



# Yorke Peninsula Council

## Marion Bay Boat Launching Facility

### Options Review Report

June 2017



# Executive Summary

## Introduction

The Yorke Peninsula Council (YPC) Recreational Boating Strategy Plan (Coppock, 2012) identified that the existing boat launching facilities provided at Marion Bay require an upgrade. Council engaged GHD Pty Ltd (GHD) to:

- undertake a review of the Marion Bay boat launching facilities.
- engage with stakeholders through a formalised and managed process to identify and understand their opinions, and,
- develop and “short-list” options for the upgrading of the boat ramp.

## Options Review

The options review for the upgrade of the Marion Bay boat ramp considered

- Previous reports
- Stakeholder feedback – face to face meetings, written responses, telephone surveys
- High-level technical review

As part of the stakeholder feedback, Council directed GHD that alternative locations for the boat ramp was not an option, and that the upgrade works associated with the boat launch facility were to be located at the existing site. In addition, the works were to achieve a minimum Category 2 (all weather) rating.

The following four options were considered:

- Option 1 – Do Nothing
- Option 2 – Upgrade Existing Boat Ramp (Category 1 Rating)
- Option 3 – New Boat Ramp with Off-shore Breakwater (Category 2)
- Option 4 – New Boat Ramp and Enclosed Harbour (Category 3)

Preliminary cost estimates for the Options were developed based on the technical sketches (refer Appendix A) and prepared by cost consultant Rider Levett Bucknell and identified that Options 2, 3 and 4 each had capital values of the order of \$5 to 8 million.

## Recommendations

It is recommended that Council:

1. Adopt Options 3 and 4 as preferred solutions for the boat ramp upgrade at Marion Bay. Both options:
  - Involve the construction of a breakwater structure
  - Achieve a Category 2 rating (or greater)
  - Have similar capital cost (in the range of \$5 to \$8 million)
  - Require an ongoing maintenance regime, and associated operational cost.

2. Undertake an Impacts Assessment of the site and the associated region to develop a greater understanding of the impacts of the boat ramp upgrade on the precinct. The assessment should include:
  - Numerical modelling of wave and associated coastal processes
  - Determination of sediment transport processes and estimation of deposition volumes.
  - Preparation of a budget estimate cost for a maintenance regime
3. Develop the design of the preferred upgrade solution, based on the outcomes of the Impacts Assessment, sufficient to support detailed funding applications and Development Approvals

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# 1. Introduction

## 1.1 Scope and Purpose of this Report

The Yorke Peninsula Council (YPC) Recreational Boating Strategy Plan (Coppock, 2012) identified that the existing boat launching facilities provided at Marion Bay require an upgrade. Council has requested that a review of the Marion Bay boat launching facilities be undertaken to determine the options available for redevelopment of the existing boat ramp and surrounding area to address key stakeholder concerns.

The purpose of this report is to identify key issues with the existing facilities, suitable redevelopment options, and a preferred option based on appropriate assessment criteria. It has been developed based on a high level consideration of:

- Safety,
- Maintenance,
- Sustainable Development, and,
- Budget.

It should be noted that the assessment was made using existing published information. The preparation of detailed modelling of coastal processes is an opportunity for a future study. It will be instrumental in the assessment of maintenance outcomes for the boat ramp upgrade.

The outcomes of the Report also address issues raised through the detailed stakeholder engagement process undertaken in conjunction with the works.

## 1.2 Site Location

Marion Bay is situated on the south-eastern coastline of the Yorke Peninsula, South Australia, approximately 72 km south-east of Yorketown. The Marion Bay boat ramp is located approximately 50 m north of the Marion Bay jetty as shown in Figure 1.

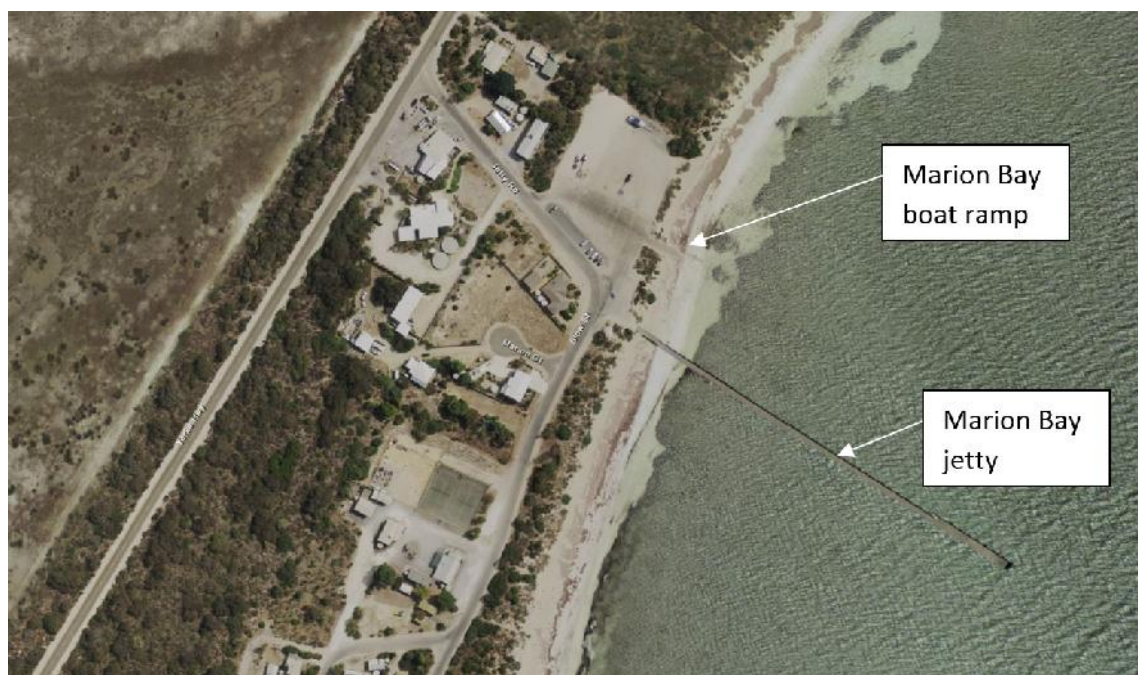


Figure 1: Site Location – Marion Bay Boat Launching Facilities

## 2. Understanding the Project Issues

### 2.1 Previous Studies

#### 2.1.1 Recreational Boating Strategy Plan (Coppock 2012)

Marion Bay is a popular tourist and holiday destination but the existing boat ramp constrains its ability to capitalise on the potential growth in boating tourism and provide users with adequate facilities to ensure safe and pleasurable boating experiences (Coppock, 2012).

The current facility consists of a single lane, low gradient, concrete ramp accessed via a sealed roadway to the ramp, and a car/trailer parking area. According to stakeholders, a boat ramp has been in this location for approximately 50 years.



Figure 2: Marion Bay Boat Ramp (June 2016)

The Recreational Boating Strategy Plan (Coppock, 2012), commissioned by Council in May 2012, reviewed the existing facilities at Marion Bay alongside other boat launching facilities in the area. The Marion Bay facility was assessed as being Category 1, and assigned a high priority for its upgrade to a Category 2 facility. The category descriptions given in Coppock (2012) are provided in Table 1.



Table 1: Classification of boating facilities in YPC Recreational Boating Strategy Plan (Coppock, 2012)

Category	Description
Category 1	<p>Good weather ramp/beach launching facility with few additional facilities which would:</p> <ul style="list-style-type: none"> <li>) mostly serve the local community (both full-time residents and visitors)</li> <li>) be of relatively low capital cost and low maintenance</li> <li>) have non-extensive parking or other facilities</li> <li>) be provided with signage and hard waste collection.</li> </ul> <p>Such facilities would generally be adjacent to small local settlements/communities and accessed via local roads.</p>
Category 2	<p>All weather ramp with adequate parking, lighting, navigation aids etc. which would:</p> <ul style="list-style-type: none"> <li>) serve the local community and a more extensive tourist market</li> <li>) be of higher capital cost and possibly higher maintenance cost (depending on design)</li> <li>) be provided with rigging area and services including lighting, water and hard waste collection</li> <li>) be a safety resource for rescue and storm shelter</li> <li>) possibly be extensive in development and disruptive to coastal processes.</li> </ul>
Category 3	<p>Enclosed harbour providing mooring facilities for cruising and local yachts which would:</p> <ul style="list-style-type: none"> <li>) serve the wider recreational boating market</li> <li>) be of high capital cost and possibly higher maintenance cost (depending on design)</li> <li>) provide appropriate servicing for cruising vessels</li> <li>) be a recreational boating resource and cruising destination.</li> </ul>

The YPC Recreational Boating Strategy Plan identified that:

- Marion Bay, on the south western tip of Yorke Peninsula, is highly strategic from a boating safety perspective and should be developed as an all-weather facility.
- Upgraded facilities should be provided in accordance with the design development report (previously prepared by Coppock and Associates):
  - Foreshore protection to be provided to protect residual dunes;
  - Ramp to be remodelled to improve access to deeper water;
  - Car/trailer parking area to be formalised;
  - Rigging area to be formalised;
  - Waste bins to be provided at head of ramp;
  - Lighting at head of ramp to be provided; and
  - Consideration to be given to relocation of ramp.



Figure 3: Marion Bay Boat Ramp Car Park (June 2016)

#### 2.1.2 Concept Design for Improvements to Boat Launching Facility – Marion Bay (KBR 2010)

A previous study undertaken in 2010 by Kellogg Brown and Root (KBR 2010) considered options for the development of the boat launching facilities at Marion Bay (refer Concept Design for Improvements to Boat Launching Facility – Marion Bay KBR AEJ802-Z-REP-001 Rev 1 25 August 2010). It recommended the following upgrades to meet the objectives of the Recreational Boating Facilities Strategy Plan:

- A second launching land to the existing boat ramp
- The provision of a rock groyne to provide all weather protection,
- The opportunity to consider an option for siting the facility at Penguin Point.

## 2.2 Stakeholder Engagement

Engagement with key stakeholders was identified as a critical component in understanding key issues at the existing Marion Bay boat launching facility. The engagement of key stakeholders therefore sought to tap into and build upon local knowledge and technical expertise specific to Marion Bay. Stakeholders were identified in collaboration with Council according to their ability to represent a broad cross section of perspectives and viewpoints.

Key stakeholders were engaged by GHD during one on one meetings between May and June 2016. Meetings were conducted either in person or via teleconference at their convenience. Stakeholders included a local park ranger, fishermen, business owners and a Councillor. The full list of stakeholders, their field of expertise and relevance to the project, and consultation meeting date is outlined in the Marion Bay Boat Launching Facility Engagement Outcomes Report (GHD, 2016), which is attached as Appendix C. The Engagement Outcomes report

provides more detailed information, with a number of key themes and issues emerging, highlighting that:

- **There are a number of safety risks for ramp users that must be addressed**

Safe launching and retrieval from the boat ramp was identified as an issue due to the current state of the boat ramp, wave conditions affecting the area, and usage of the facility by visitors who are unfamiliar with these conditions (i.e. safety vs good seamanship). There is also a drop-off at the end of the ramp that has damaged vehicles and trailers previously. It is believed that this drop off is caused by power loading vessels onto trailers (rather than winching).

- **The facility is critical to supporting the local economy**

A decline in tourist numbers is suspected to have resulted in the decline in property values and a surplus of private rental properties. It is believed there may be a link between the usability/quality of the boat ramp (and associated facilities for boats) and tourist numbers, thus the economic well-being of the area is being adversely affected.

- **There is a need for regular cleaning and maintenance of the facility**

It was identified that there is no organisation responsible for cleaning and maintenance of the boat ramp and facilities. Issues with excessive seagrass wrack and dumping of fish waste were noted from stakeholders.

- **Environmental impacts should be considered in conjunction with the development of a new facility**

Environmental considerations include avoiding sand or seagrass wrack build up, water quality, changes to sand movement and erosion/accretion patterns, impacts on the local ecology.

- **There is a need for improvement to associated infrastructure that supports the facility**

Access is somewhat limited due to the narrowness of the ramp, as well as a lack of boat holding and tie up facilities. Amenities such as a fish cleaning facility, toilets, skip bins, fuel and potable water access were also flagged as being required.

Further to these themes, several key stakeholders holding marine specific knowledge made suggestions on key drivers to guide future development of the boat launching facility. These drivers are reflected in the discussion around the key issues in Section 4.

## 2.3 Project Drivers

Council directed GHD that the upgrade works associated with the boat launch facility were to be located at the existing site. In addition, the works were to achieve a minimum Category 2 (all weather) rating.

