NORTH HARBOUR MARINA MODIFICATIONS

AQUATIC ECOLOGY ASSESSMENT

Figure 1 Drone view looking SW over the North Harbour Marina

Report Prepared for Addenbrooke Pty Ltd

Marine Pollution Research Pty Ltd

September 2024 Update

1 INTRODUCTION

This report provides an assessment of the aquatic ecology of the marine habitats around North Harbor Marina (**Figure 1**), for proposed marina reconfiguration. This report has been prepared by Marine Pollution Research Pty Ltd ecologists who have the necessary qualifications and experience to undertake the ecology survey and report on any associated impacts from the proposal. The assessment has been updated on 3 September 2024 to take account of the altered number and locations of swing moorings to be relinquished.

1.1 Available Information on Aquatic Habitats

The DCP Mapping for SEPP(BC)2021 indicates a "*mixed rocky intertidal and sand*" aquatic habitat and Sheet 16 for the DCP indicate 'wetlands' along the whole western foreshore of North Harbour. DPI Fisheries habitat mapping in 2018 (**Figure 2**) indicates that there are *Zostera* seagrass beds to the west in the shallower areas along with in the inshore areas stretching east. it is concluded that the designated "*wetland*" at the site indicates the *Zostera* seagrass bed offshore.

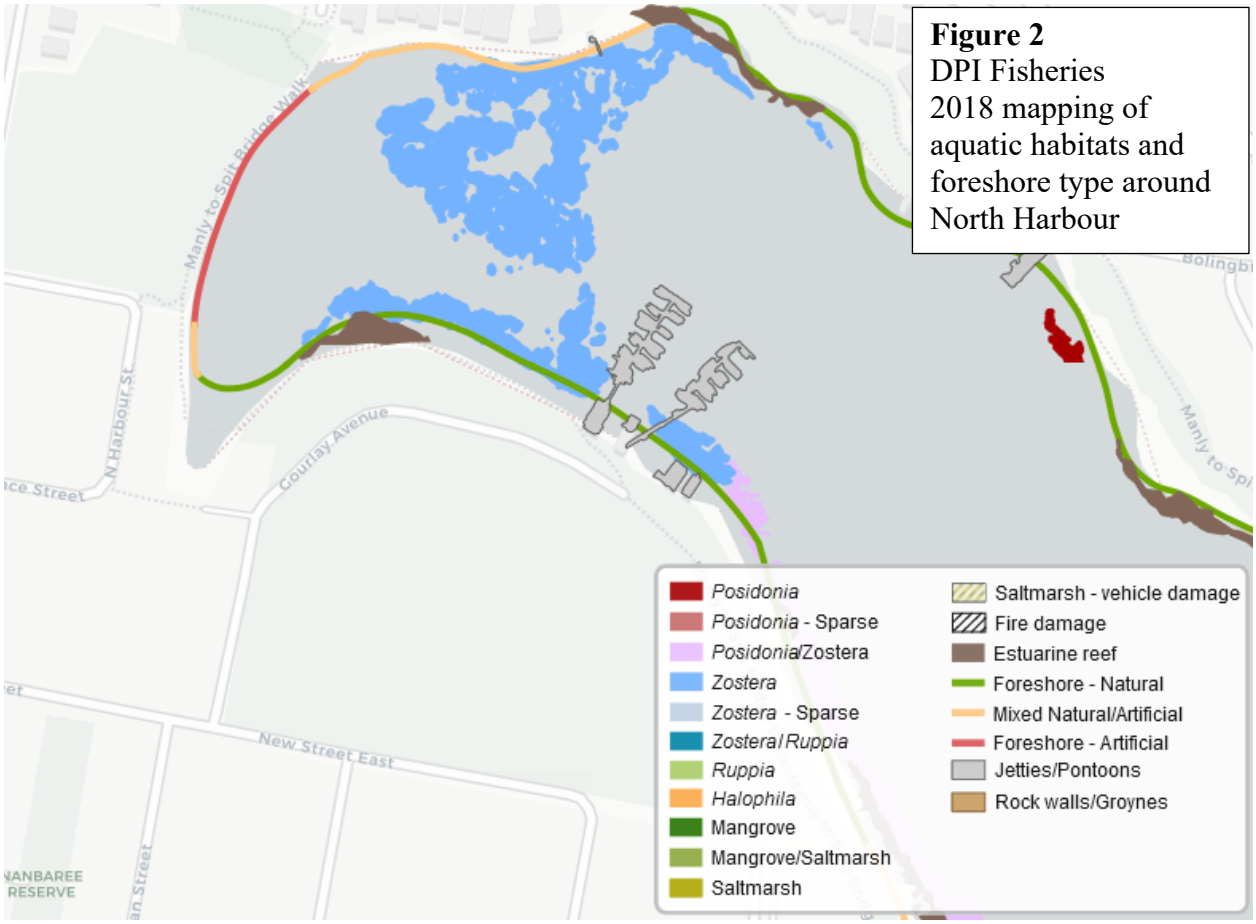

Figure 2
DPI Fisheries 2018 mapping of aquatic habitats and foreshore type around North Harbour

Figure 3 Marine habitats at the site comprise bare sand habitat intertidally with silty sand seabed offshore that *supports* a Zostera seabed inshore and encrusting mixed algae and fauna on intertidal to sub-tidal built structures. There is wrack accumulation at the base of the sliprails.

