

MARINE POLLUTION RESEARCH^{PTY LTD}

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

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30 Aug 2018

NEW JETTY PROPOSAL - 104 CABARITA ROAD, CAREEL BAY

AQUATIC ECOLOGY IMPACT REPORT



Figure 1 Oblique Drone view of 104 Cabarita Road Avalon showing mixed seagrass and *Caulerpa* algae beds off-shore (Image acquired 5 April 2018, view to SW).

1 INTRODUCTION

Marine Pollution Research Pty Ltd (MPR) was requested by Steven Crosby & Associates to undertake a survey of the aquatic habitats offshore from 104 Cabarita Road Avalon in relation to the construction and use of a new jetty facility at the above address. The site is located on the southern shoreline of Careel Bay and faces approximately north-east. There is a ramp facility to the sand at the property frontage and a long jetty ramp and pontoon facility located at No 104 Cabarita Road (**Figures 1 and 2**). The report is required to provide an assessment of possible aquatic ecology impact of the proposal.



Figure 2 View inshore (South-west) to No 104 showing existing wood ramp. Note also Sewer Riser Structure to the left of the photograph (5 April 2018).

Previous inspection undertaken in June 2005 and 2010 indicated that there was Eelgrass (*Zostera capricorni*) and Strapweed (*Posidonia australis*) seagrass in the subtidal waters offshore of the property and this is in line with marine vegetation mapping undertaken by DPI Fisheries in 2006. A portion of the DPI Fisheries Map 37 is shown in **Figure 3** below, which indicates the location of the site just south of the existing long jetty and pontoon structure at 104 Cabarita Road. The map indicates that there is a more or less continuous bed of *Posidonia* offshore with a fragmented *Zostera* bed inshore, much as was mapped in 2005. *Posidonia australis* beds in the Sydney region are listed under the NSW Fisheries Management Act 1994 (FMA) as an Endangered Ecological Community (EEC).



2 AQUATIC ECOLOGY OF THE SITE

MPR aquatic ecologists undertook a constraints and opportunities survey of the site on 5th April 2018. The survey included an initial drone survey from which particular darker marine vegetation areas were identified for further swim surveys. The drone images were then used to prepare an aquatic habitat map and constraints report to Steven Crosby & Associates (MPR 2018) that was used to determine the optimum location of a jetty facility at the site.

Following receipt of the preferred jetty layout and location, MPR biologists re-visited the site on 9 August 2018 to confirm the aquatic habitat locations in relation to the preferred option layout indicated on the Site Plan (SCA Plan 2178 – DA01 – see full plan attached to this report). A survey tape was laid along the centre line of the proposed jetty and the limits of the various aquatic habitats described from the April 18 survey were determined along this line.

Figure 4 shows the centreline location of the proposed jetty facility.



Figure 4 Survey tape laid out along the centreline of the proposed jetty facility on 9 August 2018.

The main aquatic habitats in the location of the property as determined in April 2018 are shown on **Figure 5** below and the actual surveyed-in boundaries for the various aquatic habitats (9 August 2018) under and around the proposed facility is shown in **Figures 6 and 7**.