Based on the review of data, and the outcomes of the stakeholder engagement, Council developed the following key project drivers in relation to the redevelopment of the Marion Bay boat ramp:

### Safety

The boat ramp is not currently sheltered from wave action, and boating conditions can be hazardous under certain wave conditions. The Marion Bay facility was assigned a high priority for its upgrade to a Category 2 facility, which will provide an “all weather” ramp, and a safety resource for rescue and storm shelter. To meet this criteria, the following issues require addressing:

- Wave Heights – these need to be reduced at the boat ramp
- Ramp Condition – the current status creates potential safety problems in both launching and retrieval due to a deep drop-off at the end, non-compliant gradient, and its orientation to the prevailing wave conditions.

Safety issues related to launching and retrieval of vessels from the boat ramp have been reported to Council over several years and have the potential to result in injury ,and even death, to users of the facility especially in relation to visitors who are unfamiliar with these conditions.

### **Maintenance**

Waves wash seaweed wrack onto the beach area where it accumulates on the boat ramp. Under elevated water level and wave conditions, the wrack is sometimes carried up into the adjoining car park. There is currently no individual entity that takes responsibility for removing the seaweed wrack; accordingly, wrack is removed by locals on an as-needs basis.

The construction of any structure within the intertidal zone will have an impact on the coastal processes and tend to cause increased volumes of both sand and seaweed wrack being deposited on the beach and adjacent to the structure. The issues associated with maintenance have the potential to result in a significant, repetitive cost.

## 3. Local Environment

### 3.1 Introduction

This section provides a high level overview of coastal processes in relation to the Marion Bay boating facility and surrounding area. Coastlines are subject to morphological changes due to the erosion and deposition of sediments. These changes are influenced by factors including the geology of the coastline, wind strength and direction, wave height and direction, tides, storm frequency, sediment supply and man-made structures and activities.

### 3.2 Topography and Bathymetry

A bathymetric and topographic survey was prepared for this area in August 2016. The survey shows that the seabed follows a gradual slope of approximately 1(V):27(H) to a depth of -1.5 m AHD, and then flattens to the -2.0 m AHD contour, which occurs approximately in line with the end of the jetty.

The car park is currently at a level of 2.0 – 2.5 m AHD. This level is currently sufficient for most of the weather conditions encountered, however the car park is still subject to occasional inundation during storm events where large waves coincide with high tides or localised storm surge. The survey data is included on the options sketches in Appendix B.

### 3.3 Water Levels

#### 3.3.1 Storm Tide Components

The total seawater level experienced at a coastal, ocean or estuarine sites during the passage of a storm event includes contributions from a number of different influences, with the predominant components being the astronomical tide, surge and wave set-up, as shown in Figure 4. The combined or total still water level is known as storm tide, which is referenced to mean sea level. Storm tide does not include localised wave run-up.

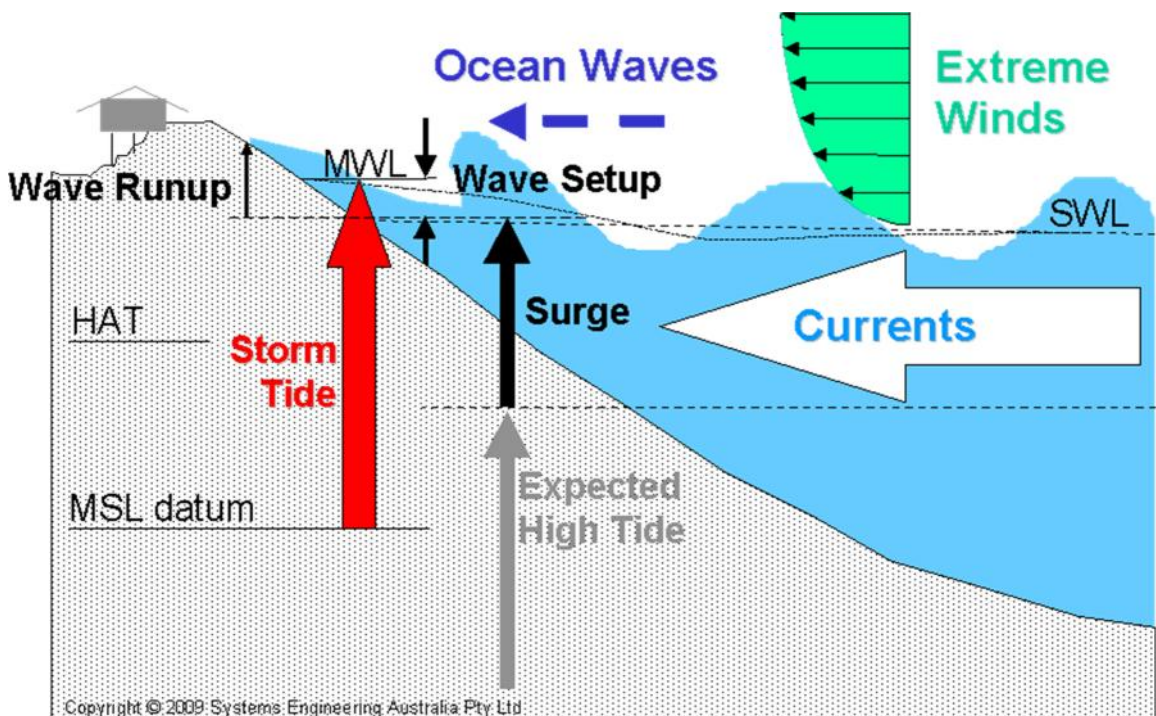


Figure 4: Storm Tide Components

Source: (Harper B.A. (Ed.), 2001)



### 3.3.2 Astronomical Tides

Astronomical tides are the daily rise and fall of sea levels caused by the combined effects of the rotation of the earth and the gravitational attraction between the earth, moon and the sun. The characteristics of tides at particular locations, such as the timing and height of expected water levels, are influenced by a number of factors, most notably by the topography of nearshore areas and the proximity of land masses such as islands or narrow bay entrances.

Because tides are periodic in nature, their size and frequency can be accurately predicted. Water levels which are frequently of interest are known as tidal planes.

Tidal planes for Marion Bay are not currently available, however are expected to be similar to nearby Stenhouse Bay, and these are considered sufficient for the purposes of this study. The tidal planes at Stenhouse Bay are provided in the Tide Tables for South Australian Ports (Government of South Australia, 2014) and are shown in Table 2. It is noted that these levels differ slightly to those in the Australian National Tide Tables (Australian Hydrographic Service, 2005). In the absence of resolution of this issue, adoption of the more stringent level for detailed design is recommended.

Table 2 Stenhouse Bay Tidal Levels (Government of South Australia, 2014)

Tidal plane	AHD (m)	CD (m)	above LAT (m)
Highest Recorded Tide (HRT)*	+0.88	+1.98	
Highest Astronomical Tide (HAT)			1.1
Mean Higher High Water (MHHW)	-0.1	+1.0	0.9
Mean Lower High Water (MLHW)	-0.4	+0.7	0.6
Mean Sea Level (MSL)	-0.5	+0.6	0.4
Lowest Astronomical Tide (LAT)	-1.0	+0.1	0.0
Chart Datum (CD)	-1.1	0.0	
Indian Spring Low Water (ISLW)	-1.2	-0.1	

\*HRT data source: Flinders Ports Pty Ltd (2006) in Coppock (2014)

### 3.3.3 Storm Surge

Storm surge is the rise in water level associated with a meteorological event and is made up of two main components. The primary component is caused by wind blowing over water (wind setup), causing the water to “pile up”. The second and smaller component is known as the inverse barometer effect and is caused by low pressure (usually at the centre of an intense weather system) causing the water level to rise vertically under the area of low pressure. Storm surge height is inversely affected by the depth of water, meaning that as the surge and accompanying weather system approach the coast, the magnitude of the surge is increased.

Figure 5 shows the approximate pattern of the 1 in 100 year storm surge heights in m (McInnes et al, 2008). This indicates that the current 1 in 100 year storm surge height for Marion Bay could be approximately 0.8 – 0.9 m. This is expected to increase in future years due to climate change. McInnes et al (2008) note that the estimate heights are “reliable only along the northern Bass Strait coast where the three tide gauges used for selection of surge events are located. Outside the region spanned by these gauges, additional weather events may contribute to severe storm surges. This will be addressed in future work by increasing the number of tide



gauges from which extreme events are selected for modelling.” The 0.8 – 0.9 m storm surge for Marion Bay under current climate conditions is therefore indicative only.

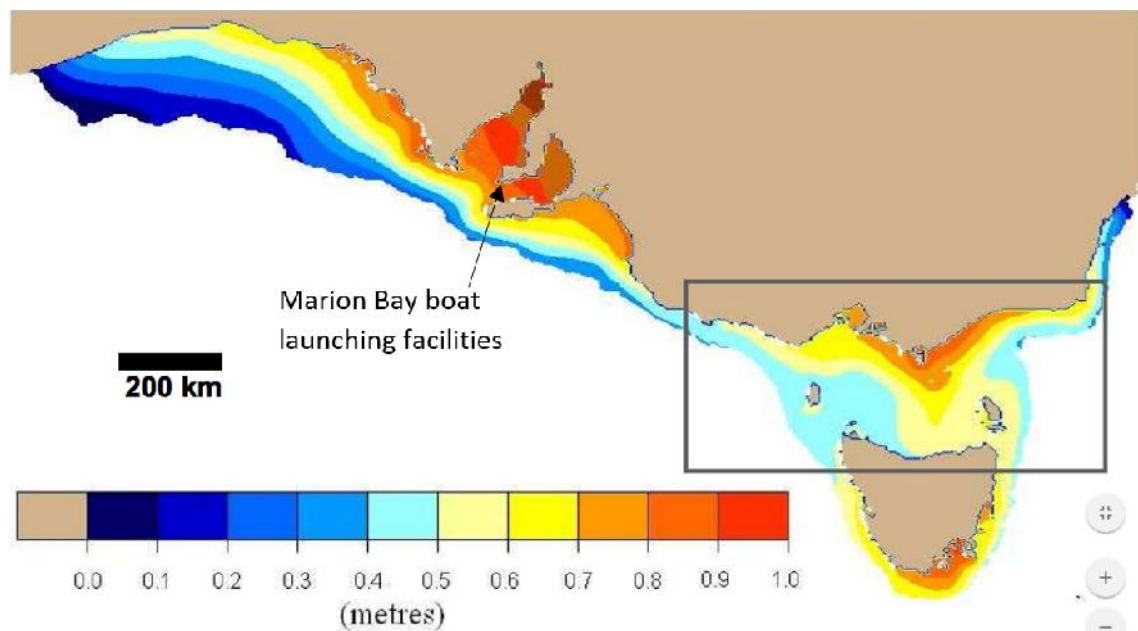


Figure 5 1 in 100 year Storm Surge Heights (m) (McInnes et al, 2008)

As previously mentioned, the storm tide is a combination of the astronomical tide, surge and wave set-up, as shown in Figure 4. Modelling has not been undertaken to determine likely storm tide levels along this coastline. Storm tide will be worst when the storm surge coincides with a high tide. Therefore, given the indicative current 0.8 – 0.9 m 1 in 100 year storm surge for Marion Bay and MHHW of -0.1 m AHD, the 1 in 100 year storm tide level under current climate conditions would be expected to be approximately 0.7 – 0.8 m AHD plus wave set-up. Future climate change would be expected to increase this level.

Further investigations at the site may necessitate detailed modelling to refine these estimates. In the absence of detailed modelling of storm surge or storm tide levels, it is suggested that a factor of safety is applied for detailed design purposes.

### 3.4 Climate Change Induced Sea Level Rise

Climate change induced sea level rise may influence existing coastal processes in more ways than by simply raising water levels. It is also projected by climate change scientists that the intensity and frequency of storms will increase. Ultimately, climate change will potentially result in more rapid coastline changes and increased inundation levels.

The “Coastal Planning Information Package - A guide to coastal development assessment and planning policy” (Government of South Australia, 2013) states that “The current policy which addresses a sea level rise of 0.3 metres to the year 2050 and a total of 1.0 metres to 2100 was based on the first IPCC Assessment Report. That Report concluded that for the “business as usual” scenario (ie. assuming continued increases in greenhouse gases), the most likely sea level rise to 2100 would be 0.65 metres (a range of 0.33 metres to 1.1 metres). One metre was chosen instead of the IPCC’s figure of 0.65m.”

Accordingly, this report has adopted a rise in sea level of 1.0 m by 2100.

The Coastal Planning Information Package shows the projected seawater inundation at Marion Bay under a 100 year ARI and 1.0 m sea level rise. No source for this modelling was provided, but it shows that substantial inundation of the area landward of the carpark (including residential areas) would occur under this scenario.



