Advisian
WorleyParsons Group

Memorandum

To:	Mathew Gulliver	**Date:**	17/08/18
CC:	Glenn Colquhoun, Deborah Lam	**From:**	Ben Morgan
Subject:	Outer Harbour Safe Navigation Statement	**Project:**	Shell Cove Boat Harbour

INTRODUCTION

The Shell Cove Boat Harbour Outer Harbour Facilities include several floating and fixed waterside structures, and are proposed to be constructed as per the revised layout provided in **Attachment 1** (exuding the boat ramp that is already constructed under the existing planning approval). The NSW Department of Planning have requested the revised layout be the subject of a Section 75W modification request (MOD 8). The condition imposed as part of the approval for MOD 8 is as follows:

Address the impact of the proposed sitting of the outer harbour structures on navigation within the harbour.

This memorandum documents the revised Outer Harbour Facilities layout to seek a modification of the boat harbour consent. This memorandum has been prepared by staff from Advisian (part of the WorleyParsons Group) that have also developed the revised layout, and are suitability qualified Marine Engineers who have successfully delivered planning, design and construction documentation of several waterway infrastructure in Australia including the Shell Cove Marina.

GENERAL DESCRIPTION

A general layout of the Boat Harbour and design bed levels (in meters reduced to the Australian Height Datum unless otherwise stated) are shown in **Figure 1** and consists of the following:

- Inner Harbour, generally R.L-4.0 (with a localised R.L-5.0 area for berthing larger keeled vessels);
- Outer Harbour, R.L. -4.5; and,
- Access Channel, R.L.-4.5 transitioning seaward to R.L-5.0 and, further on, to deeper natural seabed levels.

Note design levels are the minimum level to be achieved and may be slightly deeper in some areas.

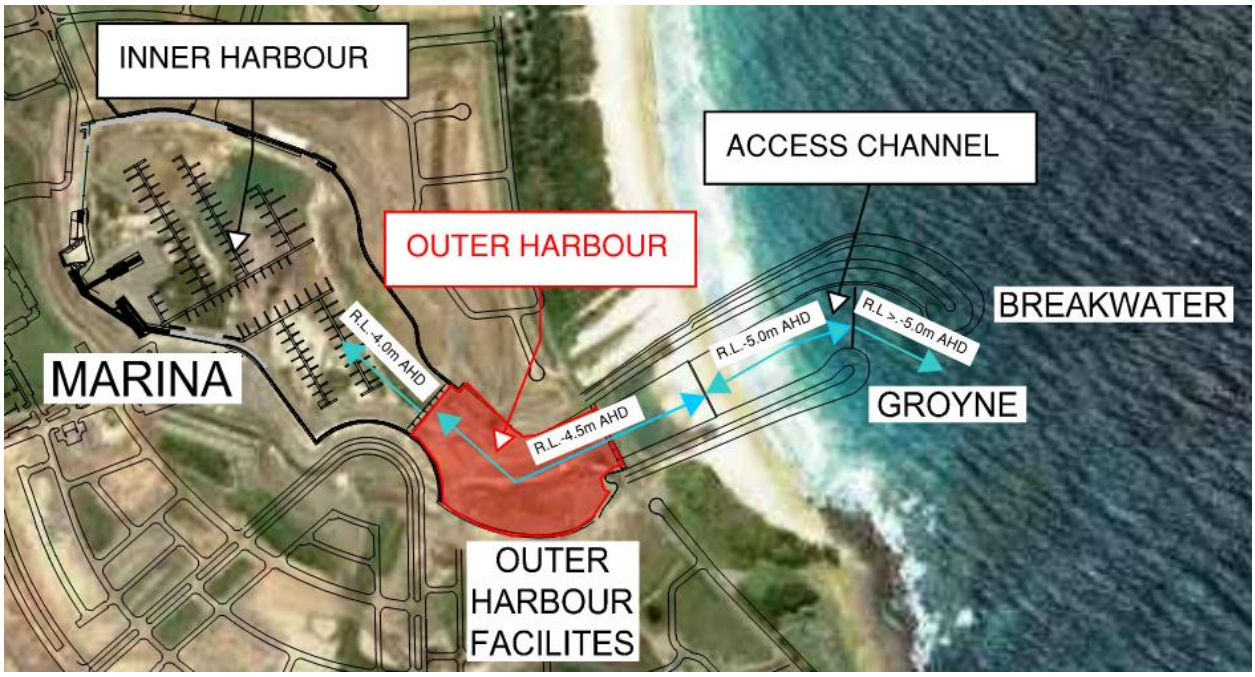

Figure 1 General layout of the Boat Harbour and design bed levels

The proposed Outer Harbour Facilities are to be located in the Outer Harbour that is generally sheltered from wind and waves. The Outer Harbour Facilities are to be accessed from the open ocean through the Access Channel between the Breakwater and Groyne, and the Inner Harbour where the marina is proposed. The Outer Harbour facilities are proposed to support both recreational and commercial vessels with a concept layout presented in **Figure 2** and **Attachment 1**.