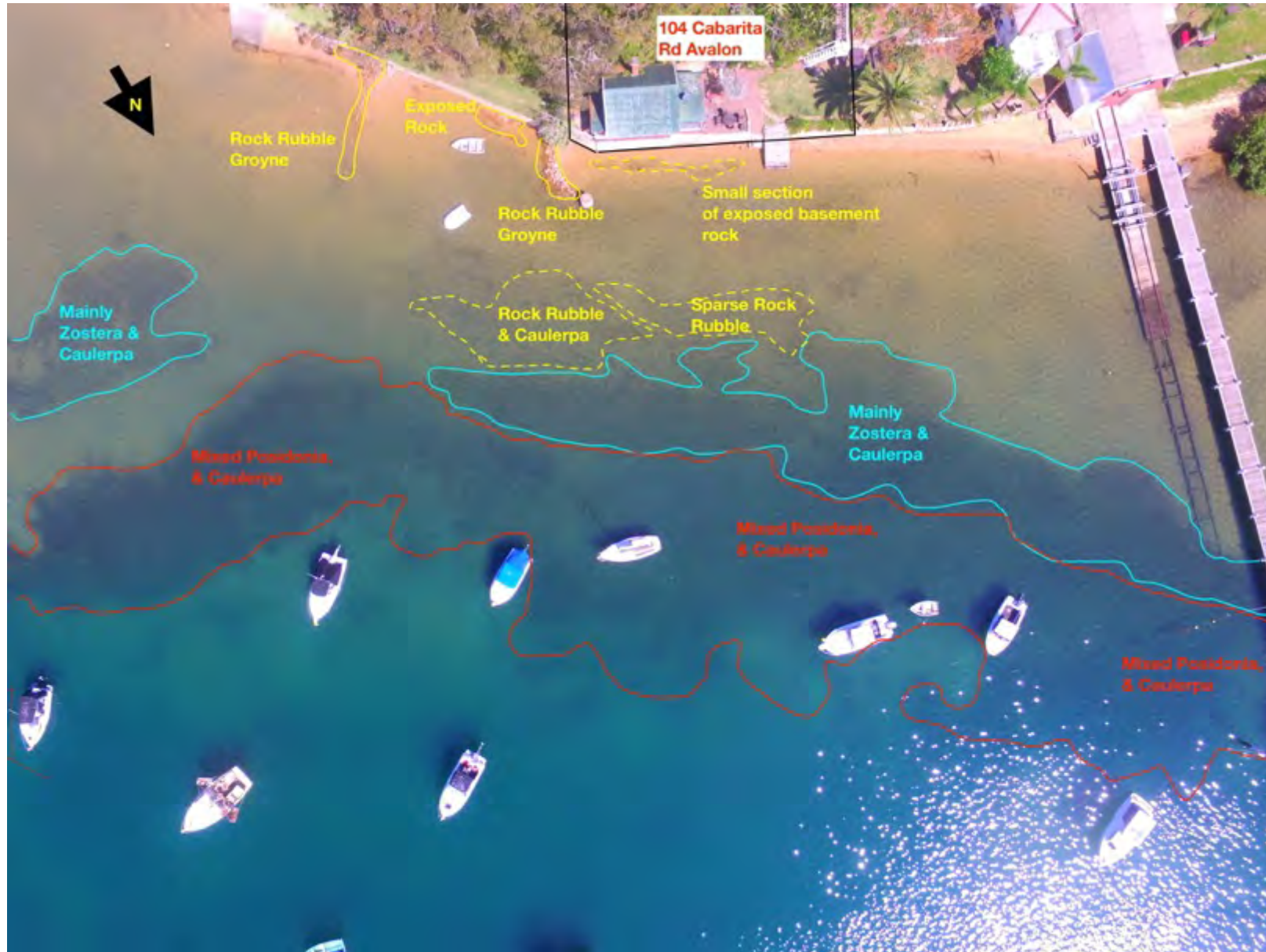


Figure 5 Main aquatic habitats fronting No 104 Cabarita Road Avalon (Surveyed April 2018)