Figure 6 Marion Bay – Seawater inundation with 100 Year ARI and 1.0 metre sea level rise (Government of South Australia, 2013)

As discussed in Section 3.2, the car park level is occasionally inundated. However, as sea levels rise it is anticipated that the car park will be inundated more frequently.

### 3.5 Waves and Wind

Surface sea waves are generated by the action of wind blowing over water. Waves generated by local winds tend to be irregular. Sea waves that have travelled out of the area in which they were generated have usually had time to become more regular and are known as swell waves.

Due to the orientation of the beach and proximity of surrounding landmasses, waves generated by winds from the south south-west through west to the north north-east will generally have negligible impact on the beach, as these waves will be offshore or shore parallel. Winds from these directions therefore do not need to be considered.

Waves impacting the beach at the project site are a combination of local seas and attenuated swell. The size of local wind waves is limited by the wind speed, the depth of water and the distance that the wind blows over the water, known as the fetch. Coppock (2014) reports that “Investigator Strait is also affected by long current ocean swell which would cause an increase in the height of locally generated wind waves.”

Typically, “the swell in the semi-enclosed waters of South Australia is generally considered insignificant” (Hemer, 1999). At Marion Bay this is influenced by Kangaroo Island providing “a significant blockage to wave energy influx into Gulf St Vincent, and the wave energy that enters Gulf St Vincent is due to refraction as the water depth decreases and the waves “wrap” into Investigator Strait” (Hemer, 1999). In addition, in the coastal zone “bottom friction is found to cause significant decreases in predicted wave heights” (Hemer, 1999) and previous reports

indicate that “the shoreline is dominated by extensive seagrass meadows” (Coppock, 2012). It is noted that Norris Reef also lies to the north-east of the existing boat ramp site.

Nature Maps (Government of South Australia, 2016) indicates that the beach surrounding the boat launching facility is a low energy beach. This is the case when compared to open ocean beaches but when compared to an estuary, the beach has higher energy.

As stated in KBR (2010) the predominant wind direction during summer is east to south-east, whilst winter winds from the north to north-west dominate. Figure 7 shows average winds for Stenhouse Bay.

Coppock (2014) also discusses the wind climate by summarising wind speed and direction for Stenhouse Bay. Based on Table 2 in Coppock (2014), winds greater than 30 km/h occur approximately 8% of the time from the east through the south-east to the south. Based on annual wind data for the period from 1996 to 2010 from the Bureau of Meteorology (Bureau of Meteorology, 2016), winds from each of these directions have been recorded as greater than 40 km/hr over this time. However, the percentage occurrence of these more severe winds is unknown. It is unknown whether any severe weather events occurred during this time.

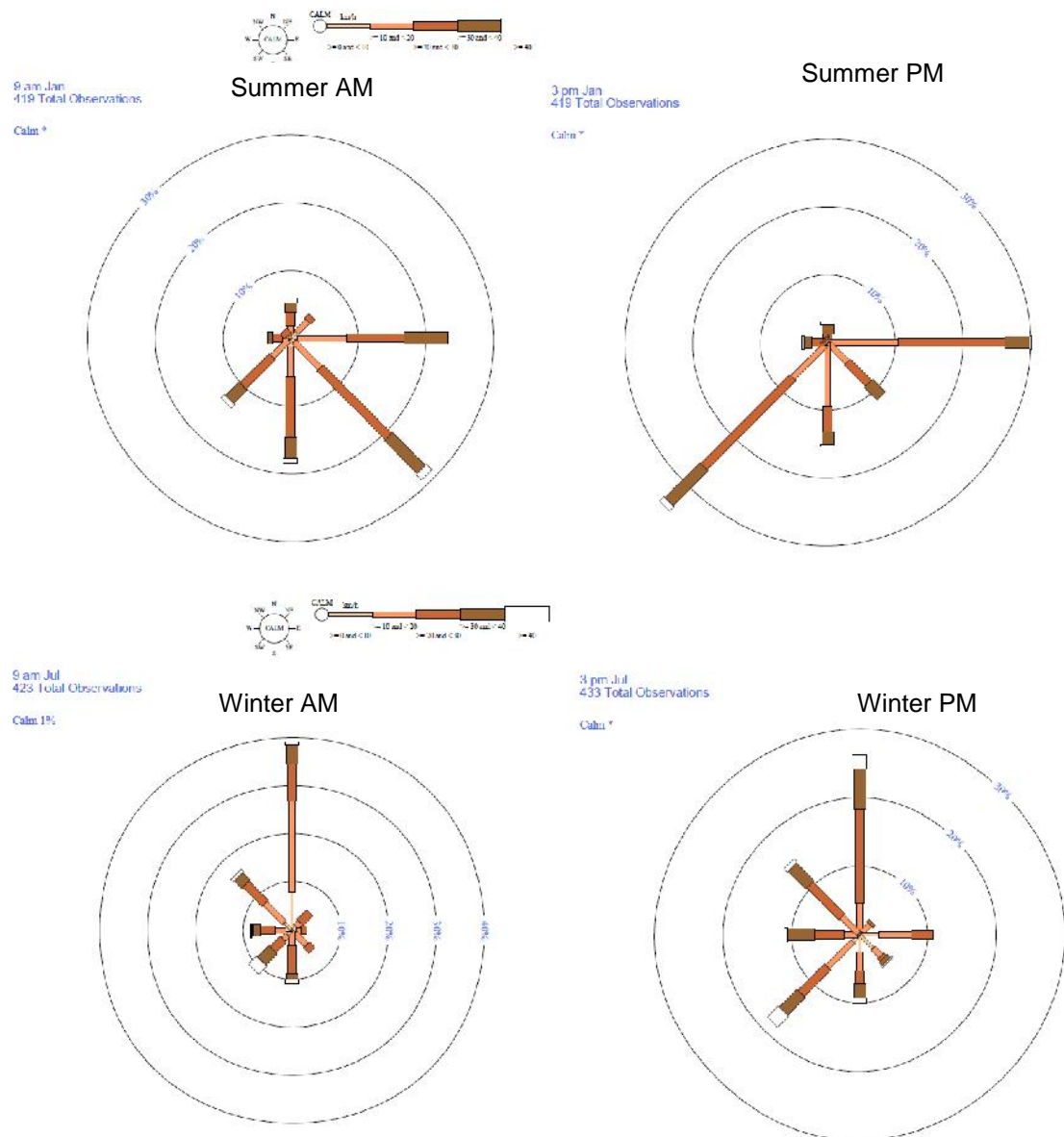


Figure 7 Average Seasonal Winds Stenhouse Bay (AM & PM) from 1996-2010

For a wind speed of 40 km/h, significant wave heights ( $H_s$ , the average of the highest one third of all waves) for sea waves could be expected to be in the order of 1.2 m to 2.3 m. It should be noted that detailed wave hindcasting has not been undertaken as part of this study, and the significant wave heights given above are indicative only for the purpose of informing the study options. Detailed wave modelling should be undertaken as part of the next design phase, and wave recording instrumentation deployed in a suitable location to confirm wave conditions at the site. As the wave heights above are based on a wind speed of 40 km/h, and winds greater than 40 km/h have been recorded, the maximum wave height would exceed these values. The frequency of these higher waves is not known.

During an extreme wind event, much larger waves may be generated. Depending on the water level, larger waves are expected to break well before they reach the beach, although the position of wave breaking is highly variable. Elevated water levels associated with an extreme wind event will allow waves to penetrate closer inshore prior to breaking. It should be noted that the determination of a detailed nearshore wave climate using numerical modelling is outside of the scope of this assessment.

### 3.6 Tidal Currents and Sediment Transport

Sediment transport modelling was not conducted as part of this study however a review of existing information has been conducted. KBR (2010) stated that:

- “The seabed is generally stable with little evidence such as sand ripples or waves, of active processes”; and
- “From site investigation and review of available aerial photography, the shoreline... is dominated by extensive seagrass meadows. Movement of sand by wind current and tidal movement into the area of the launching ramp is considered to be minimal however is subject to storm activity. A detailed assessment of sand movement has not been undertaken.”

No aerial photography was made available for review for this study and publicly available imagery was therefore considered to identify other characteristics of longshore sediment transport.

SA Government aerial photography available on the Nature Maps website (Government of South Australia, 2016) from 1981, 1992, 2001 and 2003, along with Google Earth imagery from 2005, 2012, 2013 and 2015 were examined. Many of the earlier images were of a scale that did not clearly allow identification of shoreline anomalies in the vicinity of the boat ramp. However, on two occasions small discontinuities in the shoreline were observed (2001 and 2012). It is likely that these changes in shoreline position were related to storm wave activity. No quantification of sediment transport rates from the imagery was possible.

Nature Maps (Government of South Australia, 2016) indicates that profiles of Marion Bay beaches have been collected by the South Australian Government. Repetitive beach surveys on an approximately annual basis for several local sites are available between 1975 and 2007. A review of this data over the period of record identified several dates where there was consistent coverage of survey lines in close proximity to the boat ramp.

A volumetric analysis of this data was undertaken to assess the general consistency of beach volumes in the area. Survey lines with complete coverage across the beach and nearshore areas were selected for consistency. The analysis identified that there was very little variability in overall beach volumes within the bay from 1986 to 2012, even though in some locations significant changes in the upper beach and nearshore areas were observed. This indicates that the natural longshore sediment transport processes are not being significantly impacted by the presence of the existing boat ramp. The low profile of this ramp is consistent with the beach

slope and general elevation, hence does not form a large physical barrier to sand movement along the beach.

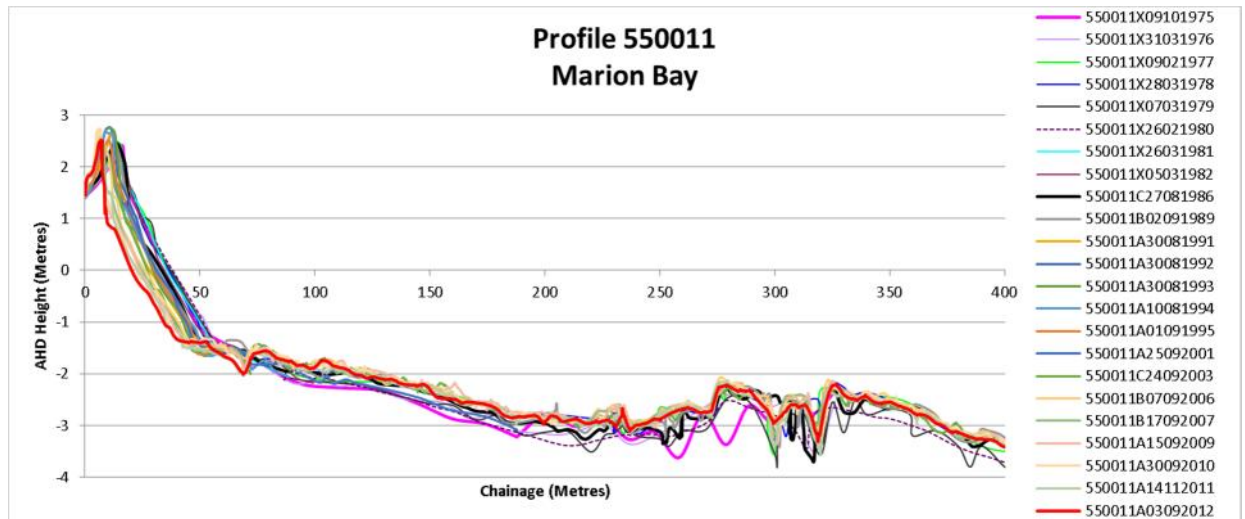


Figure 8 Example survey profiles, data provided by Department of Environment, Water and Natural Resources

The presence of mid-size coastal dunes along much of this shoreline indicates that the area is subject to erosion and accretion cycles as would be expected with sporadic exposure to swell waves.

The existing boat ramp, although at a similar elevation and beach slope to the existing beach, has acted as a groyne. In August 2016, a small discontinuity in the shoreline position and beach levels on either side of the ramp was evident.

Construction of the existing boat ramp at a slope close to that of the natural beach has minimised the trapping of beach sediments, allowing sediment flow across the ramp towards the north. This prevents a major accumulation of sand on the southern side of the ramp. Localised easterly wave conditions will temporarily direct sediment back toward the south. However, this is not the dominant sediment transport direction. A conceptual sediment transport model is shown in Figure 9, where the orange arrows represent the dominant sediment flow towards the north and the green arrows represent the less dominant easterly influences.