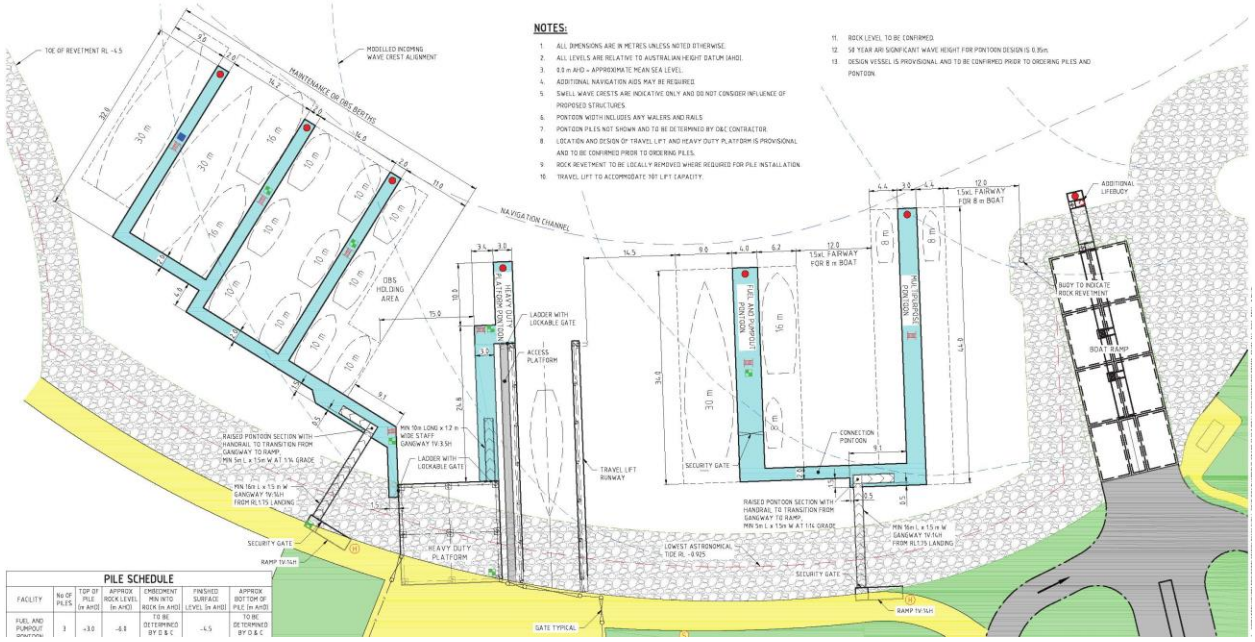

Figure 2 - Revised Outer Harbour Facilities Layout (the boat ramp does not form part of this DA modification)

The Outer Harbour facilities layout has been designed in accordance with *AS 3962-2001 Guidelines for the design of marinas* for vessel up to 30m in length, and comprises of the following main elements:

- public boat ramp and onramp pontoon (not part of this DA Modification);
- public multi-purpose pontoon;
- fuel and pump out pontoon;
- travel lift pen;
- multi-use heavy duty platform;
- dry boat storage (DBS) boat holding pontoons/berths; and,
- maintenance berths.

All berths in the Outer Harbour are considered for temporary uses that include the following:

- drop off/pick up passengers;
- provided to access DBS boats;
- refuelling;
- sewage pump-out; and,
- temporary berthing of vessels for maintenance.

BERTH SIZE

The minimum clear widths adopted for the berths are shown in **Table 1** and are based on AS 3962.

Individual finger lengths are at least 80% of the vessel length.

Table 1 Minimum Berth Size

Vessel Length (m)	Clear Width for Single Berth (m)	Clear Width for Double Berth (m)
8	4.4	7.8
10	5.0	9.0
12	5.4	9.8
14	5.8	10.6
16	6.2	11.4
18	6.4	11.8
20	6.7	12.4
25	8.0	16.0
28	9.0	17.5
30	9.0	17.5

Navigation Channel Widths

A minimum clear channel width of 1.5 times L has been adopted where L is the overall length of the longest boat using that channel. This is the minimum width recommended by AS 3962 and recognises that the harbour is reasonably sheltered.

The navigation channel width proposed for Outer Harbour have been based on the minimum requirement for the following reasons:

- sheltered waterway;
- negligible wave climate;
- low currents; and,
- boat speeds will be very low.

