



Memorandum

To:	Mathew Gulliver	Date:	22/08/18
CC:	Deborah Lam	From:	Ben Morgan
Subject:	Outer Harbour Facilities – Section 75W (Mod 8) – Coastal Process and Hazards	Project:	Shell Cove Boat Harbour

1.0 INTRODUCTION

Frasers Property Australia (FPA) intends to submit a modification to the approved boat harbour and marina at Shell Cove (DA 95/133) under Section 75W of the Environmental Planning and Assessment Act 1979. The consent for the Boat Harbour Precinct has been modified seven times, most recently in July 2017. However, the outer harbour structures, which are the subject of this modification, have not formed part of any development modification since the original approval. The proposed modification is to amend and relocate the nominated outer harbour structures further south-east to be closer to the boat ramp and boat storage facilities.

FPA has commissioned Advisian to prepare the following memo to present the modifications to the outer harbour structures made since the original approval, and address of the potential effects of coastal processes and hazards.

2.0 SECTION 75W CHANGES

The Section 75W modifications can be described generally as amending and relocating the outer harbour structures further south-east to be closer to the boat ramp and boat storage facilities

The original layout and location (red clouded area) and proposed location (red ellipse area) of the outer harbour structures are shown in **Figure 1**. The location of the proposed outer harbour structures in the context of the approved boat harbour precinct plan is shown on **Figure 2**. The proposed location of the outer harbour structures is generally sheltered from wind and waves and within the same depth of water (R.L. -4.5m AHD) as per the original layout.

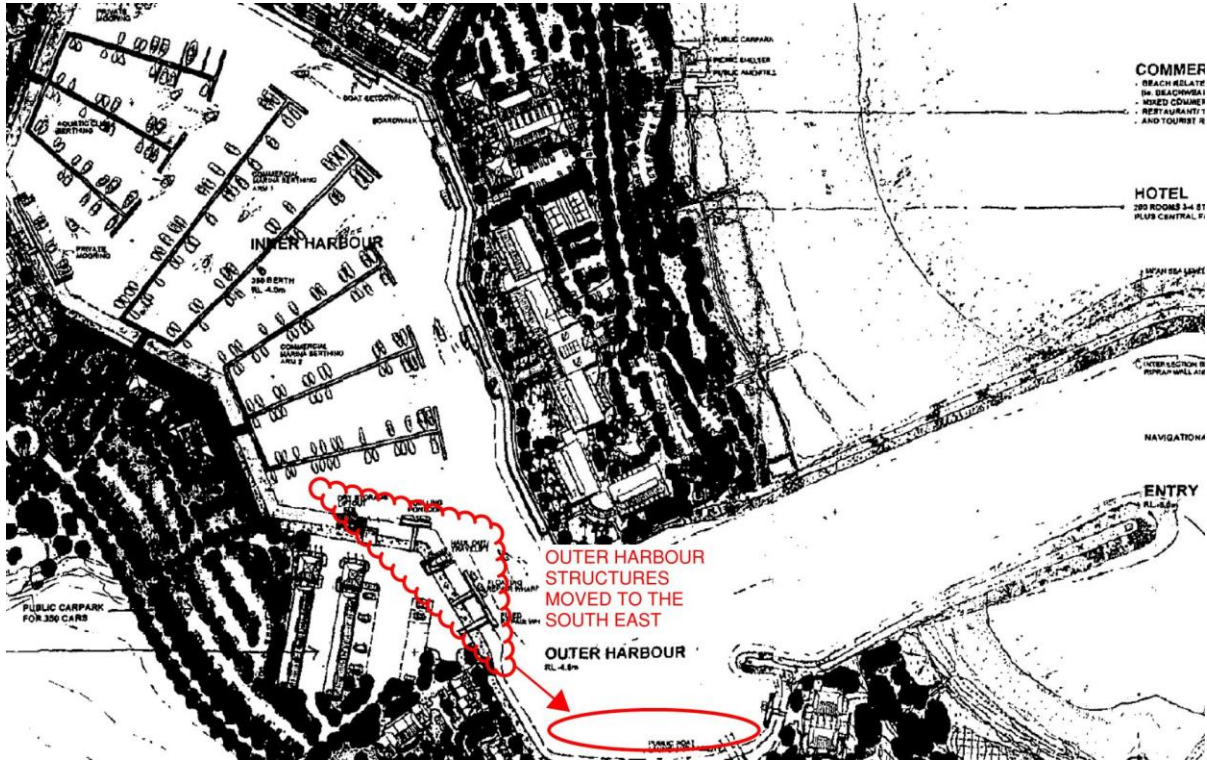


Figure 1 Original layout and location of the outer harbour structures and proposed location (orientated to the North).