2 AQUATIC HABITATS AND ECOLOGY

A dive survey of the site was undertaken on 16 November 2023. The day was generally clear with a moderate to strong easterly breeze. Waters were clear with good underwater visibility. **Figure 3** provides a drone view of the site and surrounding area on the day, and shows the seagrass habitats found at the location:

- The substratum inshore of the marina comprises generally clean, well sorted and mobile marine sands with increasing silt fraction with depth offshore. (**Figures 2 & 4**).
- There is a thin strip of lower riparian rock habitat abutting the sandy beach under the shore facility with intertidal rocky shore located to the north and south of the sandy beach habitat at and under the marina shore facilities (**Figure 1**).
- Intertidal sections of the existing sliprails supported an encrusting assemblage of oysters and sea squirts (**Figure 5**) with kelp and *Sargassum* sp. algae on the deeper subtidal sections.
- There are small amounts of rock rubble plus some disused mooring blocks scattered across the site offshore that supported some mixed algae; kelp *Ecklonia Radiata*, plus *Sargassum sp* and *Padina sp* (**Figure 6**).
- Intertidal pile sections also supported an encrusting assemblage of Sydney rock oysters, *Saccostrea glomerata*) with sea squirts, *Pyura stolonifera* which included mussels, *Mytilidae sp* in the subtidal fringe (**Figures 7 & 8**). Lower subtidal sections supported mixed algae; dense kelp, *Padina,* and *Dictyota* plus a variety of encrusting fauna, mostly bryozoans, sponges and ascidians (**Figures 9 & 10**).
- The pontoons vertical surfaces supported similar marine growth to the piles with coralline red algae, *Pyura stolonifera*, mussels, kelp, *Padina, Dictyota* and bryozoans (**Figure 11**). The undersides of the pontoons supported an encrusting assemblage of barnacles and bryozoans.
- The two large seagrass beds located to the west and east of the marina comprise medium to dense cover *Zostera* with some sparser sections in deeper waters under the eastern arm of the marina (**Figures 12 & 13**). Some sections of seagrass had a dense covering of seasonal smothering algae.
- The western *Zostera* bed continues north along the edge of the North Harbour inner sand bank and east along the North Harbour west foreshore as indicated on **Figure 1** and on the DPI 2018 Fisheries mapping (**Figure 2**).
- The darker patches that can be seen around the sliprails in **Figures 1 & 3** are *Zostera* wrack and leaf litter laying within a slight depression. There were a few *Zostera* and *Halophila* sprigs noted amongst the wrack. but no seagrass patches or beds.
- There are small amounts of *Halophila* throughout the seagrass distribution, occurring either as a minor understory with the *Zostera* seagrass or forming small random clumped patches across the site (**Figure 14**).
- Specific searches were made throughout the survey area for *Caulerpa taxifolia* (a pest algae species listed under *NSW Fisheries Management Act 1994* (FMA) and known from Sydney harbour; none was found.
- Specific searches were made on marina piles and in immediate surrounding seagrass beds for White's seahorse listed as endangered under the FMA, and none were found.

Figure 4 Looking inshore along the beach sands to the west of the marina office.

Figure 5 Intertidal section of the sliprails with oyster growth.

Figure 6 Attached *Sargassum sp.* on isolated rock rubble.

Figure 7 Oyster band in the upper intertidal pile sections.

Figure 8 Sea squirts, *Pyura stolonifera* in the upper subtidal section of pile and kelp below..

Figure 9 Mid tide kelp and encrusting fauna on an outer pile.

Figure 10 Kelp and bryozoans on deeper subtidal pile sections.

Figure 11 Vertical edge of floating pontoon supporting a variety of brown and red alga.