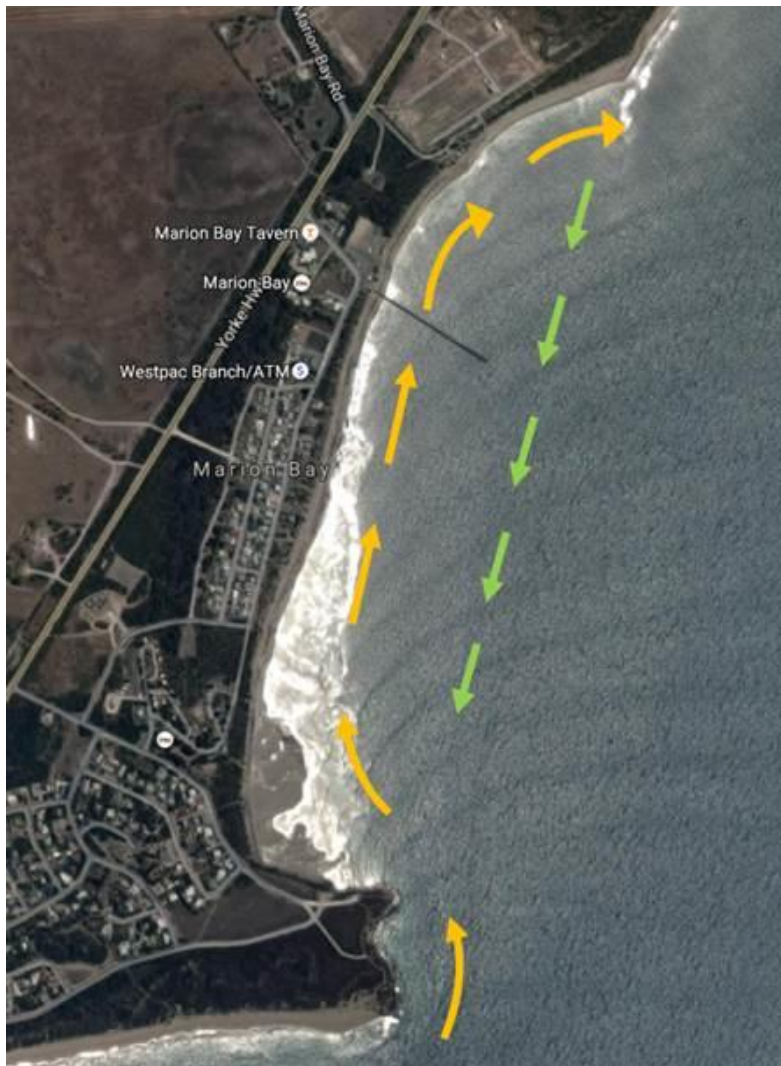


Figure 9: Sediment transport in vicinity of project site (Google Maps, 2016)

In addition, the Environmental Impact Statement for the proposed Adelaide Desalination Plant (SA Water, 2008) states that “in broad terms, Gulf St Vincent waters circulate in a clockwise direction around Gulf St Vincent with most seawater entering via Investigator Strait, flowing around the Gulf St Vincent and more saline water flowing out through Backstairs Passage.” This further supports dominant sediment transport in the vicinity of the project site being towards the north.

It is likely that larger waves near the project site would have the potential to significantly impact seaweed wrack and sand movement along the shoreline and, under the present conditions, impact on vessels during launching and retrieval operations. It is also likely that wind and wave effects combined would be the primary driver for movement of seaweed wrack along the coastline.

The seasonal seaweed wrack would be providing a limited amount of erosion protection along the coastline. However, since wrack accumulation on the boat ramp can render the ramp unusable, a solution for managing the seaweed wrack on the boat ramp is required.



### 3.7 Geology

Detailed geological and geotechnical investigations were not undertaken as part of this study, however Coppock (2014) identified that “the seabed is reported to consist of fine to medium (0.125 - 0.250 mm) slightly silty shelly sands being typical silt and sand sediments of the Holocene period overlying Permian sediments and rock of the geological Cambrian period (McBriar and Giles 1984).”

Nature Maps (Government of South Australia, 2016) also indicates the presence of heavy limestone or calcarenite reefs throughout the embayment. This reef outcrops in several locations, including Norris Reef, just north of the existing boat ramp.

### 3.8 Marine Ecology

Interrogation of Nature Maps (Government of South Australia, 2016) identifies that the area surrounding the Marion Bay jetty and boat ramp area, up to 35km offshore, is heavily colonised by dense continuous seagrass beds. This was also repeated by Coppock (2014) which referred to “the earlier study by consultants Kellogg Brown & Root (2010) reports that a site investigation undertaken in May 2003 notes the dominant marine vegetation to be wire weed (*Amphibolis antarctica*) in the shallows and narrow leaf strap-weed (*Posidonia sinuosa*) in deeper water. The study also notes that broad strap-wed (*Posidonia australis*) occurs in isolated patches in the shallows amongst the wire weed from the edge of the open sand intertidal area to about 20 metres offshore where the narrow leaf strap-wed becomes dominant.” Coppock (2014) also states that “In general the plants and animals recorded in the vicinity of the ramp are not unusual and occur commonly along this coastline and in both Spencer Gulf and Gulf St Vincent.”

## 4. Key Issues

### 4.1 Safety

#### 4.1.1 Wave Exposure

As discussed in the previous section, the boat ramp is not currently sheltered from wave action, and boating conditions can be hazardous under certain wave conditions. The Marion Bay facility was assigned a high priority for its upgrade to a Category 2 facility, which is an “all weather” ramp and a safety resource for rescue and storm shelter. To meet this criteria, the wave heights at the boat ramp will need to be reduced.

The relevant Australian Standard for the design of boat ramps is AS 3962: Guidelines for design of marinas. In South Australia, additional guidance is also provided by the South Australian Guidelines for Planning, Design and Construction of Boat Launching Facilities (SABFAC, 1997). AS 3962 and SABFAC (1997) indicate that boat launching ramps should be sheltered from waves larger than 0.2 m. At Marion Bay the wave heights can be significantly larger than this, and thus the required reduction in wave height could be achieved through the construction of a breakwater or other wave attenuation as discussed in Section 5.

If the wave heights are not reduced, the Marion Bay boat launching facility will not be able to be classified as a Category 2 facility. Whilst some wave protection is required, an enclosed harbour is not necessary unless this facility is upgraded to a Category 3 facility.

#### 4.1.2 Ramp Condition and Layout

##### Drop Off at End

The toe of the existing ramp is at a level of approximately -0.5 m AHD (mean sea level) and therefore it becomes exposed at low tide. Although there is signage informing ramp users that the launching facility is affected by low tides, the ramp is problematic to use as the tide may be higher when vessels are launching, and then have dropped by the time vessels are returning.

Particular references were made by stakeholders to the need to be familiar with the tide and resulting water depth restrictions just offshore of the Marion Bay boat ramp. It was noted that unfamiliar users were more likely to require rescuing, or sustain damage to their vessel.

SABFAC (1997) recommends that the ramp toe requires extension to at least 750 mm below the design water level. As lowest astronomical tide (LAT) for the project site is -1.0 m AHD, this would result in the ramp toe being extended to -1.75 m AHD (rounded herein to -1.8 m AHD).

##### Gradient

The gradient and positioning of the ramp is such that under large swell and elevated water conditions water can flow onto the pathways then onto the roads. Currently there is nothing in place to mitigate this.

AS 3962 recommends that the ramp gradient should be within the range of 1:9 to 1:7 with a preferred gradient of 1:8. SABFAC (1997). The ramp gradient is currently very moderate and at its seaward end approximately follows the beach slope of roughly 1(V):27(H). The existing ramp gradient therefore does not conform with SABFAC's recommendations, but it is acknowledged that this flatter slope does not substantially interrupt the local sediment transport patterns.

##### Width

AS 3962 recommends that a boat ramp should be a minimum of at least 4.5 m for a single lane without kerbs. SABFAC (1997) recommend that “a single lane ramp should be a minimum of 4.0

m wide between kerbs, or at least 4.5 m for an un-kerbed single lane. A multi-lane ramp should be in increments of 3.7 m”.

Since a Category 2 boat launching facility is desired to serve both the local community and a more extensive tourist market, it is anticipated that a two lane ramp will be required. AS 3962 recommends that a multi-lane ramp should have a minimum width per lane of 3.7 m. Thus a total minimum width of 7.4 m would be required. This width may increase if for example a floating walkway is constructed as a central access point between the lanes.

### Orientation

The current ramp is orientated east south-east. The options have the ramp at a similar orientation as present to allow dominant waves to impact the ramp “head-on” rather than obliquely, which is more dangerous for launching and retrieval.

## 4.2 Maintenance and Cleaning

Waves wash seaweed wrack onto the beach area where it accumulates on the boat ramp. Under elevated water level and wave conditions, the wrack is sometimes carried up into the adjoining car park. There is currently no individual entity that takes responsibility for removing the seaweed wrack; accordingly, wrack is removed by locals on an as-needs basis.



Figure 10: Seaweed Wrack on and around Marion Bay Boat Ramp

The introduction of an upgraded boat ramp structure to provide a Category 2 rating (or above) has a high likelihood of creating an impact on the existing local coastal processes. As with the seaweed wrack, sand depositions are likely to increase adjacent to the structure, resulting in increased maintenance requirements.

### 4.3 Supporting Infrastructure

The following additional issues should also be addressed for the boat ramp to be classified as Category 2.

Table 3: Supporting Infrastructure to be Considered

Infrastructure	Comments
Boat holding structure / Pontoon / Provision of area to tie up boats	A boat holding structure such as a mooring pontoon or jetty should be provided to improve the efficiency of the ramp usage. AS3962 suggests that each ramp lane should be capable of holding three boats at any tide stage. A single pontoon or jetty with mooring on both sides can serve two lanes on each side of the pontoon.
Trailer rigging / derigging, and vehicle queuing and manoeuvring areas	There is currently no formal rigging or queuing and manoeuvring area. Areas for these should be formalised for increased safety and efficiency.
Rubbish collection – skip bins	Waste bins should be provided at the head of the ramp, particularly with a projected increase in boat ramp users. Although AS3962 does not provide advice about waste management specifically for boat ramp facilities, it does recommend for marinas that “Garbage receptacles should have self-closing lids to prevent escape of rubbish by way of wind, birds or animals, and exclude rainwater entry.”
Toilet facilities	Toilet facilities should be provided for boat ramp users. It is noted that the existing toilet facilities are approximately 250 m south of the ramp.
Fuel supply	<p>With increased usage of the boat ramp it is important that a reliable fuel supply source is available. Although AS3962 does not provide advice about fuel supply specifically for boat ramp facilities, it does recommend the following for marinas: “It is desirable that the fuel berth should be a separate structure from the marina berths and should be isolated to the extent that fire or explosion would have minimal opportunity to spread from the fuel berth to the marina berths or vice versa.”</p> <p>The SABFAC guidelines also state that fuel supply should be considered as a supplementary facility.</p> <p>The fuel supply will also need to be separated from general ramp areas, and will require separate approvals and management.</p>
Access to fresh water	<p>Ideally, fresh water should be available for cleaning fish.</p> <p>In addition, a purpose-built wash bay with waste containment and wastewater controls could be provided.</p> <p>Supply of fresh water to the site may incur substantial costs, but could be met by a package reverse osmosis plant supplying the town, with ramp usage paid per use (e.g. coin operated).</p>

Infrastructure	Comments
Signage and lighting	<p>Lighting at the head of the ramp is to be provided for a Category 2 facility.</p> <p>Signage is also to be erected warning users of the potential hazards of the site, including water depth and potential tidal restrictions etc.</p> <p>This treatment is proposed to address the 'surprise' and uncertainty factor for users of the facility. It does not necessarily improve operational safety or mitigate any of the existing site constraints.</p> <p>It is noted that consistent power supply to the existing town (and therefore any future ramp/jetty facilities) is a major issue at present.</p>
Parking area	<p><b>Defined parking spaces</b></p> <p>Car/trailer parking area to be formalised as the current informal arrangement is not efficient during peak times.</p> <p>Adjacent land to the north of the site is subject to environmental controls and is not available for car park expansion.</p> <p><b>Foreshore protection / raise level of car park</b></p> <p>The car park is currently at a level of 2.0 – 2.5 m AHD. Whilst this level is currently sufficient for most of the weather conditions encountered, the car park is still subject to inundation during severe storm events where maximum wave heights are encountered. The likelihood of current inundation should reduce if wave heights are attenuated by other works, as discussed in Section 4.1.1.</p> <p>As illustrated in Section 3.4, the car park could become completely inundated by 2100 with a 1.0 m sea level rise and 1 in 100 year ARI storm event.</p> <p>The car park could be protected from inundation during storm events and the increasing severity and frequency of inundation due to sea level rise through the use of foreshore protection away from the boat ramp, or by raising the level of the car park.</p> <p>Foreshore protection could also be provided to protect residual dunes if required, although the dunes are the natural defence against inundation.</p> <p>Providing protection to the carpark from inundation is unlikely to be successful or practical, given the similar levels of the adjacent road network. A major storm event could be expected to breach the dune elsewhere along the foreshore and inundation could occur along this pathway.</p>
Fishing Waste – Lack of Fish Cleaning Facilities	<p>Dumping of fishing waste can be problematic as there is no fish cleaning area or supporting facilities at or near the boat ramp. This then is perceived to cause odour issues and attract vermin.</p>



Infrastructure	Comments
Upgrades to the Marion Bay jetty	<p>It has also been expressed by stakeholders that the Marion Bay jetty should be upgraded to safely transfer passengers from a vessel onto the jetty. According to stakeholders this is currently not possible under even moderately small wave conditions. Potential upgrades to the jetty may include the addition of fenders to facilitate safer mooring and reduce damage to vessels and the installation of navigation aids.</p> <p>Although a condition assessment of the existing jetty does not form part of the scope of this project, stakeholders have indicated that the jetty in its current form is unlikely to be able to be structurally capable of supporting any of the desired or suggested modifications. Substantial works to upgrade the jetty would be required.</p>

In addition to the above, SABFAC (1997) suggests that:

“Consideration should also be given to the provision of supplementary facilities such as:

- Repair, maintenance and fitting out facilities;
- Dry storage areas and other marina type facilities;
- Fuel supply, accommodation and shopping facilities;
- Rescue facilities;
- Land-based outdoor recreational facilities such as playgrounds and barbecue areas; and
- Club-type services and activities.