A 45.0m wide channel along the eastern side of the Outer Harbour provides access for vessels up to 30m in length. The revised Outer Harbour Facilities layout does not encroach on this channel.

Water Depth Requirements

The required water depth for berths and navigation channels has been determined by summation of the following:

- mono-hull draft of the vessel using the berth or channel;
- one half of the incident significant wave height Hs (50 yr Average Recurrence Interval (ARI) at berths inside the Inner Harbour and the Outer Harbour, and 1 yr ARI for the Access Channel as navigation would not be expected to occur in events rarer than 1 yr ARI);
- an underkeel clearance (UKC) of 0.3 m if the bed consists of soft material and a UKC of 0.5 m if the bed consists of hard material; and,
- appropriate allowance for sedimentation.

In the case of the permanent marina berths located in the Inner Harbour, the required water depth must be available below the Lowest Astronomical Tide (LAT) (approximately R.L.-0.925) on the basis the vessel occupies the berth in all tidal conditions during the course of any given year. Note that LAT generally occurs 1 to 2 times during a year.

In the case of the Outer Harbour Facilities where all berths are considered temporary, the required water depth can consider a higher reference water level of Mean Low Water Springs (MLWS) tide, which is at a level of approximately -0.56m AHD. A water level of MLWS is exceeded more than 90% of the time. This would allow both power and sailing vessels up to 30m in length to temporarily berth. MLWS is also the design reference water level adopted for manoeuvring in the navigation channel.

However, it should be noted that at the LAT water level, power vessels and sailing vessels of lengths up to 30m and 25m respectively could permanently berth if required.

Confirmation the proposed R.L. -4.5 design floor level of the Outer Harbour is suitable for berthing and manoeuvring of the design vessels is demonstrated by the design inputs and calculations summarised in **Table 2.**

Table 2 Calculation of Harbour Floor Level Requirements

Activity		Temporary Berthing	Manoeuvring	Permanent Berthing (if required)
Tide		MLWS	MLWS	LAT
Water Level (m AHD)		-0.56	-0.56	-0.925
Vessel Length (m)	Power	30	30	30
	Sail	30	30	25
Maximum vessel draft (m)		3.4	3.4	3
0.5Hs (m)		0.15	0.15	0.15
UKC (m)		0.3	0.3	0.3
Sedimentation Allowance (m)		0.05	0.05	0.05
Minimum Harbour Floor Level Required (m AHD)		**-4.46**	**-4.46**	**-4.43**

CONCLUSION

The revised Outer Facilities layout provided in **Attachment 1** is in accordance with the criteria set out in *AS 3962-2001 Guidelines for the design of marinas* to provide the safe navigation of various vessel sizes up to 30 m in length. No layout changes have been made to the Inner Harbour or Access Channel that can both accommodate vessels up to 30m in length.

ATTACHMENT 1

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE RELATIVE TO AUSTRALIAN HEIGHT DATUM (AHD).
3. 0.0 m AHD = APPROXIMATE MEAN SEA LEVEL.
4. ADDITIONAL NAVIGATION AIDS MAY BE REQUIRED.
5. SWELL WAVE CRESTS ARE INDICATIVE ONLY AND DO NOT CONSIDER INFLUENCE OF PROPOSED STRUCTURES.
6. PONTOON WIDTH INCLUDES ANY WALERS AND RAILS
7. PONTOON PILES NOT SHOWN AND TO BE DETERMINED BY D&C CONTRACTOR.
8. LOCATION AND DESIGN OF TRAVEL LIFT AND HEAVY DUTY PLATFORM IS PROVISIONAL AND TO BE CONFIRMED PRIOR TO ORDERING PILES.
9. ROCK REVETMENT TO BE LOCALLY REMOVED WHERE REQUIRED FOR PILE INSTALLATION.
10. TRAVEL LIFT TO ACCOMMODATE 70T LIFT CAPACITY.
11. ROCK LEVEL TO BE CONFIRMED.
12. 50 YEAR ARI SIGNIFICANT WAVE HEIGHT FOR PONTOON DESIGN IS 0.35m.
13. DESIGN VESSEL IS PROVISIONAL AND TO BE CONFIRMED PRIOR TO ORDERING PILES AND PONTOON.