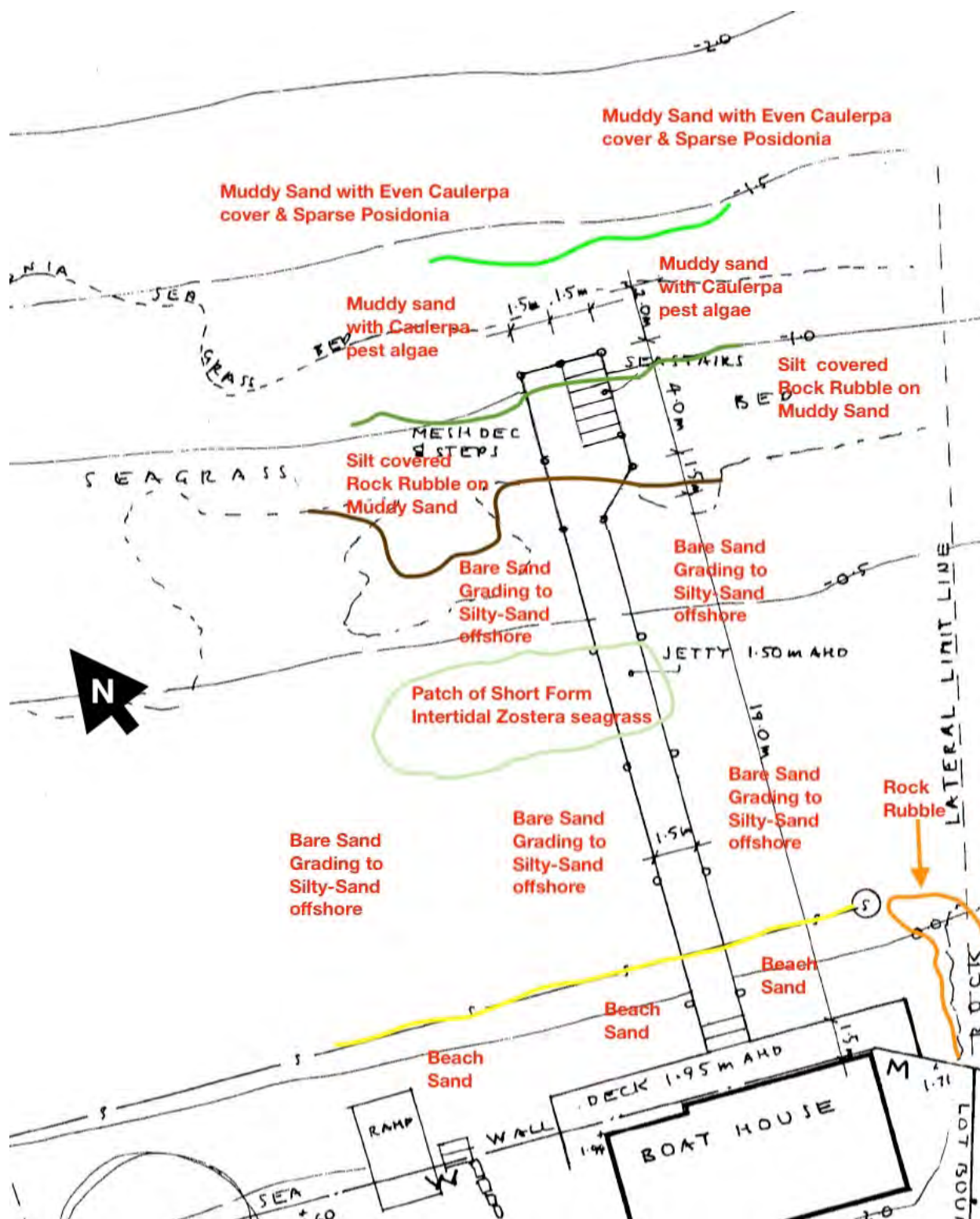


Figure 6 Location of aquatic habitats surveyed on 9 August 2018 in relation to the proposed jetty facility at No 104 Cabarita Rd Careel Bay. The base drawing is a portion of the full SCA Site Plan attached to this report. Habitat limits along the jetty centre line are as follows; beach sand to 5m, short form *Zostera* patch 13 to 16m, bare sand and rubble to 22m, rubble and *Caulerpa* pest algae cover to 30m, *Caulerpa* with sparse *Posidonia* density 30 to 50m.



Figure 7 Relationship of intertidal habitats to proposed jetty centreline (white survey tape).

The aquatic ecology of the site in relation to the proposed jetty alignment is described as follows:

- There are no mangroves stands or saltmarsh plants at the subject property or in the immediate locality (**Figure 4**). The closest mangrove along this shore is a mature Grey Mangrove immediately west of the jetty at No 102 (see **Figure 5**).
- The bottom of the riparian bank at the subject property comprises a sandstone seawall overlying a more or less flat intertidal sandy gravel substrate which dips gently to the north-east. There is sandy beach to 5m off the wall (**Figures 4 and 7**) and the upper intertidal mixed sand gravel habitat to around 22m from the seawall, with a few scattered pieces of rubble rock throughout and a band of rock rubble between 18 and 22m. This upper intertidal section does not support any marine algae (**Figure 7**).
- There is an isolated patch of stunted (short-form) intertidal *Zostera* from 13 to 16m (see **Figures 7 and 8**). The bed is located at 0.44m above 0m LAT, and is probably sustained by seepage from inshore (to the west).
- From 22m to 30 m offshore there is a section of rock rubble with a mixed cover of the listed pest algae *Caulerpa taxifolia* (**Figures 9 and 10**).
- The pest algae cover extends from 30m to 55m offshore with some patchy *Posidonia* cover between 30.5m and 50m (**Figure 11**). *Posidonia* density varied with depth from sparse inshore (round 8 -10 shoots per m²), with more shoots mid bed (variable; 15 to 40 shoots per m²), and then sparse again offshore. **Plates 1 to 5** at the back of this report provide underwater views of the mixed *Caulerpa* and *Posidonia* bed offshore.



Figure 8 Location of isolated patch of short-form (stunted) intertidal *Zostera* (looking south across jetty centreline). The patch is located around 0.4m above chart datum (0m ISLW) and is characteristic of stunted-form intertidal *Zostera* beds that are sustained by seepage runoff from the land.



Figure 9 Inshore rock rubble with *Caulerpa* algae. There is no seagrass in this habitat.



Figure 10 Inshore shallow dense *Caulerpa* bed which was formerly a *Zostera* and mixed *Caulerpa* bed.



Figure 11 *Caulerpa* bed with low density *Posidonia* offshore from rubble and *Caulerpa* bed. This was a mixed *Zostera* and *Posidonia* bed ten years ago (MPR 2018).

3 IMPACT ASSESSMENT

The full site plan is attached to this report and the aquatic habitats under the facility are shown on **Figure 6** above. The facility requires the following construction activities:

- Placement of a 1.5m wide piled deck around the front of the existing boathouse. The piles would be placed into sandy beach habitat.
- A 1.5m wide timber jetty 19m long supported on ten piles. All ten piles would be placed into unvegetated silty-sand habitat.
- An outer platform 5.5m long and 3m wide including a set of 1.5m wide sea-stairs all supported on six additional piles. Three inner piles would be placed into rock rubble habitat and three outer piles would be placed into *Caulerpa* pest algae habitat.

3.1 Mitigation of Construction Impacts

In terms of direct aquatic habitat loss, the placement of the piles would in the main disturb soft sediment habitat with no loss of native marine plants (algae or seagrass). Placement of the three outer piles would smother some *Caulerpa* pest algae, but this loss is considered beneficial. Further, 14 of the 16 piles will be located within the intertidal zone and the wetted surfaces would provide habitat for intertidal assemblages, including oyster-based assemblages (see e.g., the oyster assemblage on the Sewer Inspection Structure in **Figure 7**). This is considered good additional fish habitat and is therefore an additional beneficial impact.

In terms of indirect impact, a 3m long section of the jetty will be placed over the southern extend of a small short-form *Zostera* bed with about 1.5m² of the total 33m² bed under the jetty, and there is a potential for loss of *Zostera* to shading. However, given the orientation of the jetty to the NNE this portion of the bed would be in direct sunlight for most of the year with the jetty shadow generally falling to the south of the jetty where there is no seagrass cover. It is concluded that there is a low risk of loss of this patch of seagrass to shading.

The platform and sea-stairs are located over bare sand and unvegetated silt-covered rubble with a small section at the front located over the innermost extent of the pest algae *Caulerpa* distribution (**Figure 9**). Shading of the pest algae by the lower sea-stairs is likely to result in the loss of the algae under the stairs, which is considered a beneficial impact.

The construction would require the use of barge-mounted piling equipment to place the piles and a work barge would also be used to construct the facility. Consequently, there is a high risk of damage to inshore aquatic vegetation from construction vessel use; propeller wash and

scour, vessels bottoming out plus scour or damage arising from the use of anchors, mooring blocks and mooring lines.

