FM/BC Act Status	EPBC Status	Presence of Habitat	Likelihood of Occurrence	Likelihood of Impact
<i>Posidonia australis</i> seagrass meadows of the Manning-Hawkesbury ecoregion (populations)	E2	E	Presence known in the survey area	Posidonia found in the survey area	Moderate
Saltmarsh	E1		No presence known in the survey area	Unlikely, no saltmarsh found in the survey area	Very unlikely

BC Act (carried over from TSC Act): E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable

FM Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable

EPBC Act: M = Listed migratory species under Bonn Convention, CD = Conservation Dependent, CE = Critically Endangered, E = Endangered, V = Vulnerable, X = Extinct