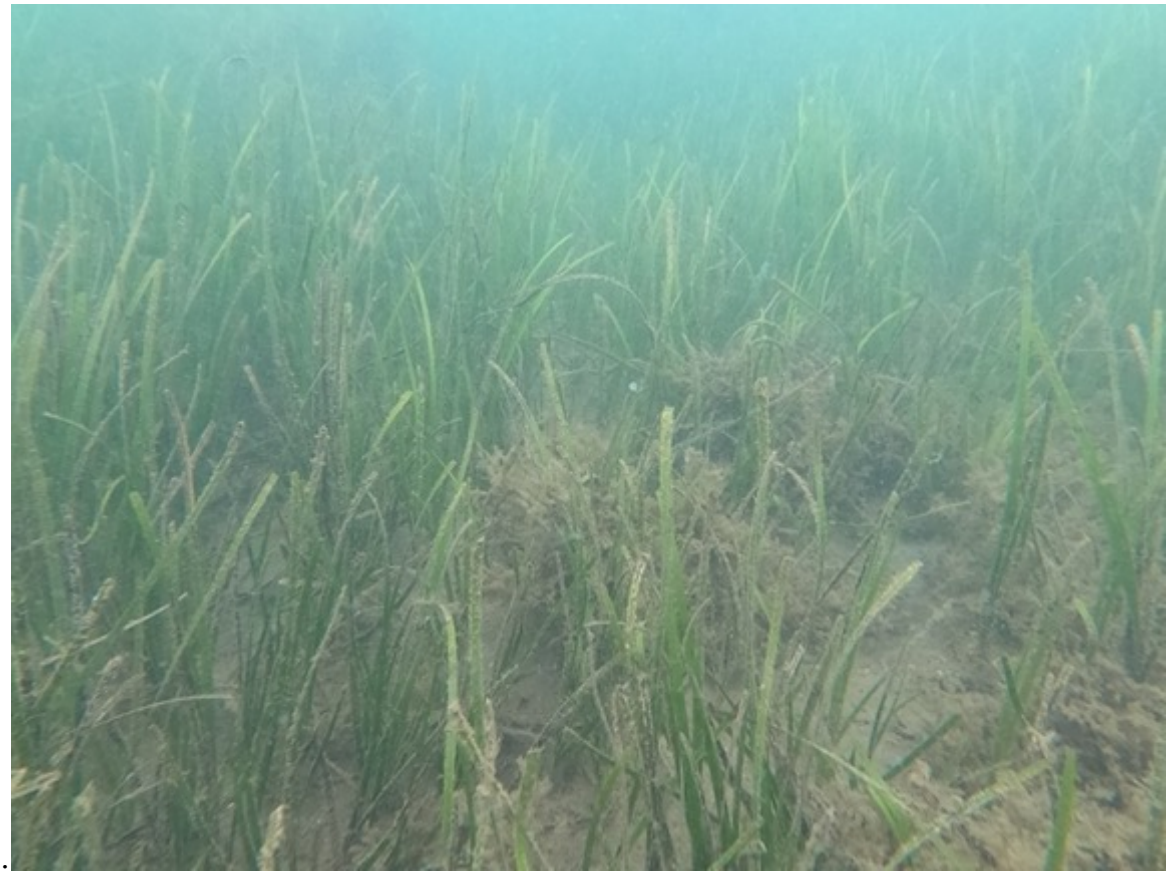

Figure 12 *Zostera* seagrass at the closest eastern edge of the Marina.

Figure 13 Dense seasonal filamentous algae patch covering *Zostera* seagrass.

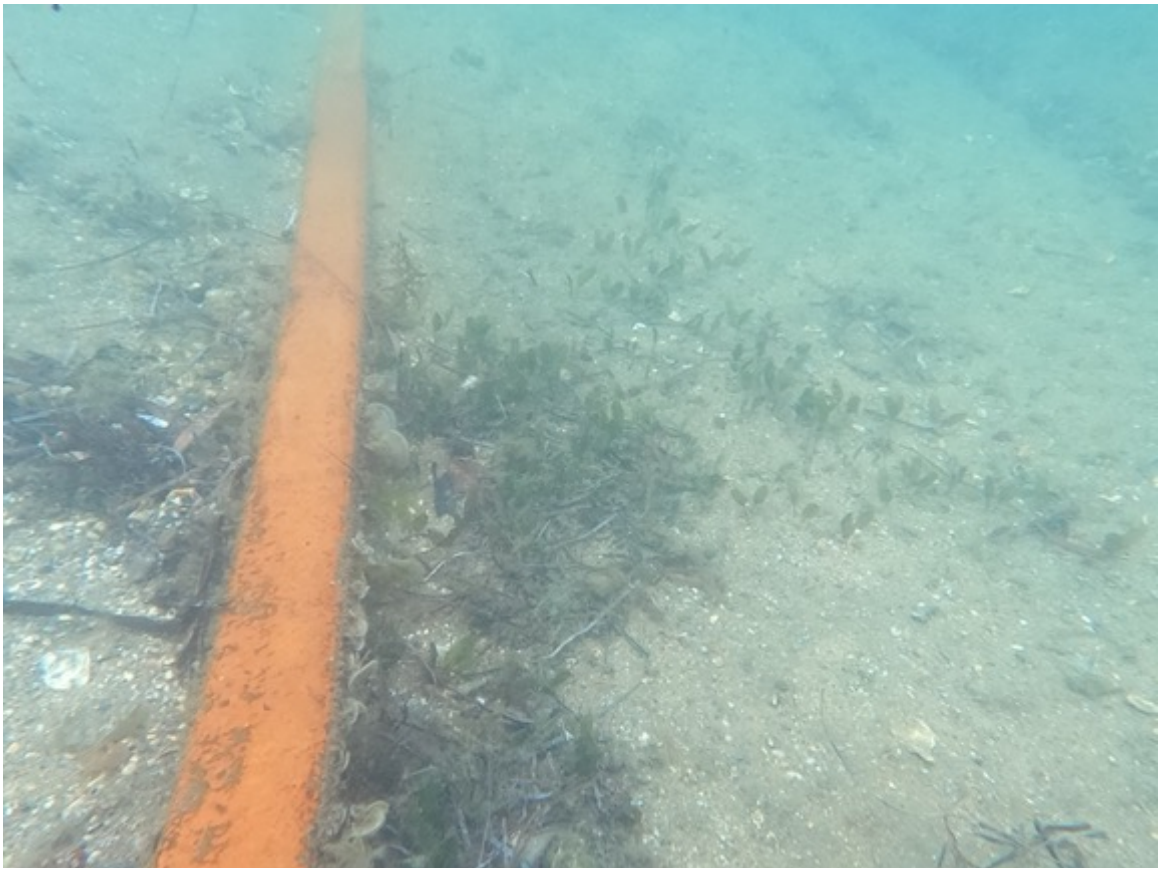

Figure 14 Sparse patch of *Halophila* alongside sliprails.

With respect to other NSW DPI (Fisheries) and TNSW (Maritime) assessment requirements:

- There are no mangroves or saltmarsh along the existing facility foreshore or in the vicinity of the proposed facilities.
- North Harbour is closed to commercial fishing activities and there are no aquaculture activities in the vicinity of the proposal. Consequently, the proposal does not have any impact on commercial fishing operations or aquaculture activities.