While the above are not essential, they make the facility more attractive to users and thus should be taken into account in the planning stage.”

Stakeholders also suggested the provision of a vehicular access ramp to the beach for general beach access purposes.

#### 4.4 Catchment and Usage

A detailed usage survey was not undertaken as part of this study, however usage of the existing facility was discussed with stakeholders. Stakeholders consistently indicated that there was sufficient parking and the single lane boat ramp capacity was sufficient during off peak times, but was crowded during peak times.

Coppock (2012) stated that the Marion Bay boat ramp is used for recreational use 90% of the time, and commercial use 10% of the time. This report also stated that in 2012 there were approximately 3,000 launchings per year with the peak launchings per day being 50. It was projected that by 2015 the number of launchings would have increased to 3,300 per year.

Based on the above it is anticipated that a two lane boat ramp will assist in easing congestion during peak periods.



## 5. Options Identification

### 5.1 Overview of Functional Requirements

The following functional requirements were considered for the redevelopment options:

- Improved capacity and ease of operation for the existing launching ramp to accommodate increased recreational and commercial charter fishing use;
- Improvements to the manoeuvring area at the approach to the ramp and car park for congestion free and safe traffic movements;
- Car trailer unit parking;
- A facility for the safe mooring of boats after launching / prior to retrieval; and
- Protection of launching and retrieval manoeuvres from wave action to reduce the risk of damage to boats and vehicles.
- Generally, the ramp options cater for recreational vessels that are able to be transported on a trailer, up to a length of approximately 8.0m. Typical draughts for powerboats and yachts up to 8 m in length are 0.9 m and 1.5 m respectively and the water depth within the bay is approximately 2.5 m. At high tide the ramp could be used for larger vessels, including commercial vessels.

Other aspects that can be incorporated into an upgraded facility include boat wash down facilities and other amenities; adequate lighting; and a boat berthing pontoon.

These options have not been verified by detail design or appropriate further studies. It should be recognised that the options involving wave attenuating structures would require further investigation to confirm if required performance can be achieved.

### 5.2 Boat Ramp Options

#### 5.2.1 Overview

Several options have been developed in the past, with some documented in the Concept Design for Improvements to Boat Launching Facility – Marion Bay (KBR AEJ802-Z-REP-001 Rev 1 25 August 2010). These included recommended upgrades to meet the objectives of the Recreational Boating Facilities Strategy Plan such as:

- A second launching land to the existing boat ramp
- The provision of a rock groyne to provide all weather protection,
- The opportunity to consider an option for siting the facility at Penguin Point.

Council directed GHD that an alternative location (ie Penguin Point) was not an option, and that the upgrade works associated with the boat launch facility were to be located at the existing site. In addition, the works were to achieve a minimum Category 2 (all weather) rating.

Therefore, the options considered in this study were:

- Option 1 – Do Nothing
- Option 2 – Upgrade Existing Boat Ramp (Category 1 Rating)
- Option 3 – New Boat Ramp with Off-shore Breakwater (Category 2)
- Option 4 – New Boat Ramp and Enclosed Harbour (Category 3)

### 5.2.2 Option 1 – Do Nothing

This option reflects business as usual. The seagrass wrack deposition will continue and the facility will continue to require the same level of voluntary maintenance from local users to remove seagrass wrack as it accumulates.

There is no improvement or change to user experiences or mitigation of adverse conditions related to the marine or landside aspects of the facility.

### 5.2.3 Option 2 – Upgrade Existing Boat Ramp (Category 1 Rating)

This option includes:

- The demolition of the existing single lane ramp and construction of a new two lane boat ramp relocated to the south of the existing ramp, with increased length to reach a toe depth of -1.8 m AHD. The gradient will however be kept to match the existing (approximately 1 in 20). The orientation of the ramp will be refined during detailed design to cater for retrieval of any vessels requiring assistance during poor weather conditions;
- The addition of a piled wave attenuation structure extending from the seaward end of the jetty approximately 220 m landward (i.e. not including approximately 45 m of the landward end of the jetty). The wave attenuation panels are to be designed to shelter the boat ramp from waves approaching from the south to south-east only;
- The addition of a piled walkway with multi-level landings at the seaward end of the structure; and
- All of the features listed in Section 5.3.

Under these options, the wave action at the ramp will not be attenuated from all wave directions. A small increase in sediment and seaweed wrack deposition in the vicinity of the jetty would be expected due to the calmer wave conditions in the lee of the jetty. Occasional manual scraping of sand accumulation and placement on the northern side of the boat ramp will be required on an as-needs basis.

### 5.2.4 Option 3 – New Boat Ramp with Off-shore Breakwater (Category 2)

This option includes the following:

- The demolition of the existing single lane ramp and construction of a new two lane boat ramp, with increased length to reach a toe depth of -1.8 m AHD and gradient (1:8). To achieve this a causeway or piled structure will be required to connect the ramp to land;
- The addition of a piled wave attenuation structure with an approximate length of 50m to protect from s/se wave approach. The wave attenuation panels would be designed to protect the boat ramp from waves approaching from the south to south-east;
- The construction of an offshore breakwater east of the end of the boat ramp to attenuate waves from the east, with a nominal crest height of 3.0mAHD;
- The installation of a piled walkway with multi-level landings adjacent to the ramp to improve the efficient and safe use of the ramp; and
- All of the features listed in Section 5.3.

A moderate increase in sediment and seaweed wrack deposition in the vicinity of the jetty would be expected due to the calmer wave conditions in the lee of the jetty. Some wrack may build up on the seaward side of the offshore breakwater but this would be expected to clear under oblique wave conditions (i.e. towards the north or south). The potential for a tombola to be formed behind the breakwater is likely to require the occasional removal of sand accumulation

from the vicinity of the boat ramp and placement on the northern side of the boat ramp will be required on an as-needs basis.

#### 5.2.5 Option 4 – New Boat Ramp and Enclosed Harbour (Category 3)

These options include the following:

- The demolition of the existing ramp and construction of a new boat ramp off of a new breakwater positioned to the south of the existing ramp, with appropriate width (2 lanes), length, depth (toe to -1.8 m AHD) and gradient (1:8);
- The construction of a shore connected breakwater to provide safe launching and retrieval of vessels and shelter for any vessels within the created harbour from all wave directions;
- The installation of a piled walkway with multi-level landings adjacent to the ramp to improve the efficient and safe use of the ramp;
- The extension of the walkway to provide layby berths within this sheltered area;
- The construction of a separate temporary mooring pontoon within the sheltered area; and
- All of the features listed in Section 5.3.

Sediment and seaweed wrack accumulation against the southern side of the shore connected breakwater would be expected due to the interruption to natural shoreline currents. Some wrack may build up on the seaward side of the offshore breakwater but this would be expected to clear under oblique wave conditions (i.e. towards the north or south). Sedimentation and wrack accumulation in the vicinity of the boat ramp would be expected only after major storm conditions; placement of sediment removed should be on the northern side of the boat ramp on an as-needs basis. To avoid sandbar formation, regular monitoring and management of sediment around the harbour would be required.

### 5.3 Consistent Features for Options 2, 3 and 4

The following complimentary works are proposed to be included in Options 2, 3 and 4:

- Formalised parking – Rearrangement of the car park to include marked parking spaces. As shown in the option sketches, the current options allow for approx. 37 car-trailer units. This would be refined during detailed design to ensure the most appropriate arrangement for vehicle movements is developed;
- Provision of trailer rigging / derigging, and vehicle queuing and manoeuvring areas, including 30 m at the ramp head for manoeuvring;
- Installation of a fish cleaning area and supporting facilities;
- Adding solar lighting and upgraded signage to highlight the safe use of the facility; and
- Engagement of a contractor to remove accumulated seaweed wrack and relocate accumulated beach sediments on an as-needs basis.

## 6. Options Review

### 6.1 Overview

The options assessment process was limited to a qualitative review that included:

- The development of review objectives against assessment criteria,
- a comparison against SABFAC's boat ramp service level ratings,
- a comparison of advantages and disadvantages, and
- a comparison of Budget Estimate of the capital value of the Options.

Along with the qualitative assessment, it was also agreed with Council that the key consideration for the upgrade of the boat launching facility is "safety". This was therefore a driver for short-listing Options 3 and 4

The results of the assessment are discussed in this section.

### 6.2 Review Objectives

The following objectives for the proposed boat ramp upgrade are aligned to the boating strategy and longer term study objectives, and were developed to assist in a qualitative assessment of the options.

Table 4 Objectives and Assessment Criteria

Objective	Assessment Criteria
<b>Boating Safety and Standards:</b>  Access and safety is in alignment with user expectations	 The 'treatment' will improve user safety for both recreational and commercial charter fishing  The treatment will reduce the risk of damage to boats and vehicles  The treatment will be seen to result in improved performance and functionality  The treatment will result in the facility being classed as either as Category 2 or Category 3 facility  The treatment aligns with the Recreational Boating Strategy Plan and relevant Standards
<b>Maintenance:</b>  Maintenance spend can be allocated to priority issues improving service and safety	 The treatment will identify a contractor to take responsibility for removing the seaweed wrack on a regular basis, as well as contractors to clean and maintain other new facilities such as fish cleaning facilities, toilets etc. and collect rubbish  The treatment will improve the ability to identify maintenance needs and future 'fundability'

Objective	Assessment Criteria
<b>Sustainable Development:</b>  Natural coastal values are protected and the risk of adverse impacts are minimised	The treatment will protect natural coastal values.  The treatment will reduce the risk of adverse social or environmental impact  The treatment improves its performance with respect to the impacts from climate change  The treatment utilises construction materials that are readily available
<b>Budget:</b>  Cost to implement and maintain over lifecycle is in alignment with Council expectations	The cost of the treatment over its lifecycle aligns with Council expectations

The alignment of the options with the objectives was further developed by reviewing against the outcomes of the Stakeholder views, including those of the Marion Bay community and wider community. These views included the demand for parking space, land-side of the boat ramp. The assessment considered the potential for

- the parking infrastructure to be optimized to service current user needs as well as to address future increased demand
- The treatment results in parking infrastructure that is optimized to service current user needs, preserves coastal land and provides opportunity to address future increased demand. This includes the provision of facilities required for a Category 2 or Category 3 rating
- The treatment provides opportunity to improve community benefit and access to the foreshore at Marion Bay

## 6.3 SABFAC Performance Rating and Service Level

### 6.3.1 Service Level Ratings

Guidance regarding boat ramp performance rating and service level was provided by the Department of Planning, Transport and Infrastructure, South Australia in a document titled “SABFAC boat ramp service level ratings” (SABFAC, 2016). This included Table 5, with the symbols meaning:

Symbol	Definition
■	<i>Partial Capability</i>
✓	<p><i>Full Capability:</i></p> <p>Ramp – design lane width, slope, head and toe level characteristics to SABFAC* design guidelines.</p> <p>Car and Trailer Parking – formalised car and trailer parking area with circulation lanes.</p> <p>Manoeuvring – area extends 30m landward beyond top of ramp and 20 m wide (minimum).</p> <p>Wave Protection – all tide all weather access with minimal restrictions due to adverse wave climate.</p> <p>Launch and retrieval – access boat from floating pontoon or fixed landing system.</p> <p>Services - provision of lay-by berth, refuelling, power, water services.</p>

Table 5: SABFAC boat ramp performance rating

Boat ramp Performance Rating	Ramp	Maneuvering	Launch and Retrieval	Car and Trailer Parking	Rigging and Derigging	Wave Protection	Services
1	■	■					
2	✓	■		■	■	■	
3	✓	■	✓	■	■	■	
4	✓	✓	✓	✓	✓	✓	■
5	✓	✓	✓	✓	✓	✓	✓

In addition to Table 5, the following service level descriptions were given for each of the performance ratings.