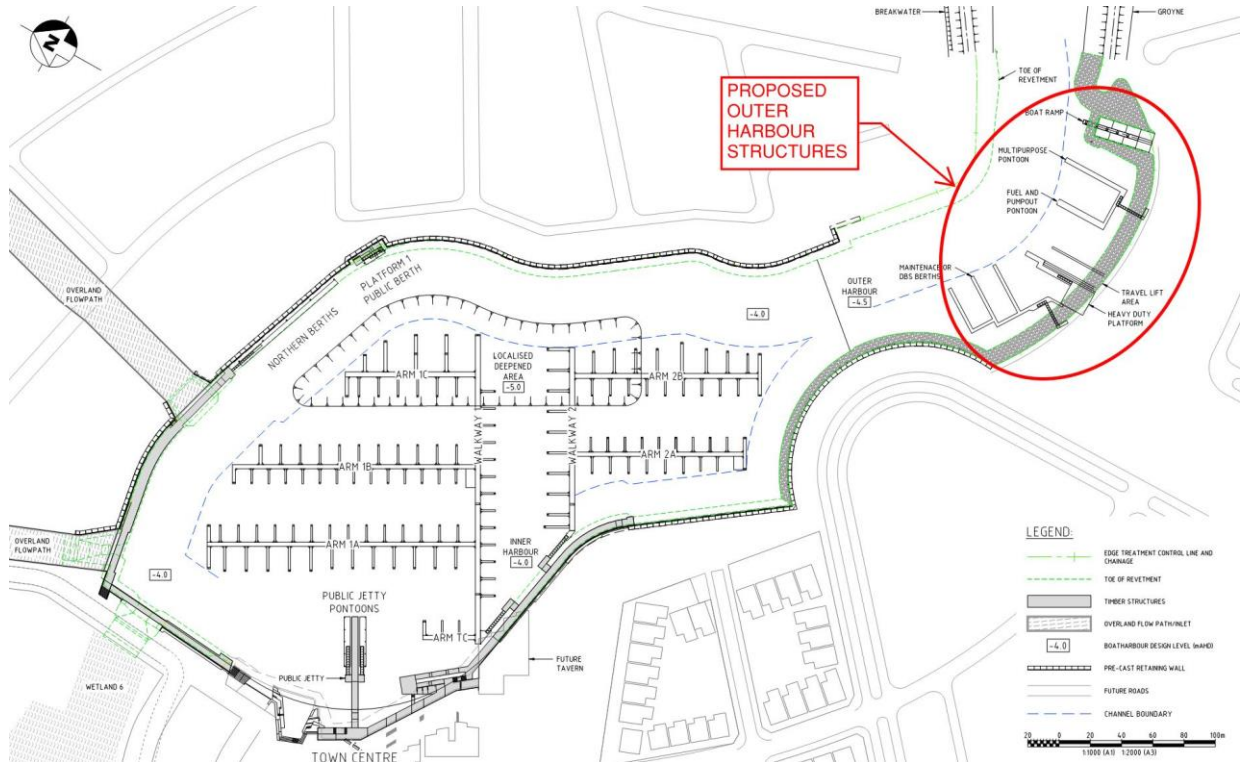


Figure 2 Proposed relocation of the outer harbour maritime structures with respect to the approved boat harbour precinct plan (orientated to the north-east)

The composition and function of the proposed outer harbour structures (refer **Figure 3**) generally remains unchanged to the original layout and includes the following:

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

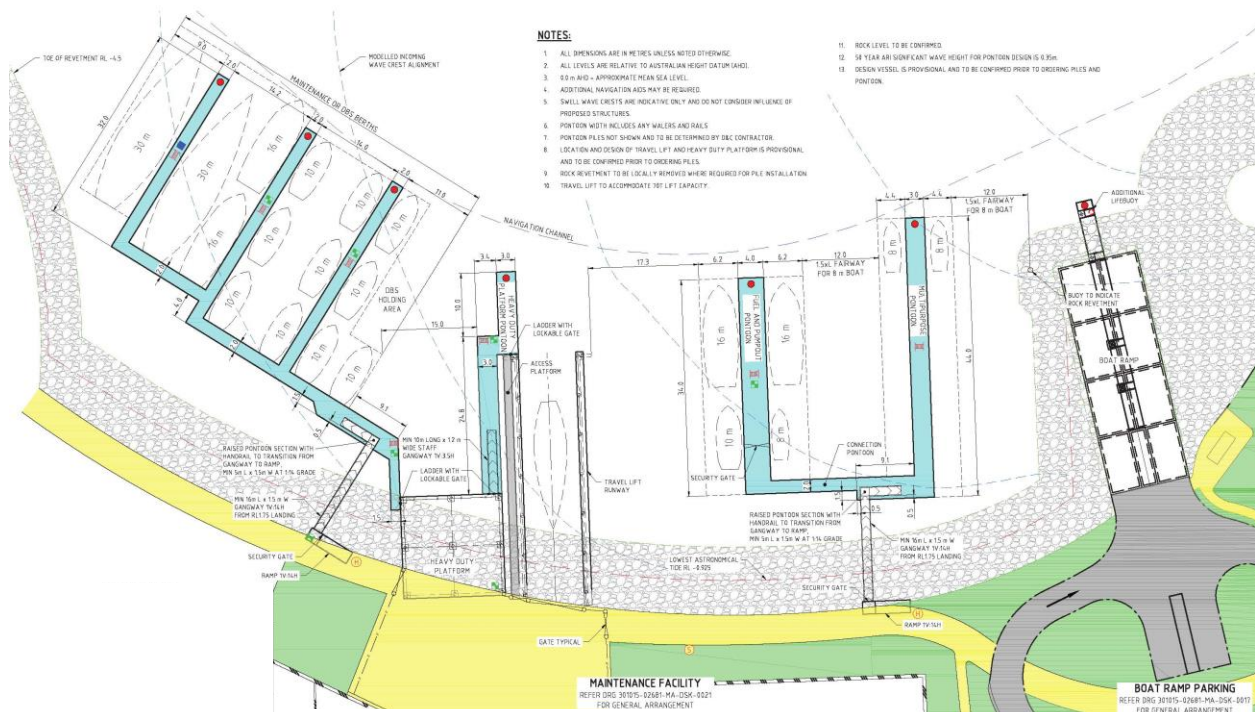


Figure 3 Proposed layout of the outer harbour structures

3.0 COASTAL PROCESSES AND HAZARDS

A review of the proposed modifications has been undertaken against the assumptions and impacts of the following documents:

- Shell Cove Boatharbour/Marina Environmental Impact Statement (LFA, 1995)
- Shell Cove Boat Harbour Precinct, Concept Plan Application and Environmental Assessment (WorleyParsons, 2009);
- Shell Cove Boat Harbour Precinct, Concept Plan Application and Environmental Assessment – Supporting Information on Coastal Processes, Response to Submissions (WorleyParsons, 2010);



The above reports address a number of key issues relating to coastal processes required for the original approval and subsequent modifications of the boat harbour precinct. The Secretary's Environmental Assessment Requirements for the proposed modification to Shell Cove Boat Harbour/Marina (DA 95/133 MOD 8) with regards to coastal processes and hazards are as follows:

Address the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016) and flooding including sea level rise and climate change:

- *on the proposed development; and*
- *arising from the proposed development.*

The Coastal Management Act 2016 defines coastal hazards as follows:

- beach erosion;
- shoreline recession;
- coastal lake or watercourse entrance instability;
- coastal inundation;
- coastal cliff or slope instability;
- tidal inundation; and,
- erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

Tidal inundation and erosion and inundation of foreshores caused by tidal waters and the action of waves are the two coastal hazards that have potential to affect the outer harbour structures. The impacts of the remaining coastal hazards would be confined to areas seaward of Boollwarroo Parade / Bass Point Tourist Road.

Further discussion of each coastal hazard and the impacts of climate change and coastal processes in the context of the proposed outer harbour structures layout is provided in this Section.

Beach erosion and shoreline recession

Beach erosion affects areas well seaward of Boollwarroo Parade / Bass Point Tourist Road. Typically, the landward limit of beach erosion is at least 60 to 80 m east of Boollwarroo Parade / Bass Point Tourist Road. The proposed outer harbour structures are well landward of Boollwarroo Parade/Bass Point Road and there would therefore not be impacted by beach erosion.