TOE OF REVETMENT RL -4.5
MODELLED INCOMING WAVE CREST ALIGNMENT
MAINTENANCE OR DBS BERTHS
NAVIGATION CHANNEL
DBS HOLDING AREA
HEAVY DUTY PLATFORM PONTOON
LADDER WITH LOCKABLE GATE
ACCESS PLATFORM
TRAVEL LIFT RUNWAY
HEAVY DUTY PLATFORM
FUEL AND PUMPOUT PONTOON
MULTIPURPOSE PONTOON
CONNECTION PONTOON
1.5xL FAIRWAY FOR 8 m BOAT
ADDITIONAL LIFEBUOY
BUOY TO INDICATE ROCK REVETMENT
BOAT RAMP
MIN 10m LONG x 1.2 m WIDE STAFF GANGWAY 1V:3.5H
RAISED PONTOON SECTION WITH HANDRAIL TO TRANSITION FROM GANGWAY TO RAMP, MIN 5m L x 1.5m W AT 1:14 GRADE
MIN 16m L x 1.5 m W GANGWAY 1V:14H FROM RL1.75 LANDING
SECURITY GATE
RAMP 1V:14H
LOWEST ASTRONOMICAL TIDE RL -0.925
GATE TYPICAL

MAINTENANCE FACILITY
REFER DRG 301015-02681-MA-DSK-0021 FOR GENERAL ARRANGEMENT

BOAT RAMP PARKING
REFER DRG 301015-02681-MA-DSK-0017 FOR GENERAL ARRANGEMENT

PLAN
1:250 (A1) 1:500 (A3)

5 0 5 10 15 20 25m
1:250 (A1) 1:500 (A3)

PILE SCHEDULE

FACILITY	No OF PILES	TOP OF PILE (m AHD)	APPROX ROCK LEVEL (m AHD)	EMBEDMENT MIN INTO ROCK (m AHD)	FINISHED SURFACE LEVEL (m AHD)	APPROX BOTTOM OF PILE (m AHD)
FUEL AND PUMPOUT PONTOON	3	+3.0	-6.0	TO BE DETERMINED BY D & C CONTRACTOR	-4.5	TO BE DETERMINED BY D & C CONTRACTOR
CONNECTION PONTOON	1	+3.0	-6.0	TO BE DETERMINED BY D & C CONTRACTOR	-4.5	TO BE DETERMINED BY D & C CONTRACTOR
MULTIPURPOSE PONTOON	4	+3.0	-6.0	TO BE DETERMINED BY D & C CONTRACTOR	-4.5	TO BE DETERMINED BY D & C CONTRACTOR
HEAVY DUTY PLATFORM	9	+2.2	-6.0	1.5	VARIES	-7.5
HEAVY DUTY PLATFORM PONTOON	4	+3.0	-6.0	TO BE DETERMINED BY D & C CONTRACTOR	-4.5	TO BE DETERMINED BY D & C CONTRACTOR
MAINTENANCE OR DBS PONTOON	11	+3.0	-6.0	TO BE DETERMINED BY D & C CONTRACTOR	-4.5	TO BE DETERMINED BY D & C CONTRACTOR
TRAVEL LIFT	16	+2.2	-6.0	1.5	VARIES	-7.5

SERVICES SCHEDULE

SYMBOL	DESCRIPTION	NUMBER
(S)	SERVICES CONNECTION POINT	1
●	NAVIGATION LIGHT	7
(H)	FIRE HYDRANT	2
▬	FIRE HOSE REEL (C/W 9kg DRY CHEMICAL EXTINGUISHER) EVERY SECOND REEL AND LIFEBUOY	7

SERVICES PEDESTAL SCHEDULE

SYMBOL	PEDESTAL TYPE	POWER SUPPLY	No OF PEDESTALS	REFERENCE
▣	TYPE 1B	2 x 15A	1	DWG-0811
▣	TYPE 1C	4 x 15A	6	DWG-0811
■	TYPE 4B	2 x 15A + 4 x 32A-3 PH + 2 x 125A-3PH	1	DWG-0811

ISSUE	DATE	ISSUE DESCRIPTION	DRAWN
E	07.03.18	MINOR AMENDMENTS	KM
D	27.02.18	SERVICES ADDED	VIP
C	15.02.18	ISSUED FOR INFORMATION	TJR
G	16.08.18	MINOR AMENDMENTS	VIP
F	15.08.18	MINOR AMENDMENTS	VIP

WorleyParsons
resources & energy

OneWay to zero harm

FOR INFORMATION ONLY

NORTH

SHELL COVE BOAT HARBOUR
OUTER HARBOUR FACILITIES
WATERSIDE OPTION 1
301015-02681-MA-DSK-0024

USER NAME: vaughan.patrick LOCATION: W:_INFRASTRUCTURE\PROJECTS\301015\02681 SHELL COVE BOATHARBOUR STAGE 2\12.0 DRAWINGS\SKETCHES\301015-02681-MA-DSK-0024_F.DWG
CTB FILE: Worley-Full.ctb Plotter:None
PLOT DATE & TIME: 16/8/2018 5:52:29 PM
SAVE DATE & TIME: 16/8/2018 5:52:07 PM