#### Rating 1:

Safe vehicle access; Unsealed ramp or sound sand foundation; Tidal access only; Limited manoeuvring capabilities; Limited protection from sea conditions (use by experienced mariners only)

#### Rating 2:

Safe vehicle access; Sealed ramp (concrete); Tidal access only; Appropriate manoeuvring area; Limited rigging/de-rigging and parking facilities; Limited protection from sea conditions



### Rating 3:

Safe vehicle access; Sealed ramp (concrete); Tidal access only; Limited manoeuvring area; Limited rigging/de-rigging and parking facilities; Limited protection from sea conditions; Safe launch and retrieval of boats (pontoon or fixed landings)

### Rating 4:

Safe vehicle access; Sealed ramp (concrete); All-weather, all tide ramp with weather protection; Manoeuvring area; Rigging/de-rigging and parking facilities; Safe launch and retrieval of boats (pontoon or fixed landings)

### Rating 5:

Safe vehicle access; Sealed ramp (concrete); All-weather, all tide concrete ramp with weather protection; Manoeuvring area; Rigging/de-rigging and parking facilities; Safe launch and retrieval of boats (pontoon or fixed landings); Servicing of boats available (refuelling, lay-by wharf)

#### 6.3.2 Options Rating Against SABFAC Performance Rating Criteria

Each of the options were compared against SABFAC's boat ramp performance rating criteria and service levels, with the results shown in Table 6.

Table 6: Options Compared to SABFAC Boat Ramp Performance Rating

Option	Ramp	Maneuvering	Launch and Retrieval	Car and Trailer Parking	Rigging and Derigging	Wave Protection	Services
1	■	■	x	x	x	x	x
2a	■	✓	x	✓	✓	■	x
2b	■	✓	✓	✓	✓	■	x
3a	✓	✓	✓	✓	✓	✓	x
3b	✓	✓	✓	✓	✓	✓	x
4a	✓	✓	✓	✓	✓	✓	■
4b	✓	✓	✓	✓	✓	✓	✓

Based on these results and the service level descriptions included above, the boat ramp options have been given a performance rating which aligns to the SABFAC guidelines as follows:

- Option 1: Rating 1
- Option 2: Rating 2
- Option 3: Rating 4
- Option 4: Rating 4

## 6.4 Options Advantages and Disadvantages

The immediate and longer-term advantages and disadvantages for each option are described in Table 7.

Table 7: Options advantages and disadvantages

Option	Advantages	Disadvantages
<b>Option 1</b> <b>Do nothing</b>	No immediate costs involved.	There is no improvement or change to user experiences or mitigation of constraints that are related to the marine or landside aspects of the facility.  This option does not alleviate any of the current facility concerns or align with stakeholder views.
<b>Option 2</b> <b>Upgrade but remain as Category 1</b>	Landside facilities significantly improved.  Option 2a: Piled wave attenuation structure provides limited protection to the boat ramp from waves approaching from the south to south-east.  Option 2b: Wave attenuation panels protect the boat ramp from waves approaching from the south to south-east, improving the safety and usability of the facility.  Simple construction.  Lowest cost options (excluding do nothing option).  Option 2b: piled walkway adjacent to the ramp improves the efficiency and safety of the ramp.	Boat ramp is still exposed to waves from the east, with resultant safety concerns.  Facility would still be classed as Category 1 as it would not be an all-weather facility.  Option 2a: The piled wave attenuation structure may be a navigational hazard  Moderate negative impact on coastal processes and seagrass beds.  The benefit of maintaining the existing ramp gradient (i.e. approximately following the beach slope) is that there will be less interruption to sediment transport than a causeway or similar structure would generate (such as with Option 3a). However the existing ramp gradient does not conform with SABFAC's recommendations.
<b>Option 3</b> <b>Upgrade to Category 2</b>	Landside facilities significantly improved.  Wave attenuation panels protect the boat ramp from waves approaching from the south to south-east, improving the safety and usability of the facility.  Offshore breakwater attenuates waves from the north-east to south-east.  Floating walkway adjacent to the ramp improves the efficiency and safety of the ramp.	Cost of construction anticipated to be high due largely to the requirement for an offshore breakwater.  Yearly maintenance cost.  Negative impact on coastal processes and seagrass beds.  Potential to form a tombolo between shore and offshore breakwater due to sedimentary processes, care should be taken in the detailed design phase to ensure positioning and orientation to avoid this.

Option	Advantages	Disadvantages
<b>Option 4 Upgrade to Category 3</b>	<p>Landside facilities significantly improved.</p> <p>Shore connected breakwater provides protection from waves. Breakwater may be able to be constructed from land rather than by barge, increasing constructability of the breakwater, and potentially reducing costs. More accessible for maintenance works also.</p> <p>Floating pontoon / fixed walkway adjacent to the ramp improves the efficiency and safety of the ramp.</p> <p>No modifications required to jetty, as floating walkway can be used for loading / unloading passengers.</p> <p>Option 4b: Extension of floating pontoon / fixed walkway allows for layby berths within sheltered area.</p> <p>Option 4b: pontoon allows for vessels to berth in a sheltered area.</p>	<p>Cost of construction anticipated to be highest due to the length of breakwater required.</p> <p>Yearly maintenance cost.</p> <p>Blocking off direct access from boat ramp to jetty, when stakeholders have expressed a desire for modifications to the pier to allow for passenger embarking / disembarking.</p> <p>Negative impact on coastal processes and seagrass beds.</p> <p>Potential to disrupt sediment transport pathways – could result in maintenance dredging requirement and/or erosion to the north.</p>

## 6.5 Options Cost Estimate

Cost estimates were completed for the options with the results shown in Table 8. Cost breakdowns are included in Appendix C. These costs do not include the cost of maintenance over the options lifecycle, however routine maintenance can be assumed to be approximately 5-10% per year of the capital cost of the options.

Table 8: Options Cost Estimates

Option	Cost Estimate Range
2	\$4 - \$5 million (not including cost for wave attenuation)
3	\$5 - \$7 million, (not including cost for wave attenuation)
4	\$6 - \$8 million (not including cost for piled walkway extension or berth pontoon)

## 6.6 Synthesis of Results

This section provides a brief overview of the background to the scores allocated to each option against each of the study objectives.

### 6.6.1 Boating Safety and Standards

- Doing nothing was considered to result in the worst outcome as this does not achieve the standards, and safety and usability does not improve.
- All other scenarios (except do nothing) would be expected to provide a generally positive outcome, as all treatments are expected to mitigate a number of safety related constraints to some extent.
- Options 3 and 4 would be expected to provide the best outcomes as these options significantly improve the safety and usability of the facility, achieving at least a Category 2 rating.

### 6.6.2 Maintenance

- Doing nothing was considered to result in a negative outcome as maintenance issues are not addressed.
- Options 2 and 3 requires a maintenance regime for removal of the seagrass wrack.
- Option 4 could also be expected to require the manual management of sediment transport northwards past the breakwater.

### 6.6.3 Sustainable Development

- Doing nothing was considered to result in a neutral outcome.
- Option 2 would be expected to have a minor negative impact on coastal processes, however it may also provide improved protection from the effects of some large waves that will reduce the risk of some adverse environmental impacts.
- Options 3 and 4 could be expected to have a negative impact on coastal processes and seagrass beds.

### 6.6.4 Budget

- The estimated costs for each option are significant
- Within the quantum of the budget estimate range, Options 3 and 4 provide an improved level of service (Category 2 or above) when compared with Option 2

### 6.6.5 Aligns with Stakeholder's Views

- Doing nothing does not align with the majority of stakeholder views as safety and usability does not improve.
- All other scenarios (except do nothing) could be expected to provide a generally positive outcome, as these treatments are expected to mitigate a number of safety related concerns and improve usability which is desired by stakeholders. This improvement though is tempered by the potential impacts on coastal processes and seagrass beds.

## 7. Conclusions and Recommendations

### Conclusions

The need for the upgrade of the Marion Bay boat ramp has been recognised for many years. Several options have been proposed over this time. The review of these options in this Report, especially in the context of a robust and targeted community engagement program, has enabled the short-listing of two options for further consideration – namely, the construction of a breakwater element to protect the boat ramp (Options 3 and 4).

Within the scope of this Report, it was not possible to ascertain a detailed understanding of the impact of the boat ramp upgrade on the coastal processes. This is an important element that has operational and cost implications on Council.

### Recommendations

It is recommended that Council:

1. Adopt Options 3 and 4 as preferred solutions for the boat ramp upgrade at Marion Bay. Both options:
  - Involve the construction of a breakwater structure
  - Achieve a Category 2 rating (or greater)
  - Have similar capital cost (in the range of \$5 to \$8 million)
  - Require an ongoing maintenance regime, and associated operational cost.
2. Undertake an Impacts Assessment of the site and the associated region to develop a greater understanding of the impacts of the boat ramp upgrade on the precinct. The assessment should include:
  - Numerical modelling of wave and associated coastal processes
  - Determination of sediment transport processes and estimation of deposition volumes.
  - Preparation of a budget estimate cost for a maintenance regime
3. Develop the design of the preferred upgrade solution, based on the outcomes of the Impacts Assessment, sufficient to support detailed funding applications and Development Approvals



## 8. References

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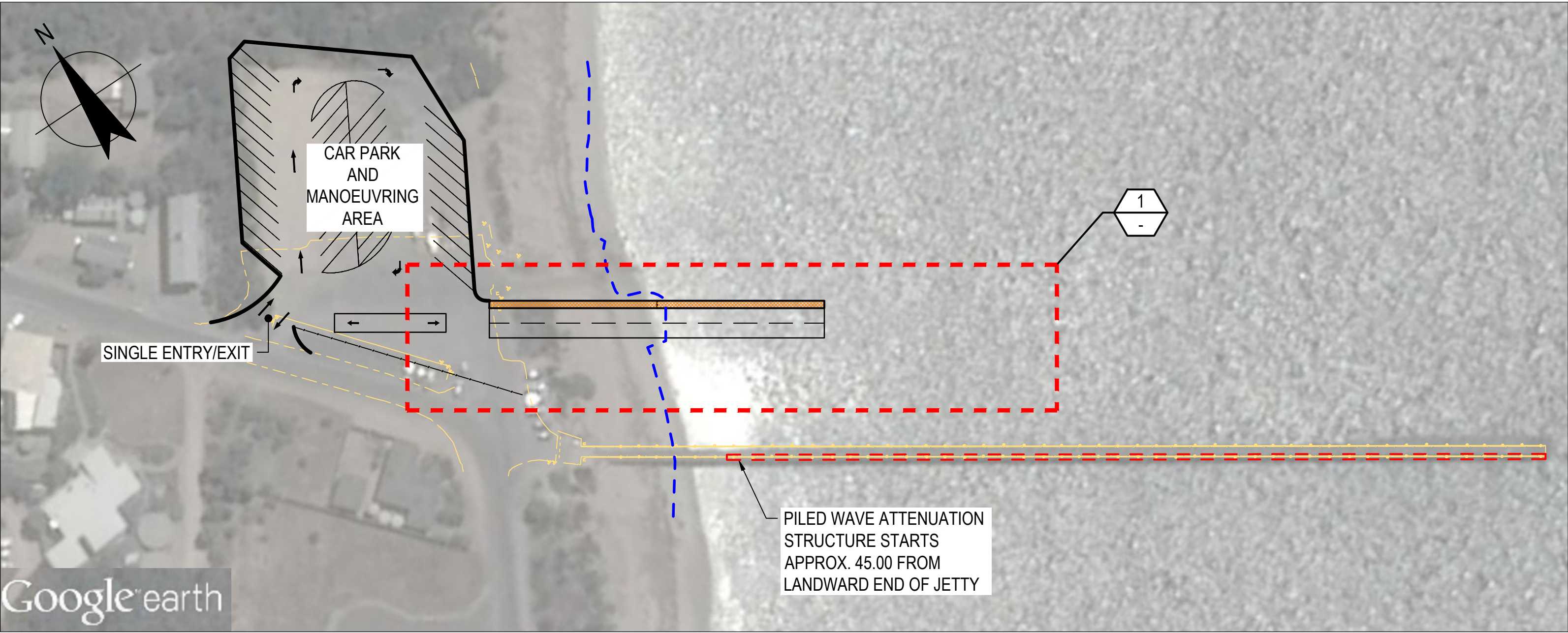
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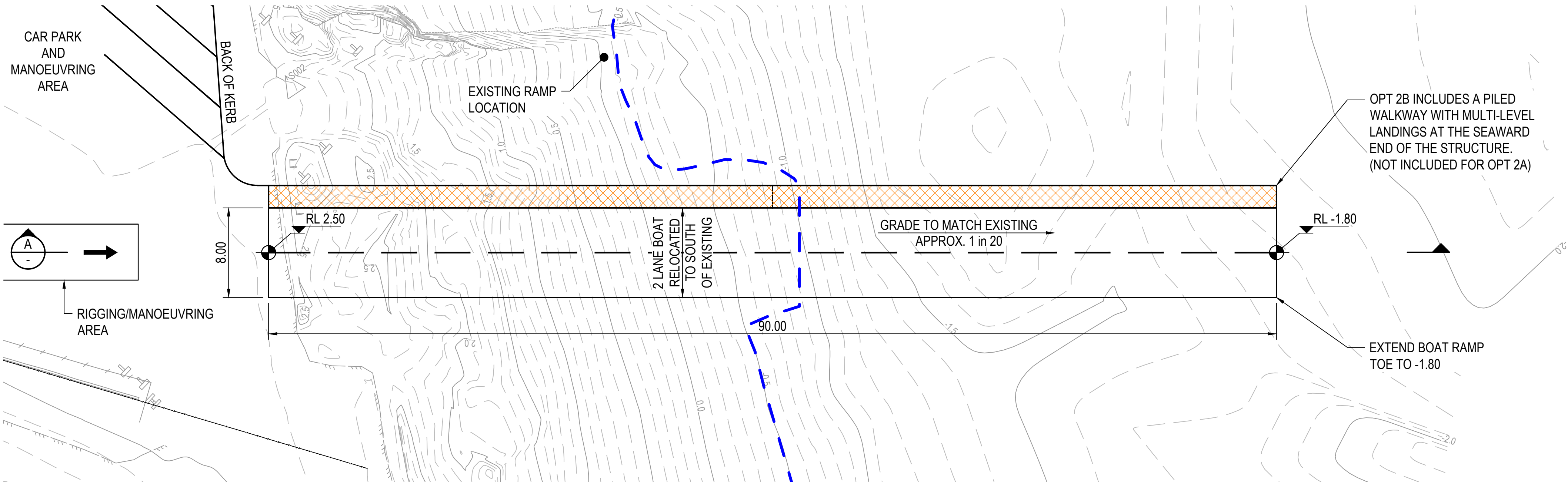
# Appendices

