

# **MARINE POLLUTION RESEARCH** PTY LTD

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

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## **PROPOSED BOATING FACILITY MODIFICATIONS AT LOTS 1 & 3 DOUGLAS ESTATE McCARRS CREEK - AQUATIC ECOLOGY ASSESSMENT**



**Figure 1** SixMap Aerial View of Existing Boating Facilities at Lots 1&3 Douglas Estate.

## 1 INTRODUCTION

Marine Pollution Research Pty Ltd (MPR) was requested by *Stephen Crosby and Associates Pty Ltd* (SCA) to provide an aquatic ecology assessment report of proposed modifications and extensions of an existing boating facility at Lots 1&3 Douglas Estate located on the northern side of McCarrs Creek, as set out on the SCA drawing 2033-DA01 Site Plan dated May 2023 and updated in September 2024. **Figure 1** provides an aerial view of the site, **Figure 2** provides a view north-east to the pool structure, **Figure 3** shows the pool and inshore sandstone seawall looking south-west, and **Figure 4** provides a view of the sandstone seawall at the facility ramp and pontoon facility, **Figures 5 and 6** shows natural rocky reef extending south-west of the existing facility.



**Figure 2** View of existing sea-pool facility, looking north-east. The riparian edge at this property comprises a block sandstone seawall with a paved reclamation behind.

With respect to expected marine vegetation, estuarine vegetation mapping by NSW DPI Fisheries in 2000, 2005 and 2019 (**Figure 7**) indicated a thin *Zostera* seagrass bed off-shore at this location in 2005 which was not mapped 2000 or 2019. Shallow sand bar *Zostera* beds were also indicated in the small cove to the north-west for the 2000 and 2005 surveys. There are no saltmarsh or mangroves noted (or found) at the site with the closest mangroves some 170m to the west (2019 mapping).





**Figure 3** View of existing sea pool and sand-stone wall facility, looking upstream.



**Figure 4** View of existing reclamation, seawall and ramp facility upstream of the sea pool facility, note intertidal oyster band on lower wall.