Coastal lake or watercourse entrance instability

Coastal lake or watercourse entrance instability hazard is confined to the Boat Harbour entrance and adjacent beaches. The original investigations and studies demonstrated that the proposed entrance works would induce a minor re-alignment of the beach but be unlikely to have any detrimental effect on beach stability, which would be managed appropriately by the Beach Nourishment / Rehabilitation Management.



Coastal inundation

The inundation hazard to the Boat Harbour Precinct due to wave overtopping of the dune crest level along Shellharbour South Beach is not considered significant as it would be managed by the following:

- infiltration of any overtopping flows into the sandy dune system between the dune crest and Boollwarroo Parade/ Bass Point Tourist Road;
- the drainage system in the Boollwarroo Parade / Bass Point Tourist Road would serve to collect any overtopping flows, although it is considered unlikely waves would ever reach this far landward within a planning period of 100 years.

Slope and cliff instability

It is been established that beach erosion along Shellharbour South Beach in a severe storm event, occurring at the end of a planning period of 100 years taking into account a 'High' sea level rise scenario, would still be well seaward of proposed development in the Boat Harbour Precinct and well seaward of Boollwarroo Parade / Bass Point Tourist Road. There are no cliffs or bluffs along the seaward edge of the Boat Harbour Precinct.

Tidal inundation

The tidal range in the boat harbour would be similar to the open ocean tidal range, typically between R.L. +1.1 to -0.9m AHD for Highest Astronomical Tide and Lowest Astronomical Tide respectively. The outer harbour structures are proposed at R.L. +2.2m AHD for the deck of the fixed structures (ie Heavy Duty Platform and Travel Lift rails), and R.L. +3.5m AHD for the top of the piles restraining the floating structures (ie pontoons). The outer harbour structures are designed at a level sufficient to accommodate all states of the tide and sea level rise.

Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters

The foreshore in the Outer Harbour (not part of this DA modification) is typically a rock revetment supporting a concrete kerb at the crest. The level of concrete kerb is above R.L. +2.2 m AHD. The 100 year ARI extreme water level for the Outer Harbour is +R.L. 1.5m AHD area, and would be exposed to waves no greater than 0.3m under design event conditions. The inclusion of the outer harbour structures would, if anything, provide additional foreshore protection from wave action. The foreshore is also designed to be unerodable for the given site conditions. It should also be noted that the foreshore level for this specific area is at least 200mm higher than the remainder of the approved boat harbour precinct. This higher foreshore level has been set to facilitate access for DBS and travel lift operations. However, it would inadvertently provide additional protection from foreshore inundation.

Sea Level Rise and Climate Change

The proposed outer harbour structures within the Boat Harbour Precinct would not be threatened by coastal processes, including with consideration of possible future sea level rise. A future sea level rise allowance of 0.6m has been considered for the 50 year service life of the proposed structures. This outcome is not affected in any way by the Section 75W modifications.



Structures accommodating coastal processes

The wave climate in the harbour basin would provide excellent mooring conditions (LFA,1995). This is supported by AS 3962 Guidelines for design of marinas for head and oblique seas where the 50 year ARI wave significant height is estimated to be less than 0.3m using a hydrodynamic numerical wave model (PBP, 2005). The direction of refracted/diffracted waves in the Outer Harbour with respect to the proposed structures is shown by the approximate wave crest alignments on **Figure 3**. The modelled wave climate at the location of the original layout is similar to the proposed layout location as presented in **Figure 4**.

Structurally, the expected wave climate, tidal currents and water levels are considered suitable for the design of the proposed structures in accordance with AS 3962 Guidelines for design of marina, AS 4997 Guidelines for the design of maritime structures, and other relevant guidelines and standards.