2.1 Threatened Species, Endangered Ecological Communities & Protected Species

The NSW *Fisheries Management Act 1994* (FMA), NSW *Biodiversity Conservation Act 2016* (BCA) and the Commonwealth EPBC Act 1999 require that any proposed activity be assessed with respect to its potential impact on species or ecological communities listed as threatened under the Threatened Species Schedules of the Acts or listed as migratory species under the EPBC Act. The FMA and EPBC Act list a number of marine and estuarine shark and teleost fish species as Vulnerable Species under Schedule 5 of the Act. Syngnathiformes (seahorses, sea-dragons, pipefish, pipe-horses and sea-moths) are protected, under both the EPBC Act and the FMA, with Whites Seahorse *Hippocampus whitei* listed as *endangered* under the FMA. Seagrasses are protected under the FMA, and *Posidonia australis* seagrass is listed under both the FMA and EPBC Act as an *Endangered Ecological Community* in Sydney Harbour.

There are three FMA threated species (Grey Nurse Shark, Great White shark plus Black Rock Cod) known from coastal waters at the mouth of Sydney Harbour and White's Seahorse (listed as Threatened under the FMA) is known from Sydney Harbour:

- Whilst the two shark species would visit the outer harbour from time to time, they would only be expected in North Harbour when in search of or pursuit of mobile prey species.
- Whilst the Black Rock Cod *Epinephelus daemelli* is known from the outer harbour reefs, there is no suitable reef habitat nor rock cave or crevice habitat found at the site.
- AMBC (2007) listed four Syngnathids from Sydney Harbour; two seahorse species (White's Seahorse *Hippocampus whitei,* Bigbelly Seahorse *Hippocampus abdominalis*) and three pipefish (Wide-body Pipefish *Stigmatopora nigra*, Stick Pipefish *Trachyrhamphus bicoarctatus* and Hairy Pipefish *Urocampus carinirostris).* White's seahorse populations have declined significantly over the past decade, which resulted in them being listed as *Endangered* under the NSW Fisheries Management Act in 2019. In 2020 this species was also listed as *Endangered* under the Commonwealth EPBC Act. Whilst no White's seahorses were located during searches of the immediate *Zostera* seagrass habitats and marine infrastructure they are expected to reside in the wider North Harbour seagrass beds.
- Of the three seagrass species recorded from Sydney Harbour; *Zostera capricorni* and *Halophila ovalis* (both protected under the FM Act) made up the seagrass beds around the project area, and *Posidonia australis* seagrass (which is listed under both the FM and EPBC Acts as an *Endangered Ecological Community* in Port Jackson) was not recorded from the project area.

With regard to other aquatic species or ecological communities listed under the NSW *BCA* and the Commonwealth *EPBC Act,* Little Penguins are observed fishing and feeding throughout North Harbour but are not expected to utilise the shore or riparian habitats for possible roosting, breeding or moulting due to both unsuitable habitat for these activities and the general disturbance by humans and companion animals along this beach front.

Various listed cetaceans (whales and dolphins), marine mammals (seals and sea lions), marine reptiles (turtles and sea-snakes) and sea-birds (ocean birds and waders) are known from Sydney Harbour and are known to penetrate North Harbour from time to time. Of the species that may occur in the vicinity of the site, most would be utilising the calm North Harbour waters or isolated intertidal shores for resting, or utilising the tidal resources of inshore rock or seagrass beds in adjacent waters as transients or opportunistic feeders.

It is concluded that, other than the Whites seahorse and other Syngnathiformes, it is unlikely that there would be any threatened species listed under the FMA, BCA and EPBC Act residing within the locality.

2.2 Key Fish Habitat Assessment

With regard to the Fisheries NSW waterway classification scheme as shown in Table 2 of the NSW Fisheries 2013 Policy and Guidelines document, Manly Cove 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 within Manly Cove (as defined in Table 1 of Fisheries NSW 2013):

- The mixed *Zostera* and *Halophila* seagrass beds identified for this proposal in **Figures 2 and 3** are Type 1 “highly sensitive KFH”.
- The pile habitats with dense marine algae growth are Type 2 "moderately sensitive KFH, due to the presence of *Sargassum sp.* and *Ecklonia radiata.*
- The remaining un-vegetated marine sand and shell habitats are Type 3 “minimally sensitive” KFH.

3 IMPACT ASSESSMENT

The marina re-configuration proposal is shown in **Figure 15 and Appendix A**, and this section considers potential losses and gains of aquatic habitat to construction activities plus provides recommended construction mitigation procedures to avoid and minimise impacts on the aquatic biota at and around the site.

The proposal is for the existing marina arm structure to remain, but with a restructuring of marina pens to include the addition of several new pontoons to achieve an extra nine marina berths. The proposal also includes an extension to the inshore boatshed deck over the intertidal sands. Further, ten swing moorings to be removed. The marina arm restructure requires installation of three additional pontoon locator piles, four berthing pen finger pontoons and three smaller finger pontoons. The deck extension will require up to six support piles.