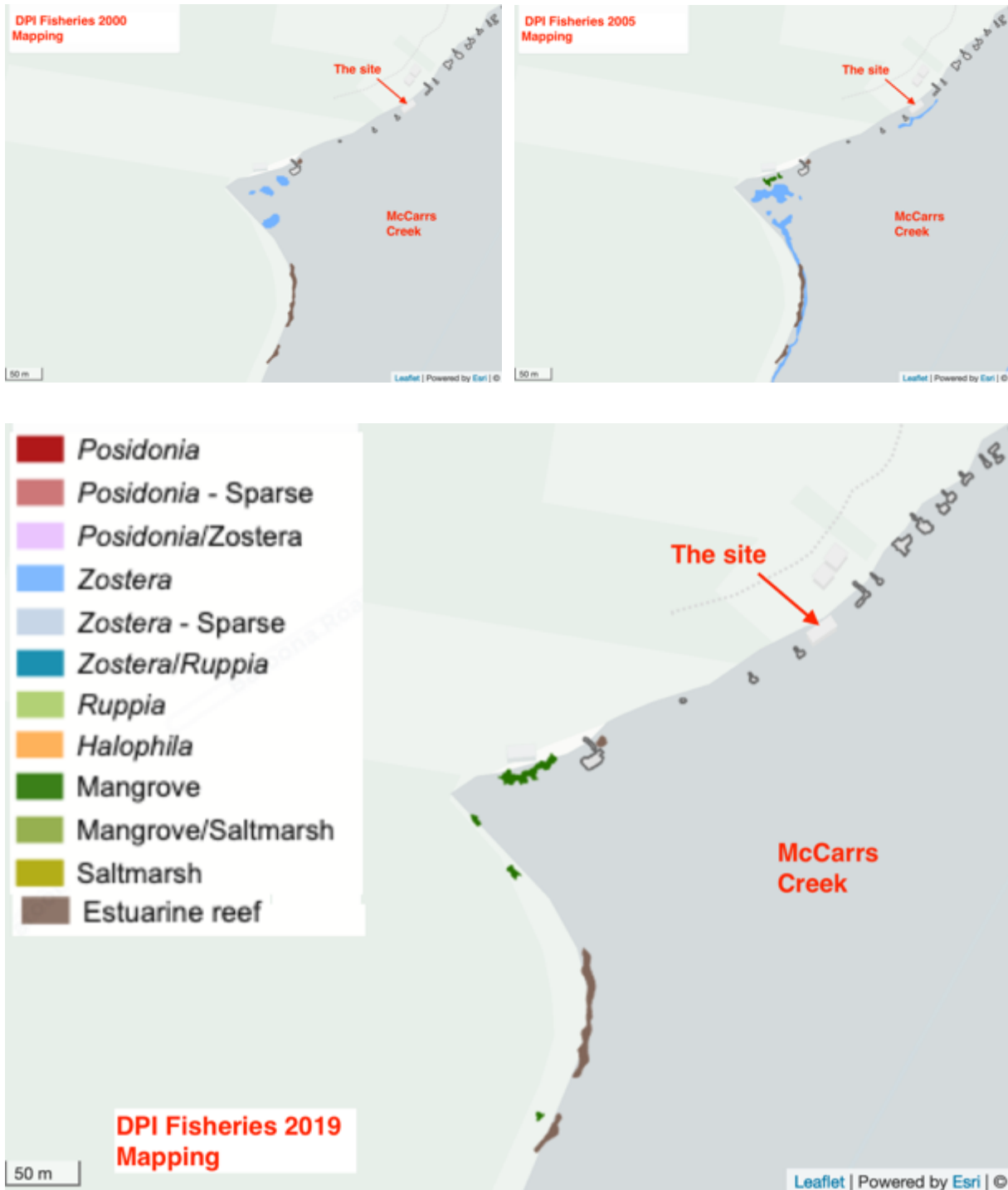


**Figure 5** Natural rock shore upstream of property supports an oyster and gastropod mollusc assemblage with a fringe of *Hormosira* algae in the lower intertidal to shallow subtidal



**Figures 6** Views upstream of the property showing natural riparian edge and sloping intertidal rocky reef





**Figure 7** Distribution of marine vegetation along the McKarrs Creek lower northern shoreline in the vicinity of the subject property - NSW DPI Fisheries Surveys dated 2000, 2005 & 2019.

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## 2 AQUATIC ECOLOGY OF THE SITE

An initial above-water survey of the site was undertaken on 3 September 2023 with an underwater survey delayed until December 2023 due to underwater camera failure. These surveys were supplemented with a check dive survey on 28 August 2024 to confirm whether there is any *Zostera* regrowth offshore at the property. **Figure 8** provides a copy of the proposal plan with the main aquatic habitats indicated and **Figures 9 to 18** provide underwater views of habitats at and on the existing facility:

- The immediate inshore natural habitat to the north-west of the site (**Figures 5 and 6**) comprises a sloping rocky shore that supports an oyster and gastropod mollusc assemblage in the intertidal with a fringe of *Hormosira* algae in the lower intertidal to shallow subtidal with a steep rock boulder sub-tidal habitat that terminates on a silty-sand seabed with some rock rubble inshore.
- This intertidal habitat is replaced by the block sandstone wall and reclamation that separates the subject property boundary from the upstream natural habitats, and the block sand stone seawall has been placed along the edge of the intertidal drop-off embedded in the top of the steep rock boulder embankment above the silty-sand seabed. The seawall supports a mixed oyster and gastropod assemblage in the low intertidal that continues with *Hormosira* in the lower intertidal (**Figures 9 and 10**).
- The *Hormosira* band then continues deeper to the top of the rock boulder habitat with a mix of small red fringing algae and *Sargassum* in the narrow sub-tidal fringe (**Figure 11**).
- The rock boulder habitat below the sub-tidal fringe supports a relatively dense cover of *Sargassum* (**Figure 12**) and this cover thins out at the toe of the slope where the rock rubble has a proportionally higher smothering silt cover (**Figures 13 and 14**).
- The lowest portion of the rock boulders and the inshore rock rubble plus the silty-sand seabed beyond supports a dense and complete cover of the pest algae *Caulerpa taxifolia* (**Figure 15**) with this species also reaching upslope into the lower *Sargassum* zone (**Figures 13 and 14**).
- The *Caulerpa* bed also extends inside the netted pool sandy seabed (**Figure 16**).
- The mesh net itself supports clumps of attached biota including water borne filamentous algae and clumps of tunicates (**Figure 17**).
- Piles associated with the facility support a good growth of oysters in the lower to subtidal (**Figure 18 left**) with less biota with depth due to silt smothering.
- The wetted surfaces of the floating pontoon at the site supports a relatively diverse attached and encrusting fauna (sponges, brzozoans, molluscs) but with almost no algae, (**Figure 18 right**) presumably due to constant freshwater flooding down McCarrs Creek.



**Figure 9** Mid to Upper, Intertidal Oyster and mollusc band on seawalls.



**Figure 10** Low intertidal oysters grading to *Hormosira* cover on lower portions of seawall.





**Figure 11** Transition from low intertidal *Hormosira* to mixed *Hormosira*, red algae and *Sargassum* in the sub-tidal fringe (at natural rocky shore and below property seawall).



**Figure 12** *Sargassum* growth on rock boulder slope (from about -0.2 m to -1.2m chart datum depth. Note *Caulerpa* plants under the *Sargassum* canopy.



**Figure 13** Looking downslope to rock rubble toe at about -1.5m chart datum showing transition to silty-sand seabed with *Caulerpa* cover.