# Appendix A – Options Sketches



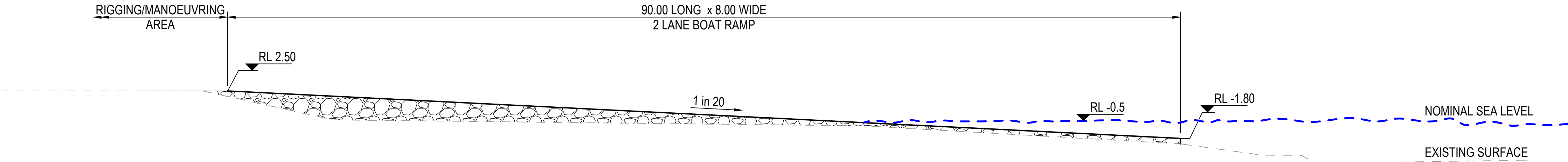


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1 DETAIL  
SCALE 1 : 250

BOAT RAMP LAYOUT




A SECTION  
SCALE 1 : 250

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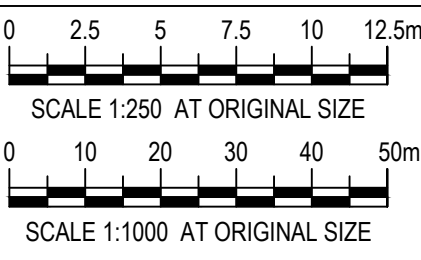
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B	UPDATE WITH OPT 2A AND 2B	JE*	16.02.17
rev	description	app'd	date

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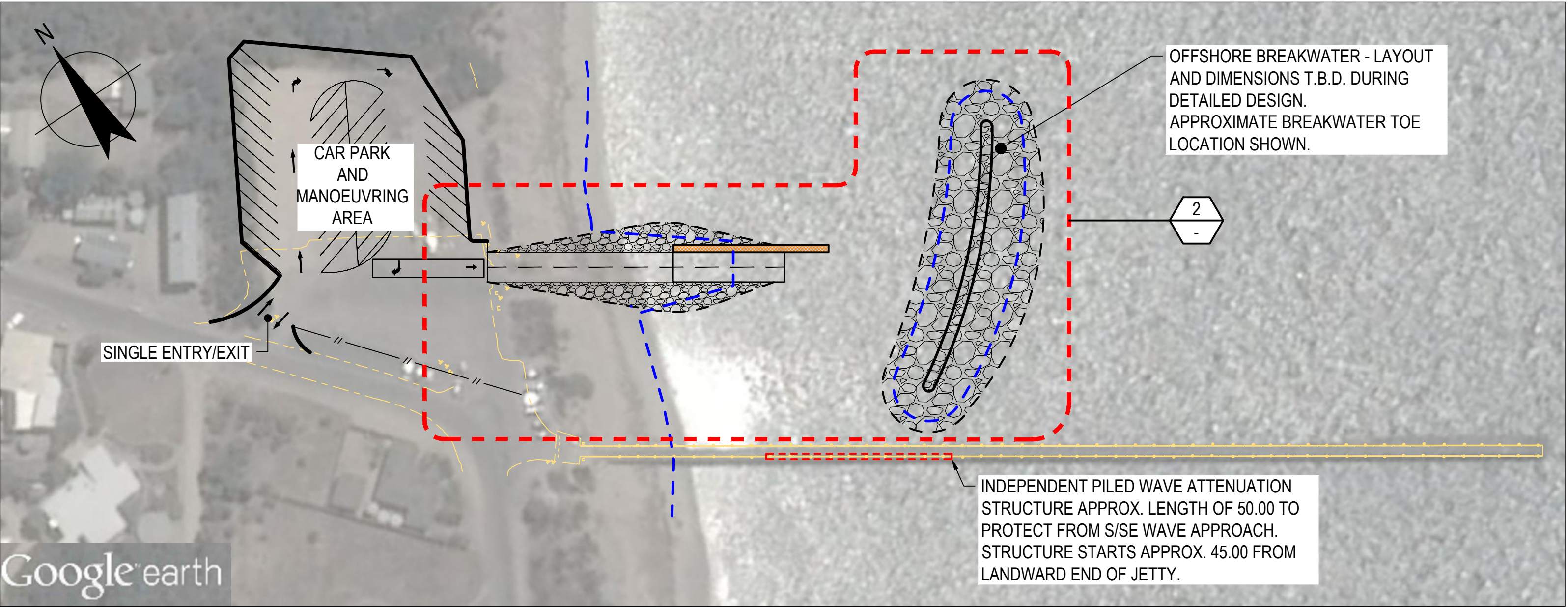
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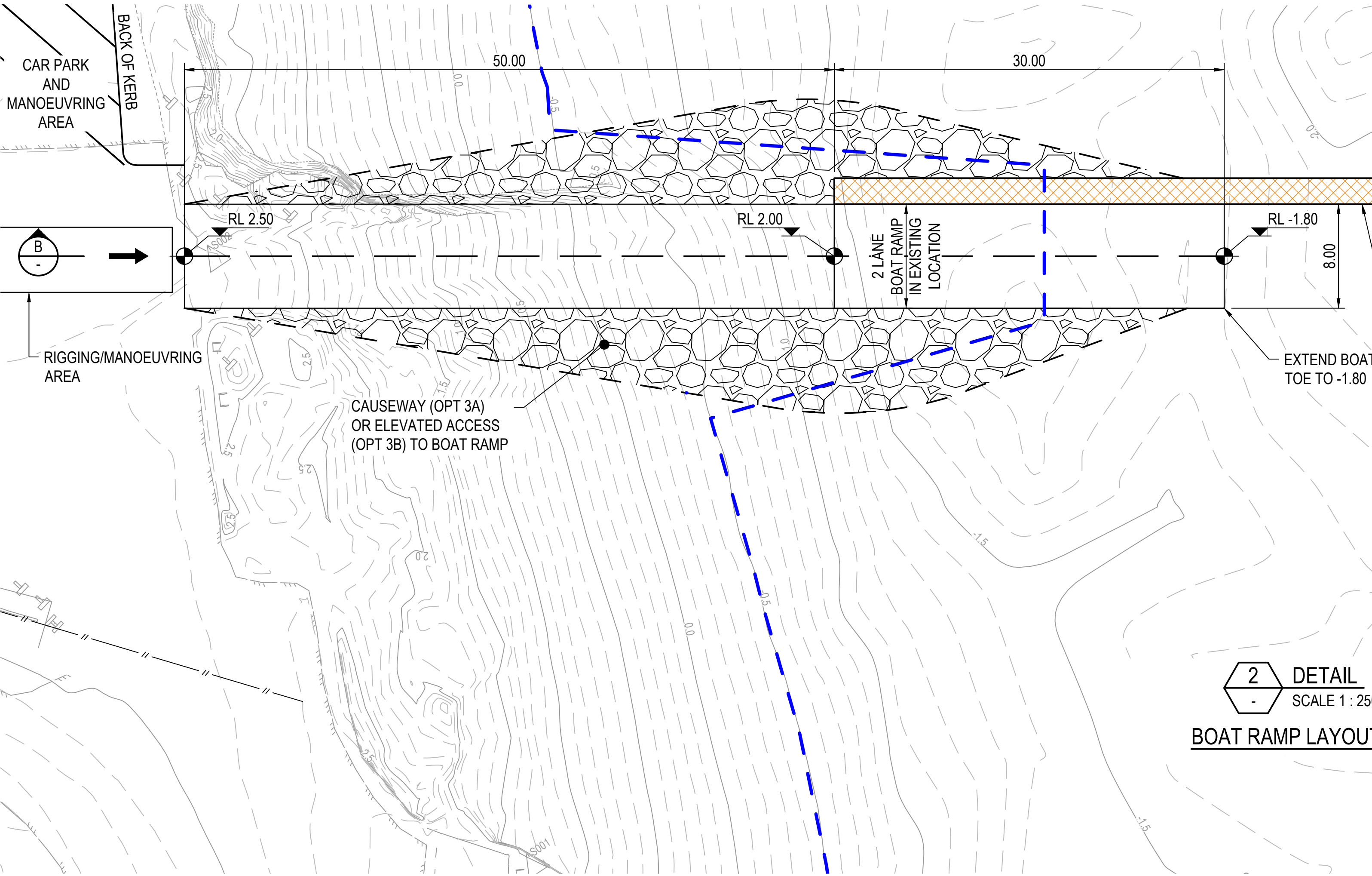
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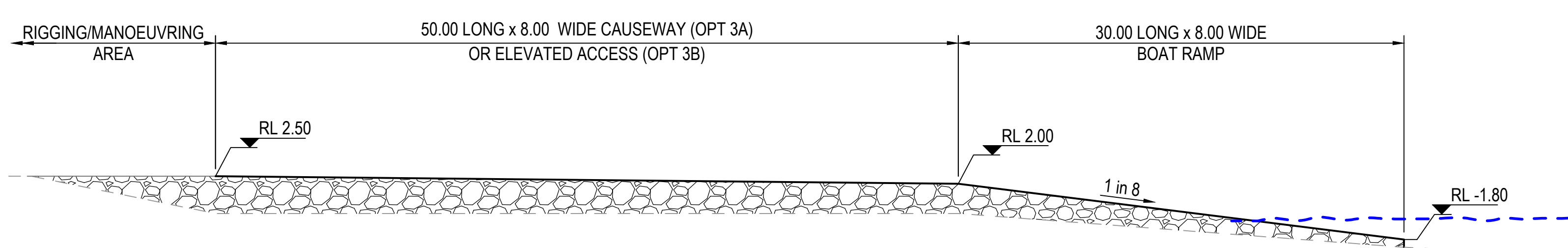