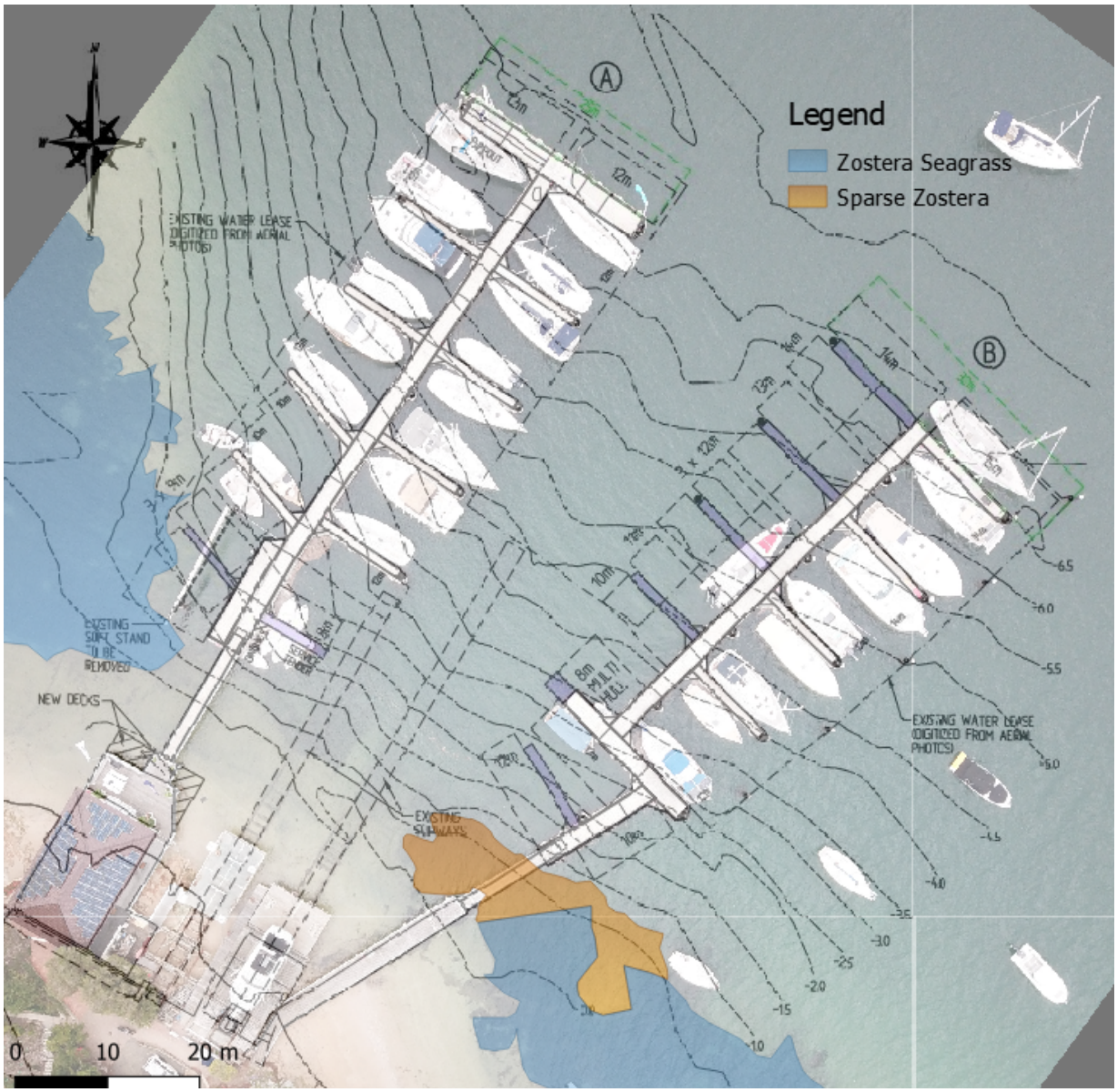

Figure 15 Marina modification proposal overlaid onto habitat map.

3.1 Potential Impact and Management of Construction Activities

In terms of overall existing habitat protection arising from the proposal, there is no loss of seagrass habitat arising from the reconfiguration in terms of direct damage from pile placement or from potential shading loss, and as there is a net gain in hard surface wetted surface areas (from extra piles and pen pontoons placed over bare sand seabed habitat), there will be a net increase in overall marine algae and associated encrusting assemblage habitat that benefits overall fish utilisation (see **Figure 9** above).

Pile placement and deck construction works will require cranes and pile driving equipment on board floating plant, and given the proximity of seagrass beds adjacent the site, there are additional potential shading and physical damage impacts to these habitats arising from placing floating plant over vegetated habitats, potential dragging and scouring impacts from placing anchor gear or tensioned cables onto vegetated habitats, potential propeller scouring impacts from vessel propulsion when manoeuvring plant into place.

These risks of losses of key fish habitat to use of vessels for construction works can be minimised by including specific aquatic habitat protection conditions to the project Construction Environmental Management Plan (CEMP) – see **Section 3.1.1** below:

Given the nature of the seabed sediments at the site (being for the most part coarse marine sand and shell fragments, the potential for turbidity and smothering impacts on adjacent habitats arising from pile placement activities is considered low and the use of silt curtains around the pile driving activity is considered unnecessary with potentially more risk for harm of adjacent habitats arising from turbidity curtain deployment. However, if turbidity curtains are to be deployed, they must be floating curtains set in a manner that does not increase the risk of damage to the indicated seagrass beds arising from curtain mooring apparatus or from curtain dragging during low tides and or high wave activity.

Construction of the deck extension and provision of services to the reconfigured marina arms have the potential for introducing off-cut litter to the harbour which can pose an ingestion risk to diverse biota from fish through to fishing birds and cetaceans. This can be mitigated by including ingestion risk into the CEMP and ensuring that this is discussed at inductions and tool box meetings.

As the ten moorings to be removed are commercial moorings. they are cleaned and serviced regularly so encrusting and attached biota assemblages do not have the time to develop to a point of providing valuable fish (including syngnathid) habitat between annual servicing and their removal will not result in a loss of fish nursery or feeding habitat.