**Figure 14** The lower rock rubble has a silt cover, small *Sargassum* plants and invading *Caulerpa* rhizomes.

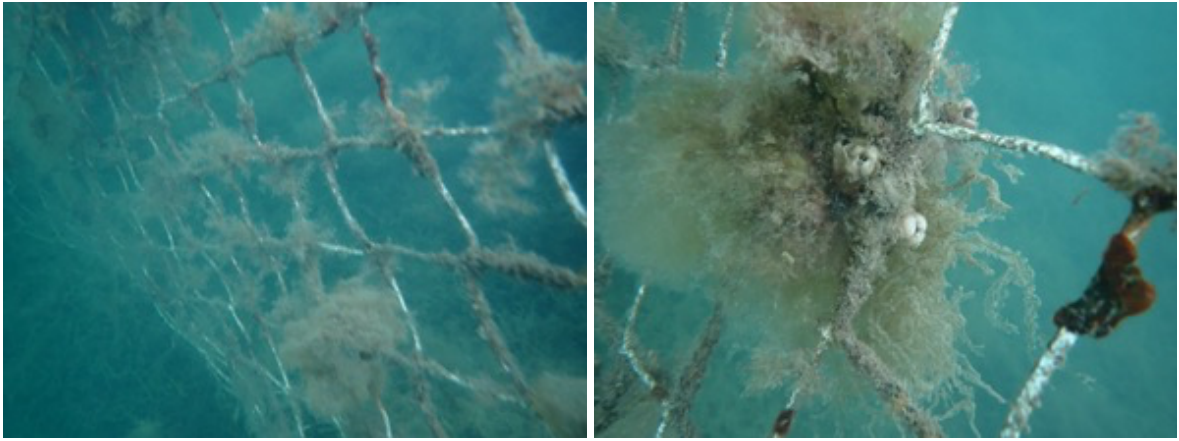




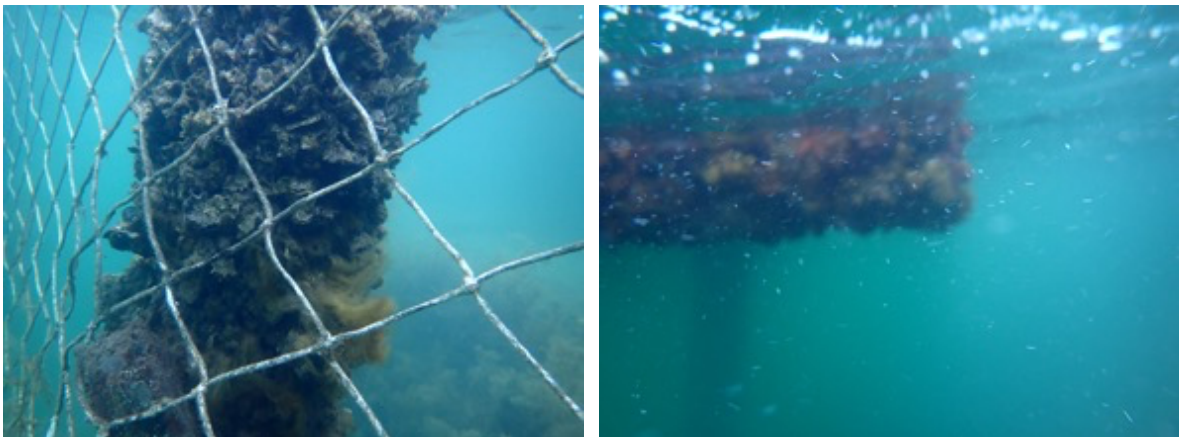
**Figure 15** The seabed offshore from the boulder rock reef supports a uniform and dense *Caulerpa taxifolia* bed.



**Figure 16** The *Caulerpa* bed extends into the netted pool seabed.



**Figure 17** The net supported some attached or caught algae and a few clumps of attached biota include this cluster of tunicates.



**Figure 18** Piles and Pontoon do not support algae in the shallows, likely due to flood waters.

With respect to other possible aquatic ecological requirements for DPI Fisheries:

- There are no saltmarsh or mangrove plants or patches at the site with the closest mangroves well upstream (see **Figure 7**).
- Whilst there are no aquacultural activities, or commercial fishing (hauling or meshing) in the locality.

## 2.1 Threatened Species

In terms of possible threatened species, the only species that could conceivably be expected to reside in habitats described at the locality of McCarrs Creek are Black Rock Cod (by virtue of the possible crevice habitat in the rock boulder habitat) or White's seahorse by virtue of the *Sargassum* algae beds and possible mesh net encrusting habitats. Specific searches in both December 2023 and for the recent August 2024 check survey did not yield any individuals of either species and none are expected for several reasons:

- There is actually limited crevice habitat in the rock boulder shoreline due to silt smothering inside the crevices so limiting Black Rock Cod residence.



- There is limited actual encrusting cover on the pool netting so there is neither sufficient shelter nor feeding resources for White's Seahorse.
- The observed silt loads and sparse algae on the netting are also most likely related to the location which is a flooding creek with relatively high turbid freshwater discharges during floods, both limiting colonisation opportunities.

## 2.2 Fish Habitat Classification

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

- The shoreline sub-tidal rock habitats at the site are Type 2 "moderately sensitive KFH" by virtue of the presence of *Sargassum* algae cover.
- Whilst the remaining sub-tidal sand and silty-sand habitats that are currently supporting dense pest algae cover are Type 3 Minimally sensitive KFH by virtue of the low habitat utilisation value of the pest algae species, the habitat could be Type 2 KFH if the *Caulerpa* was eradicated allowing at least some regrowth of *Zostera* and *Halophila* seagrasses.