These risks can be mitigated to low risk by the inclusion of the following precautions to be provided in the project *Construction Environment Management Plan* (CEMP):

- All contractors undertaking construction work are to ensure that their activities do not cause any harm to vegetated aquatic habitats, as identified on **Figures 5 and 6** above.
- No vessel will be moored with anchor or other bottom tackle located in the marine vegetation habitats as identified in **Figures 5 and 6** of this report.
- By virtue of the shallow depths over the seagrass habitats to the north of the project footprint area, no vessel will be taken over or left over the seagrass beds unless there is adequate vessel clearance depth (including allowance for tidal movement plus swell/wind wave heights) over the seagrass bed. The estimations of clearance depths should include allowance for vessel propulsion gear clearance depths.
- The construction contractor will utilise inshore infrastructure for mooring vessels and plant where suitable and temporary mooring blocks if required, will only be placed in unvegetated habitat as indicated in **Figures 5 and 6**, and then only where mooring lines cannot scour seagrass habitats located between the mooring block and the moored vessel.
- Mooring lines or cables will not be laid across the offshore seagrass beds where there is any risk of these cables reaching the bottom due to wave action or low tides. If they do need to be deployed, they are to be suitably buoyed prior to laying, and kept buoyed once laid, to prevent cable drag and cable swing damage (scalping) of marine vegetation areas and to prevent disturbance and fragmentation of the pest algae species *Caulerpa*. Where this is impractical, contractors should use floating rope.
- In order to minimise wash and prevent bottom scouring of the marine vegetation habitats and to prevent mobilisation of the pest algae *Caulerpa*, towing or pushing vessels will not use excessive power to manoeuvre barges into place near or over the designated seagrass habitats. Scouring damage will also be minimised by ‘working the wind and tides’, i.e., only moving floating plant into place on high tides and under favourable or no winds
- There will be no stockpiling of demolition or construction materials on the seabed

Construction activities may also disturb and mobilise *Caulerpa taxifolia* fragments that can be carried to other estuaries not currently infested. Fragments can also adhere to equipment (ropes, cable, anchors) that can then be transported to other estuaries to infest these estuaries when the equipment is re-deployed (**Figure 12**). This risk will be mitigated by inclusion of the following additional *Caulerpa* Management protocol:

- All construction related equipment that comes in contact with the seabed (including mooring tackle, cables, ropes and anchors), must be inspected for attached fragments of the declared pest algae species *Caulerpa taxifolia* and any fragments found must be collected and disposed of into plastic bags then placed into garbage bins on shore.



Figure 12 The pest algae *Caulerpa taxifolia* attached to a segment of chain.

3.2 Operational Impacts

The main potential impact arising from the use of the completed jetty and sea-stairs is damage to the seagrass habitat off-shore from the end of the stairs. As noted from **Figure 6**, the jetty and sea-stairs will terminate some 4m inshore from the inshore limit of the *Caulerpa* bed which includes a low density of *Posidonia* shoots, and it is considered that this separation distance is sufficient to prevent direct trampling impact on *Posidonia* seagrass shoots from persons stepping off the sea-stairs. Use of the jetty will also minimise the risk of trampling the intertidal short-form *Zostera* bed and this is considered a beneficial impact.

4 CONCLUSIONS

It is concluded that the construction of a deck plus jetty and sea-stair facility at 104 Cabarita Road Careel Bay can be undertaken with no significant impact on marine vegetation or other aquatic habitats in the locality provided that the construction safeguards outlined in the above report are adopted. It is also concluded that the proposed facility could meet the aquatic ecological conservation requirements of the *Fisheries Management Act 1994* (FMA) as contained in the DPI Fisheries (2013) Fish Habitat Protection Guidelines. The project is not likely to require any permits under the FMA as there is little risk of “*harm to marine vegetation*” and there are no activities classified as “*reclamation or dredging*”.

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.

MPR (2018)

Aquatic Ecology Survey 104 Cabarita Road, Careel Bay. Report prepared for Steven
Crosby & Associates, June 2018

ADDITIONAL UNDERWATER PHOTOS FROM 5 APRIL 2018



Plate 1 Shallow intertidal inshore exposed rock rubble



Plate 2 Shallow water *Zostera* and *Caulerpa* bed located to the west of the proposed jetty.



Plate 3 Mixed *Posidonia* seagrass and *Caulerpa* algae bed inshore (north-west of the proposal)



Plate 4 Sparse *Posidonia* and *Caulerpa* at the deep limit of *Posidonia* growth.