3.1.1 Suggested Aquatic CEMP Inclusions for Construction Activities

The risk of additional losses of habitat to use of vessels for construction works can be minimised by including the following conditions to the project Construction Environmental Management Plan (CEMP):

All contractors undertaking construction work associated with the project shall ensure that their activities do not cause any harm to the marine vegetation habitats (i.e., seagrass beds) adjoining the project footprint, as identified on **Figure 2 & 3** above. In order to achieve these aims, contractors shall implement the following precautions:

- There will be no stockpiling of demolition or construction materials on the seabed.
- By virtue of the shallow depths over the marine vegetation habitats either side of the project footprint area, no vessel is to be taken over or left over the indicated marine vegetation (seagrass bed) habitats shown in **Figure 3** unless there is adequate vessel clearance depth (including allowance for tidal movement plus wind, vessel and swell wave heights) over the habitats. The estimations of clearance depths will also need to account for vessel propulsion gear clearance depths to ensure no propeller or wash scouring damage.
- No vessel is to be moored with anchor or other bottom tackle located in the marine vegetation habitats and, where possible, the construction contractor should utilise existing club or adjacent club infrastructure for mooring rather than setting temporary mooring blocks. If offshore mooring blocks are required, they will still need to be set to ensure no crushing or scouring damage to offshore seagrass beds as indicated in **Figure 2 & 3**.
- No mooring lines or cables are to be laid across the marine vegetation habitats if there is any risk of these cables reaching the bottom due to wave action or low tides. If deployed, they must be suitably buoyed prior to laying, and kept buoyed once laid, to prevent cable drag and cable swing damage (scalping) to marine vegetation areas.
- In order to minimise wash and prevent bottom scouring of the marine vegetation habitats, towing or pushing vessels must not use excessive power to manoeuvre barges into place near the designated marine vegetation habitats. Scouring damage can 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.
- Ingestion risks for marine biota arising from offcuts and debris from construction works and provision of services to the reconfigured marina arms can be mitigated by including ingestion risk into the CEMP and ensuring that this is discussed at inductions and tool box meetings
- Given the proximity of potential Little Penguin nesting, roosting and moulting habitat along the outer western shore of North Harbour construction works should be confined to daylight hours to **minimise** risk for local Little Penguin transiting the area with vessel

manoeuvring operations **not** scheduled over the dawn and dusk periods, in order to **avoid** any residual risk for transiting or feeding Little Penguins.

4 CONCLUSIONS

It is concluded that refurbishment proposal at North Harbour Marina in North Harbour can be undertaken with a low risk of impact on threatened species that may be in the vicinity of the site and low risk of impact on the aquatic habitats at the site. Residual risk of potential impact of pile and deck construction works will be mitigated by the use of best practice work methods outlined in **Section 3.1** above and that will be specified in the project Construction Environment Management Plan (CEMP).

Accordingly, the project would meet the aquatic ecology conservation requirements of SEPP(BC) 2021 Chapter 6, and would meet the aquatic ecology and fish habitat conservation requirements of the Fisheries Management Act 1994 (FMA) plus the NSW DPI Fisheries Guidelines (Fisheries NSW 2013).

As there are no works to be undertaken in the seagrass beds there will be no loss of marine vegetation arising from the proposal, provided the potential construction related impact avoidance measures provided in this report are employed, and whilst the works would therefore not require a *Permit to harm marine vegetation* under the FMA, DPI Fisheries may still require a permit to account for residual construction related risk.

4 REFERENCES

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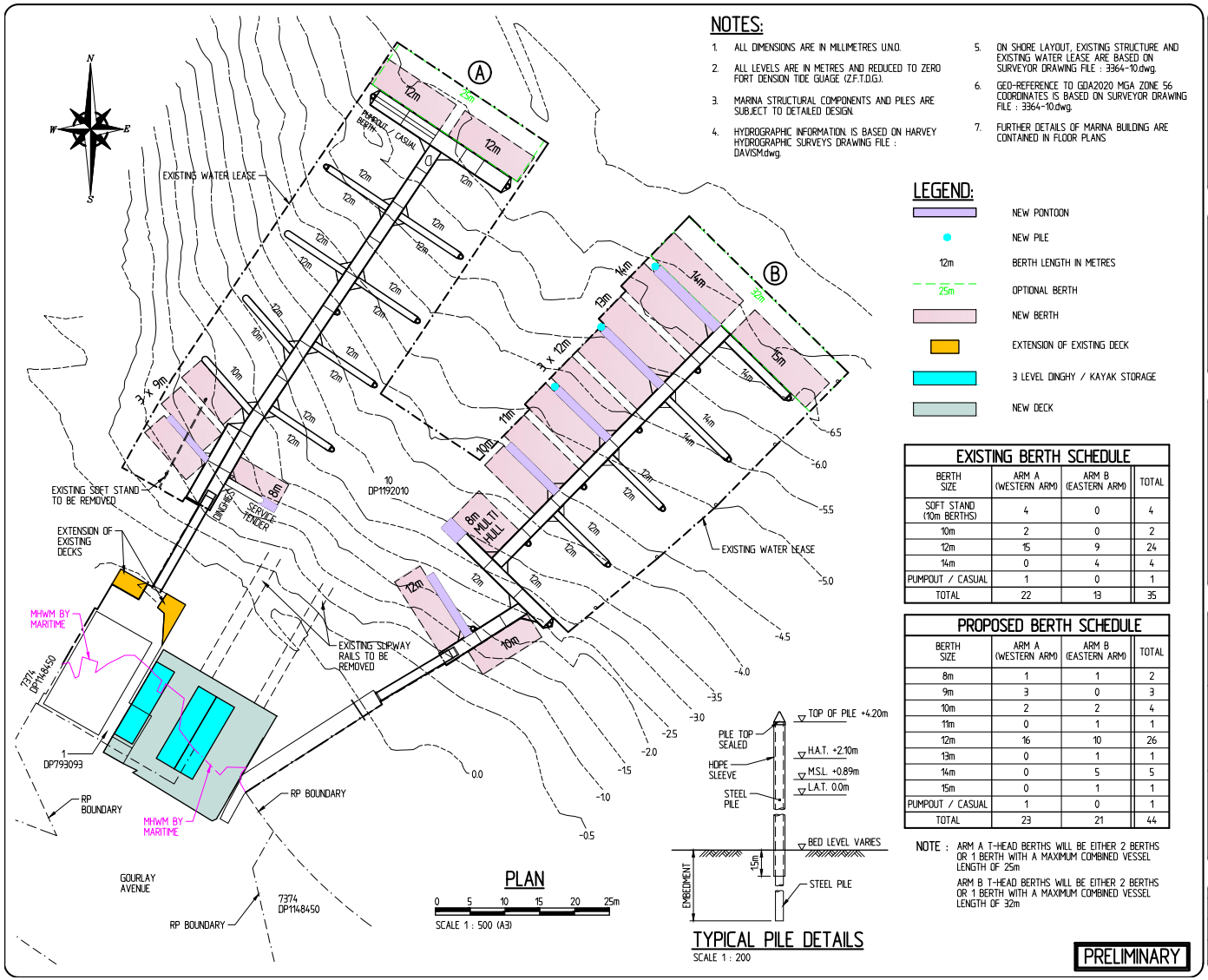
APPENDIX A


NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
2. ALL LEVELS ARE IN METRES AND REDUCED TO ZERO FORT DENSION TIDE GUAGE (Z.F.T.D.G.).
3. MARINA STRUCTURAL COMPONENTS AND PILES ARE SUBJECT TO DETAILED DESIGN.
4. HYDROGRAPHIC INFORMATION IS BASED ON HARVEY HYDROGRAPHIC SURVEYS DRAWING FILE : DAVISM.dwg.
5. ON SHORE LAYOUT, EXISTING STRUCTURE AND EXISTING WATER LEASE ARE BASED ON SURVEYOR DRAWING FILE : 3364-10.dwg.
6. GEO-REFERENCE TO GDA2020 MGA ZONE 56 COORDINATES IS BASED ON SURVEYOR DRAWING FILE : 3364-10.dwg.
7. FURTHER DETAILS OF MARINA BUILDING ARE CONTAINED IN FLOOR PLANS
LEGEND:
NEW PONTOON
NEW PILE
12m BERTH LENGTH IN METRES
25m OPTIONAL BERTH
NEW BERTH
EXTENSION OF EXISTING DECK
3 LEVEL DINGHY / KAYAK STORAGE
NEW DECK
EXISTING BERTH SCHEDULE
BERTH SIZE | ARM A (WESTERN ARM) | ARM B (EASTERN ARM) | TOTAL
SOFT STAND (10m BERTHS) | 4 | 0 | 4
10m | 2 | 0 | 2
12m | 15 | 9 | 24
14m | 0 | 4 | 4
PUMPOUT / CASUAL | 1 | 0 | 1
TOTAL | 22 | 13 | 35
PROPOSED BERTH SCHEDULE
BERTH SIZE | ARM A (WESTERN ARM) | ARM B (EASTERN ARM) | TOTAL
8m | 1 | 1 | 2
9m | 3 | 0 | 3
10m | 2 | 2 | 4
11m | 0 | 1 | 1
12m | 16 | 10 | 26
13m | 0 | 1 | 1
14m | 0 | 5 | 5
15m | 0 | 1 | 1
PUMPOUT / CASUAL | 1 | 0 | 1
TOTAL | 23 | 21 | 44
NOTE : ARM A T-HEAD BERTHS WILL BE EITHER 2 BERTHS OR 1 BERTH WITH A MAXIMUM COMBINED VESSEL LENGTH OF 25m
ARM B T-HEAD BERTHS WILL BE EITHER 2 BERTHS OR 1 BERTH WITH A MAXIMUM COMBINED VESSEL LENGTH OF 32m
PLAN
SCALE 1 : 500 (A3)
TYPICAL PILE DETAILS
SCALE 1 : 200
TOP OF PILE +4.20m
PILE TOP SEALED
H.A.T. +2.10m
HDPE SLEEVE
M.S.L. +0.89m
STEEL PILE
L.A.T. 0.0m
BED LEVEL VARIES
EMBEDMENT
15m
STEEL PILE
PRELIMINARY
EXISTING WATER LEASE
EXISTING SOFT STAND TO BE REMOVED
EXTENSION OF EXISTING DECKS