### 3 IMPACT ASSESSMENT

The project will require the following work with the following ecological consequences that will need to be controlled by the recommended Management Sub-Plans:

- On-shore excavation for the recessed concrete ramp will require the removal of some of the sandstone rock wall blocks with loss of intertidal seawall habitat. This lost habitat would be balanced by provision of ramp side stone intertidal habitat.
- The works would also entail a smothering risk from excavation and concreting works and would require appropriate controls via a **Sediment & Erosion Management Plan** for the land works, a **Silt Curtain Placement and Management Plan** for estuarine habitat plus water quality protection, and a **Stormwater Management Plan** for post construction estuarine habitat plus water quality protection, all to be developed as part of the overall project **Construction Environmental Management Plan (CEMP)**.
- Construction of the jetty extension would require the placement of at least six support piles which would increase overall pile wetted surface habitat area.
- Connection of the ramp and pontoon would require placement of four pontoon locator piles, increasing overall pile wetted surface habitat.
- The present pen locator pile is to be relocated for the new pen location.
- The single pile removal and to a lesser degree new pile placement will disturb pest algae habitat with a risk of transporting pest algae offsite with a possibility of expanding pest algae habitat further afield. This impact will need to be managed by an appropriate **Caulerpa Management Plan** which would need to be prepared as part of the overall project **CEMP**.
- Turbidity and Sediment disturbance associated with Pile placement would also need to be considered in the above **Silt Curtain Placement and Management Plan**.
- Owing to the orientation of the facility to available sunlight, the shading impact from the proposed north-south portion of the jetty extension will affect inshore shallow reef algae habitat and accordingly shading from this part of the facility will need to be minimised by the use of appropriate mesh decking as recommended by DPI Fisheries.
- Whilst the remaining proposed jetty expansion and ramp plus pontoon facility has been set off shore from the pool to avoid shading of the inshore reef algae habitat, it will shade deeper water silty-sand seabed habitat that currently supports pest algae and shading would provide some benefit by diminishing the overall area of pest algae.
  - Whilst *Zostera* was reported from this locality in the 2005 Fisheries mapping (towards the end of the Millennial Drought), it is considered highly unlikely



that this flooding creek deep location would remain clear enough for long enough to support permanent seagrass growth.

- In any case, as pest *Caulerpa* can out compete seagrass via smothering there is little prospect of seagrass growth at this location.
- The pile that needs to be pulled and relocated for the new berthing area in front of the recessed concrete ramp has adequate depth to ensure minimal disturbance to seabed pest algae and to inshore rock algae habitats from the piling works.

### 3.1 Minimising Jetty Construction Related Impacts

Jetty construction will most probably be undertaken using barges brought in at high tide with piles located using a barge-mounted pile driving rig. The work barges will most likely need to be manoeuvred into position using towing and/or pushing vessels, and may need to be kept *in-situ* over multiple tide cycles:

- Holding a barge in place for construction works is generally done using one or more barge-mounted stub piles pushed into the seabed to hold the barge in place or by using barge mounted winches and wires connected to pre-placed mooring blocks.
- In terms of overall construction impacts, the main potential impacts relate to the manoeuvring of work vessels and barges over the indicated inshore sloping reef habitats plus the potential for disturbing and mobilising the seabed pest *Caulerpa*.

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. Notwithstanding the low risk of aquatic ecology harm from turbid plumes associated with pile removal and placement, piling associated turbidity can be constrained by the use of a floating silt curtain around the active works as necessary.

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

- Construction works will need to include measures to ensure no damage to inshore rock rubble habitat as identified in **Figure 8** to this report. These measures are to include the following provisions:
  - There will be no stockpiling of demolition or construction materials on the seabed