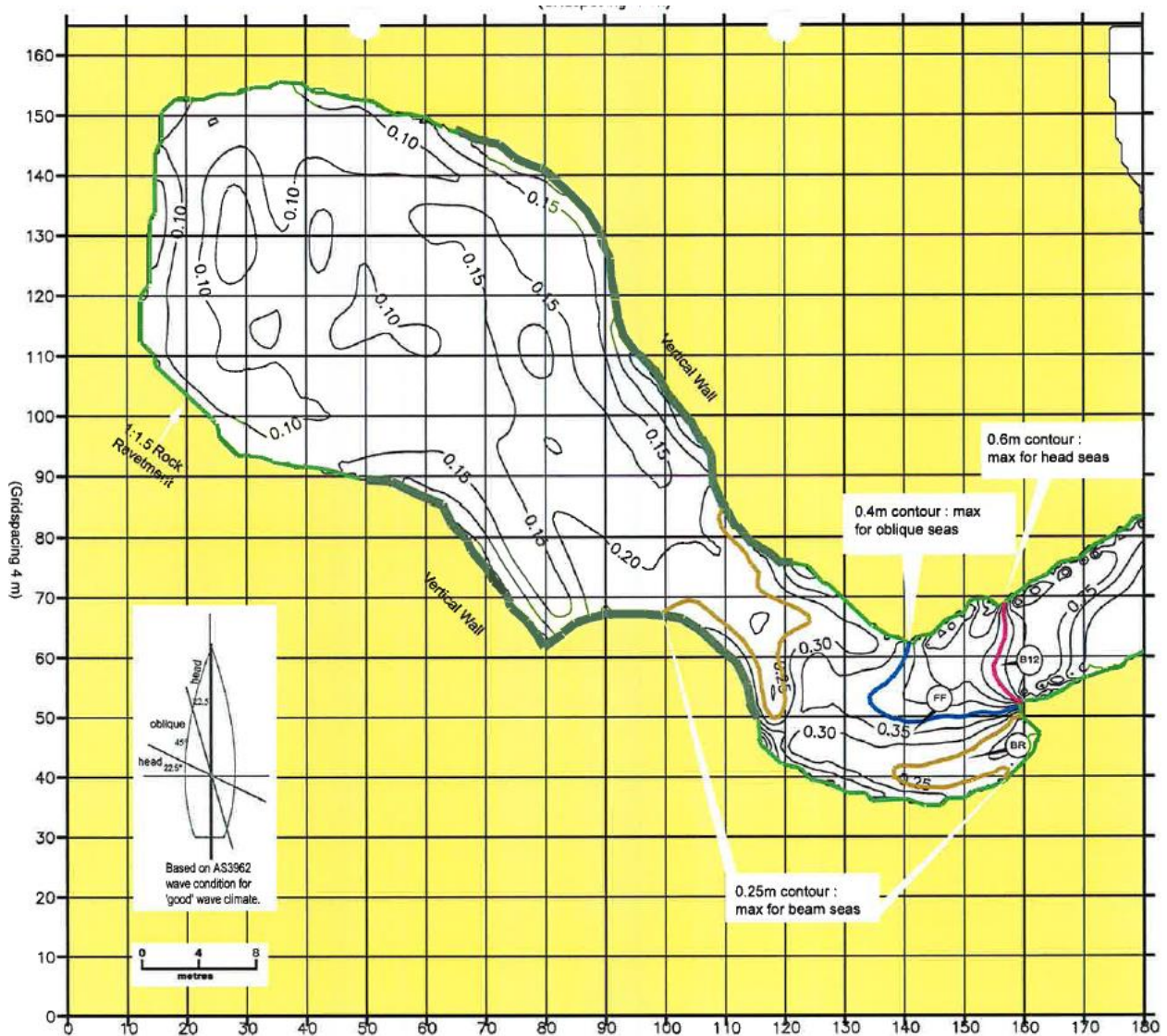


Figure 4 Modelled 50 year significant wave heights in the boat harbour (PBP, 2005)



4.0 IMPACT OF PROPOSED SECTION 75W MODIFICATIONS

The significant change to outer harbour structures is the relocation and specific layout, while the composition and function of the outer harbour structures remains generally unchanged to the original layout. These modifications will have no significant impact on the coastal processes and hazards for the site and the previous management measures would be retained.

5.0 REFERENCES

WorleyParsons (2009), Shell Cove Boat Harbour Precinct, Concept Plan Application and Environmental Assessment

WorleyParsons (2010), Shell Cove Boat Harbour Precinct, Concept Plan Application and Environmental Assessment – Supporting Information on Coastal Processes, Response to Submissions

LFA (1995), Environmental Impact Statement – Shell Cove Boatharbour/Marina, Shadforth Wetland, Haul Road landfill

PBP (2005) Shell Cove Boatharbour Stage 2 – Preliminary Design Development Volume 1 – Main Report