EXISTING SLIPWAY RAILS TO BE REMOVED
MHWM BY MARITIME
RP BOUNDARY
GOURLAY AVENUE
7374 DP1148450
1 DP793093
10 DP1192010
PUMPOUT / CASUAL BERTH
DINGHIES
SERVICE TENDER
8m MULTI HULL
3 x 9m
3 x 12m
L 22/05/24 NOTE No. 7 ADDED
K 6/03/24 PUMPOUT / CASUAL DESIGNATED
J 24/11/23 REVISED AS PER COUNCIL'S COMMENT
H 22/01/24 SLIPWAY NOTE REVISED
G 15/01/24 DINGHIES/KAYAK STORAGE ADDED
F 12/12/23 GEO-REFERENCE APPLIED
E 24/11/23 REVISED AS PER CLIENT'S COMMENT
Revisions
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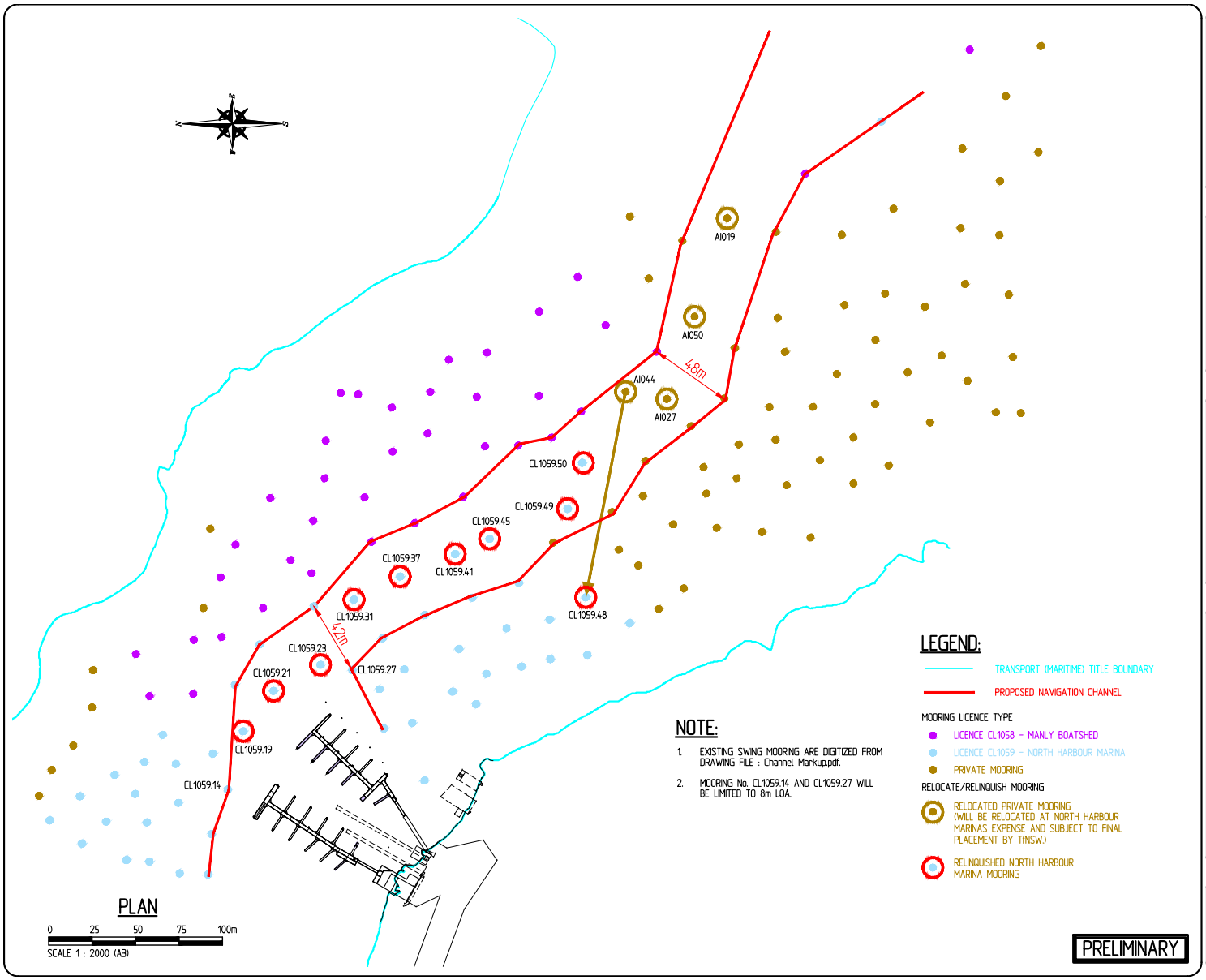
International Marina Consultants
Consultants to the Marina Industry.
International Marina Consultants Pty. Ltd.
A.C.N. 079 905 481
Suite 2, Building 4 107 Miles Platting Road, EIGHT MILE PLAINS QLD 4113 AUSTRALIA
Phone (07)3892 5711 Fax (07)3892 5611
Email : imc@imc-marinas.com
CLIENT:
ADDENBROOKE PTY. LTD.
PROJECT:
NORTH HARBOUR MARINA
TITLE:
PRELIMINARY LAYOUT
Date: 11/08/2023
Drawing No.: 6318-01/L
Scale: AS SHOWN
Drawn By: J.C.
Checked By:
Approved By:



L 27/08/24 DIMENSION ADDED
K 27/08/24 DIMENSION ADDED
J 27/08/24 MOORING LAYOUT AND NAVIGATION CHANNEL CHANGED AS PER CLIENT'S MARK UP
H 28/06/24 REVISED AS PER CLIENT COMMENTS

Revisions

International Marina Consultants
Consultants to the Marina Industry.
International Marina Consultants Pty. Ltd.
A.C.N. 079 905 481
Suite 2, Building 4 107 Miles Platting Road,
EIGHT MILE PLAINS QLD 4113
AUSTRALIA
Phone (07)3892 5711 Fax (07)3892 5611
Email : imc@imc-marinas.com

CLIENT: ADDENBROOKE PTY. LTD.

PROJECT: NORTH HARBOUR MARINA

TITLE: PROPOSED MARINA CHANNEL AND SWING MOORING REARRANGEMENT

Date:	15/08/2023
Drawing No.:	6318-02/L
Scale:	AS SHOWN
Drawn By: J.C.	Checked By:
Approved By:	