- In order to minimise the risk of mobilising the seabed pest algae, no vessel is to be taken over the inshore works areas unless there is sufficient depth to prevent vessel strike, propeller strike or scouring damage from propeller wash.
- No vessel is to be moored with anchor or other bottom tackle located in the indicated marine vegetation habitats.
- To ensure minimum disturbance of seabed habitats during barge mobilisation, barge movement operations will need to be done during favourable tide and wind combinations, with the pushing vessel operated in such a manner as to minimise sediment disturbance and prevent strike or disturbance to seabed aquatic habitats. These manoeuvres should also be timed with the tides and low wave/wash periods to minimise seabed disturbance.
- No vessel or barge is to be left over the indicated marine vegetation habitats in **Figure 8** where there is any risk of vessels bottoming out on the habitats due to tidal variation or to wind wave effects.
- Barge mounted spuds cannot be used in rock reef or *Caulerpa* habitat areas as indicated in **Figure 8** but can be used in bare sand habitats south of the Figure 8 no anchoring line.
- Where winches and anchor/mooring blocks are to be used, the anchor/mooring blocks and any associated chain are to be placed in such a manner that there is possibility of disturbance of the seabed *Caulerpa* or damage to inshore rock reef habitat areas as indicated in **Figure 8** from the anchors/mooring blocks or associated lines and chain.
  - Accordingly, all anchors/blocks and shore mooring points must be selected so that there is no risk under any tide or tide/wind combination of scalping the identified vegetated habitats from anchor chain or from cables sagging between the barge and any anchor/mooring block/shore point. If there is a sagging and scalping risk, the use of floating rope or suitable buoyancy for cables must be adopted.
- All construction offcuts must be removed from the site and no construction materials are to be placed or stored on the seabed. Any dropped offcuts are to be retrieved from the seabed immediately for appropriate on-site disposal.
- Any moorings or anchors that are used or piles/structures that are removed, should be inspected for the pest algae *Caulerpa taxifolia* once on the barge deck. If the alga is present, it should not be returned to the water and should be disposed of as normal construction waste into bins for appropriate shore disposal.



### 3.2 Management of Operational Impacts

With regard to operational impacts arising from the use of the facility, the main potential impact from using the new ramp is damaging inshore rock habitat biota at very low tides when launching or retrieving vessels from the boat ramp. The potential for this impact will be proportional to the actual height of the ramp above the habitats and can be minimised by ensuring that the launching height is set 0.3m above the natural upper limit of the *Hormosira* algae as indicated in **Figure 5**.

Whilst use of the new mooring pen has a potential for damage to inshore shallow rock reef habitats from vessel (including propeller) strike, it is considered that the risk of damage to vessel and motor are such that the vessels would be moored to ensure this risk is minimised.

By virtue of the proposed offset location shading from the east-west jetty extension plus from the ramp and pontoon will not extend to the inshore shallow reef algae habitats but will still shade deeper seabed that currently supports dense *Caulerpa taxifolia* pest algae growth, so is considered a beneficial impact.

### 3.3 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”.

As this project requires the removal of some intertidal block sandstone for placing the recessed concrete ramp there is a low risk of damage to adjacent rock reef algae habitats that can be managed with appropriate CEMP plans as outlined above and it is unlikely that these works would trigger a legal requirement for a permit. However, given the complexity of the proposal, and on the basis that construction related damage to nearby marine vegetation and rocky reef habitats will need to be minimised by appropriate construction and operational safeguards that will need appropriate management plans, it is concluded that DPI Fisheries may decide that the project will require a Part 7 Permit under the *FMA*.

## 4 CONCLUSIONS

The construction of a boat ramp, jetty extension, ramp and pontoon facility plus mooring pen at Nos 1-3 Douglas Estate McCarrs Creek can be undertaken with no direct impact on marine habitats that support marine vegetation and minimal risk of impact to other un-vegetated marine habitats provided construction plus operational related indirect harm risks are mitigated and managed by the use of appropriate, specific and approved aquatic habitat protection measures to be incorporated into the project Construction Environment Management Plan (CEMP) and the project Operational Environment Management Plan (OEMP).

## 5 REFERENCES

DPI Fisheries (2013)

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

EPA (1992)

Coastal resource atlas for oil spills in Broken Bay, Pittwater and the Hawkesbury River. NSW EPA. March 1992.

NSW Fisheries (2004).

NSW Control Plan for the Noxious Marine Weed *Caulerpa taxifolia* in NSW Waters. NSW Fisheries, pp 24.



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Drawing Number	

**2033 - DA 01**

**No's. 1-3  
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