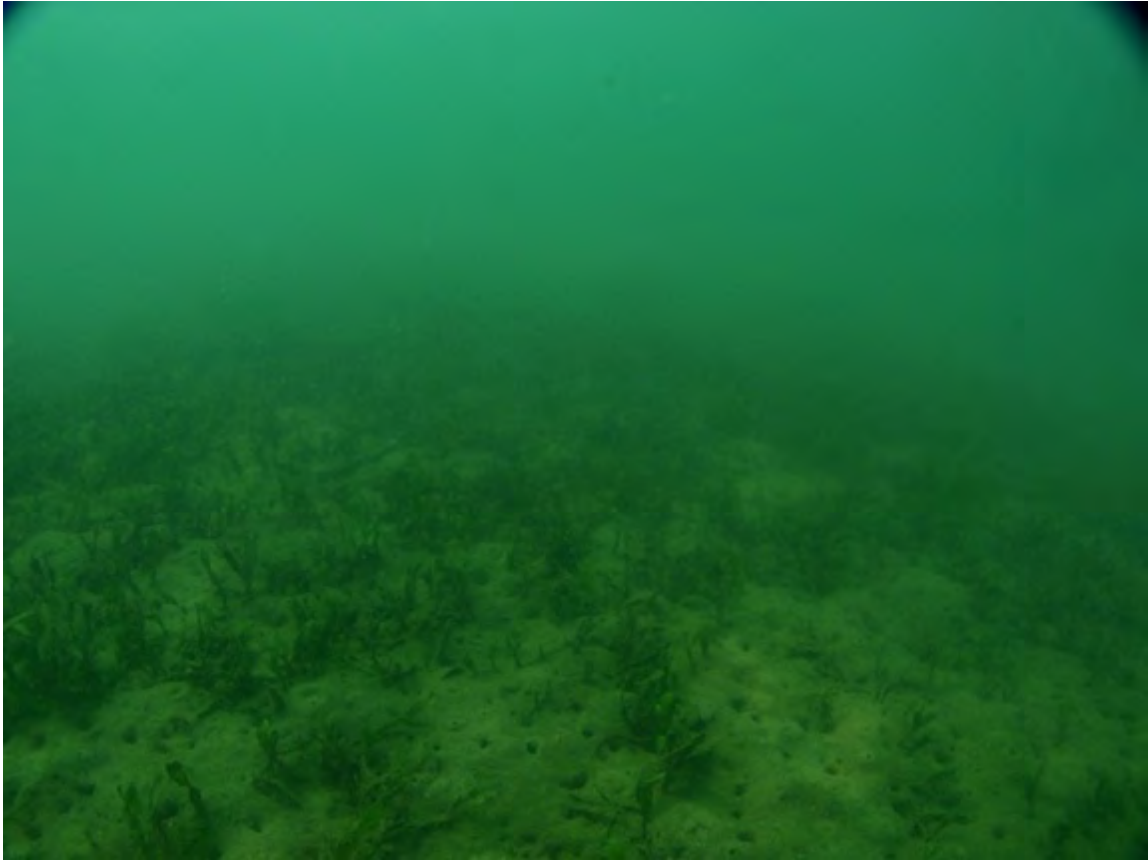
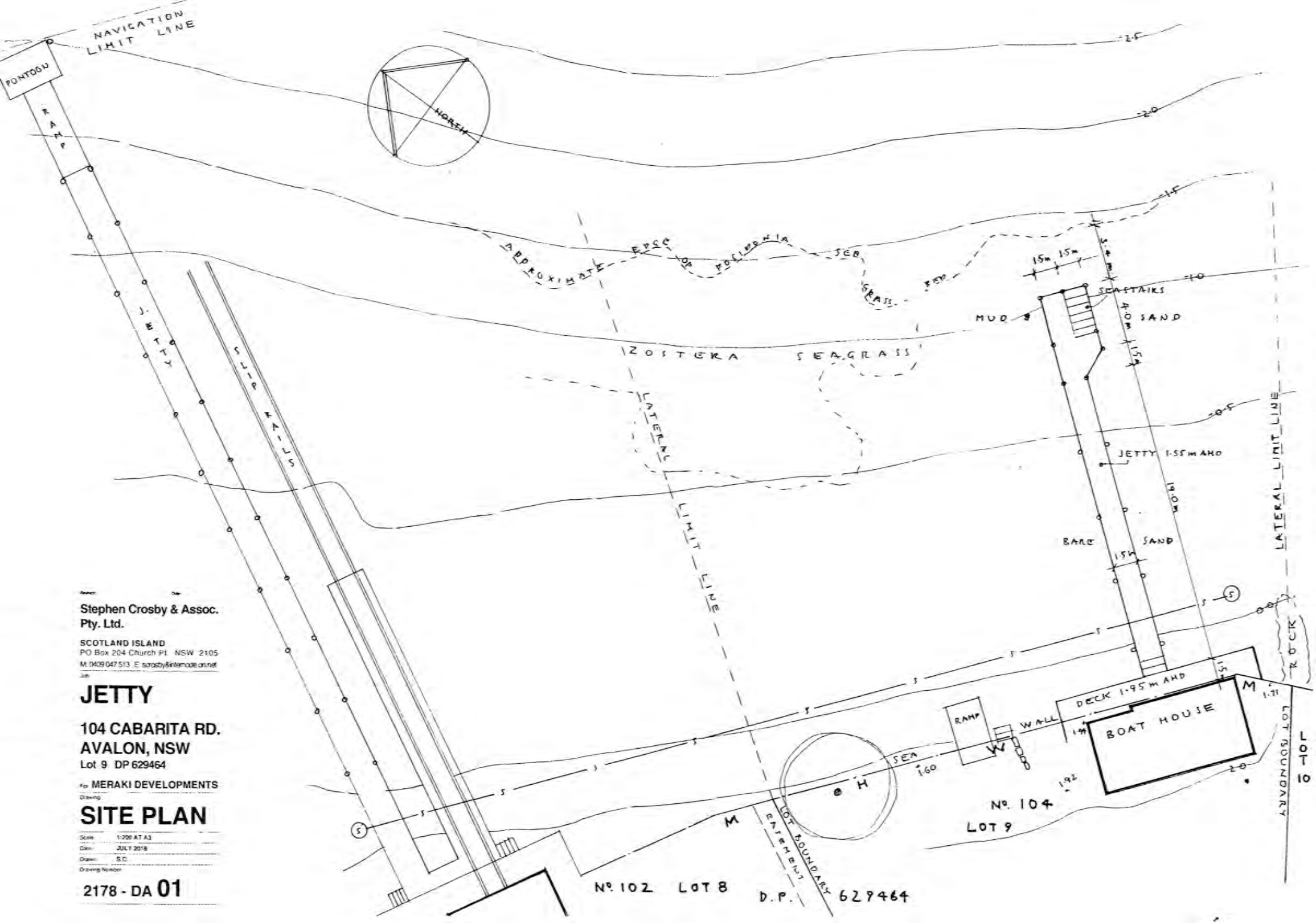
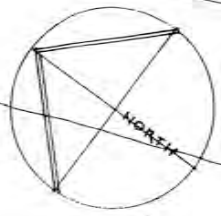


Plate 5 *Caulerpa* in deeper waters at the limit of growth (looking back inshore from *Posidonia* limit).



NAVIGATION
LIMIT LINE

PONTOON



APPROXIMATE
EDGE OF
POLYMERIA
SEA GRASS

ZOSTERA SEAGRASS

LATERAL
LIMIT LINE

MUD

SEASTAIRS
4.00 SAND

JETTY 1.55m AHD

BARE SAND

DECK 1.95m AHD

BOAT HOUSE

No. 104
LOT 9

No. 102 LOT 8
D.P. 629464

LATERAL LIMIT LINE

LOT BOUNDARY

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JETTY

104 CABARITA RD.
AVALON, NSW
Lot 9 DP 629464

for MERAKI DEVELOPMENTS

SITE PLAN

Scale 1:200 AT A3
Date JULY 2018
Drawn S.C.
Drawing Number

2178 - DA 01