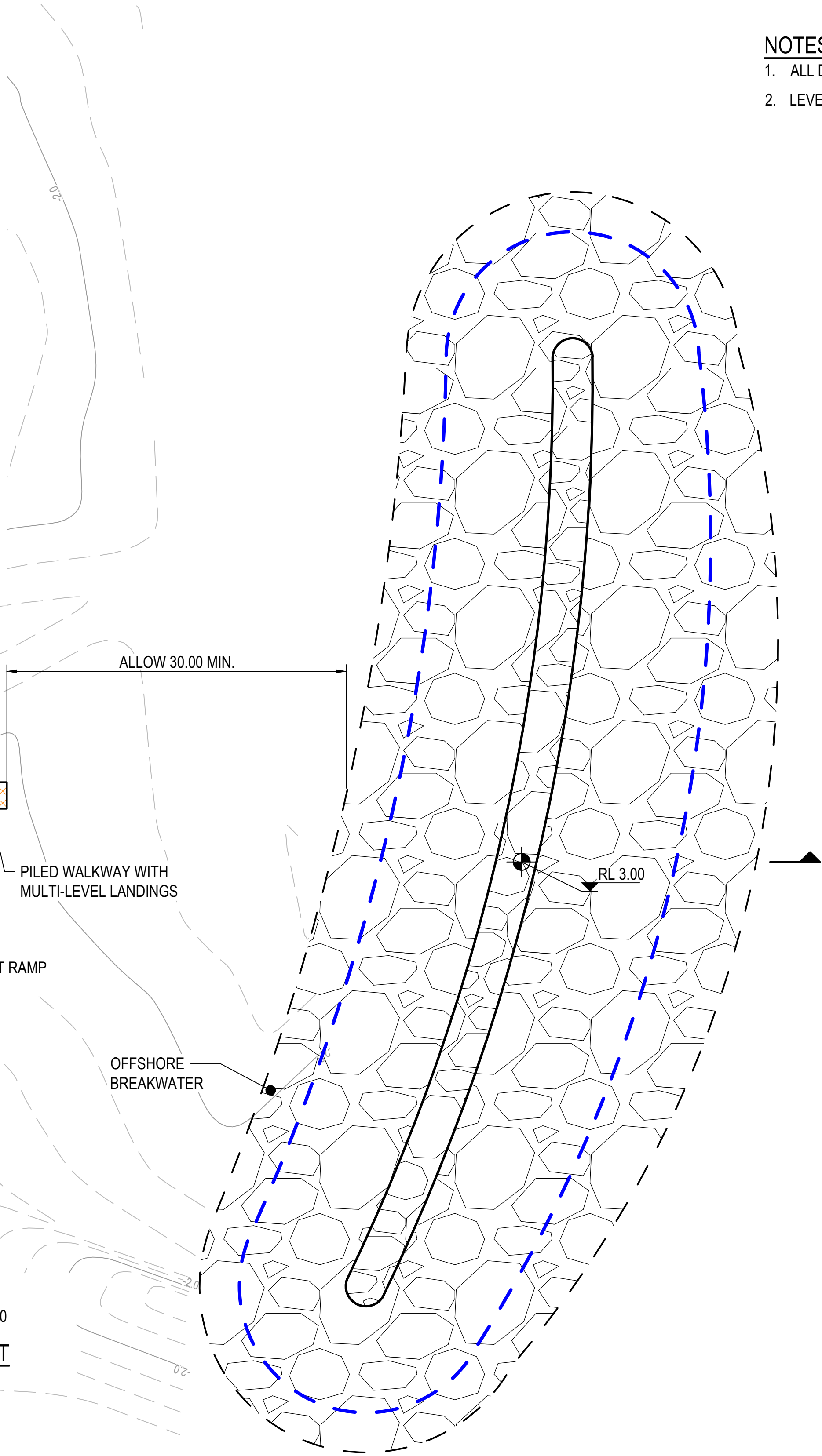
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2 DETAIL  
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BOAT RAMP LAYOUT



B SECTION  
SCALE 1: 250



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MARION BAY  
CARPARK AND BOAT RAMP  
OPTION 3

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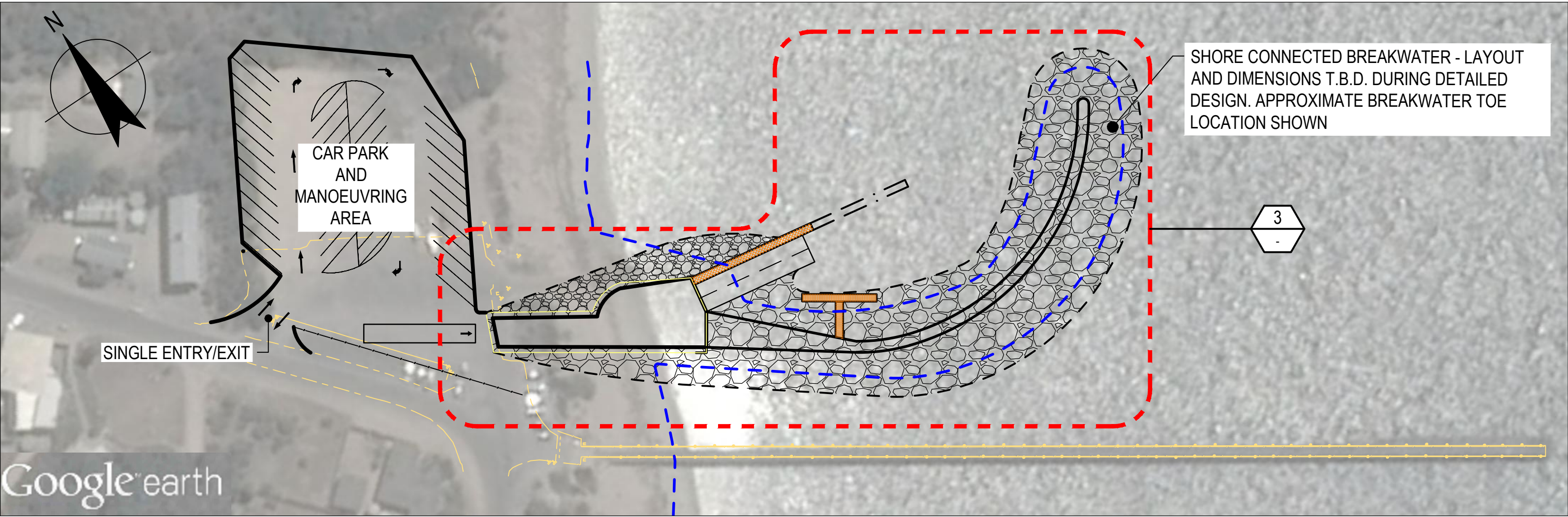
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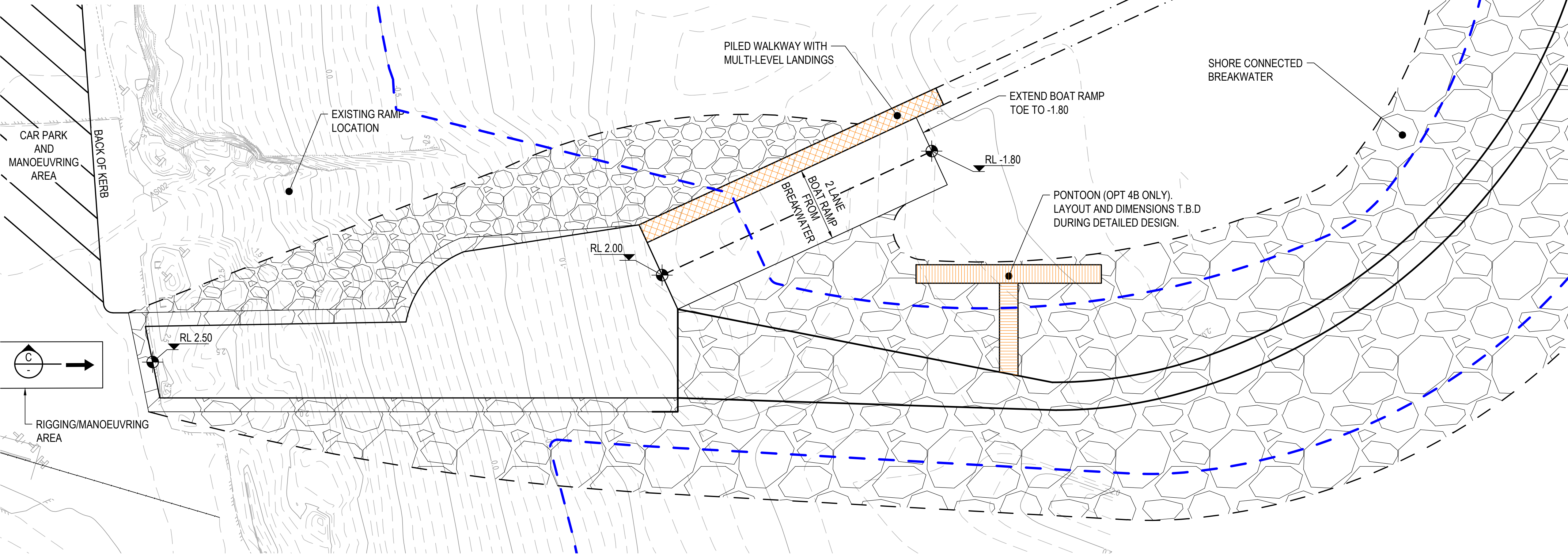
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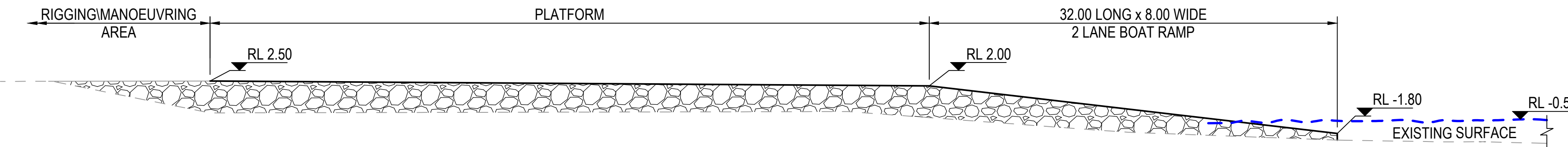




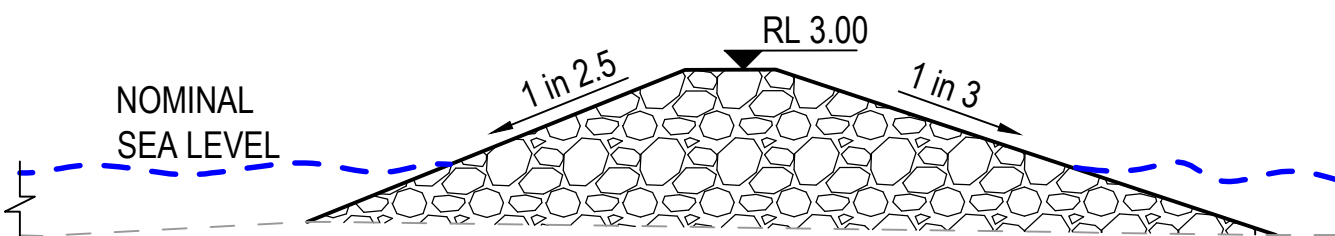
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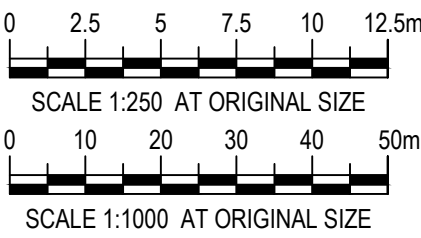


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## Appendix B – Engagement Outcomes Report



# Yorke Peninsula Council Marion Bay Boat Launching Facility Engagement Outcomes Report

July 2017



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- Appendix A – Notes from Key Stakeholder Discussions
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# 1. Introduction

## 1.1 Project overview

Marion Bay is situated on the southern coastline of the Yorke Peninsula, approximately 72 kilometres from Yorketown. As the southernmost town on the Yorke Peninsula and the last 'port of call' before entering the Innes National Park, Marion Bay is a key destination for tourism and boating in the region.

The town boating facility consists of a single lane, low gradient ramp accessed via a sealed roadway to the ramp and an associated car/trailer parking area.

In May 2012, the Yorke Peninsula Council (YPC) commissioned the *Recreational Boating Facilities Strategy Plan* which reviewed the facility alongside others in the area.

This Strategy identified that the current boat facility is unable to capitalise on the potential growth in boating tourism expected in the region. It also identified that the facility was unable to provide its existing user groups with adequate facilities to ensure safe boating operations.

To address these shortcomings, YPC have engaged GHD to undertake a review of the Marion Bay boat launching facility to determine what options are available for redevelopment of the existing boat ramp and surrounding area. By working with key stakeholders, GHD aim to develop a design solution that minimises impact on the environment and coastal processes whilst enabling safe and controlled community recreation.

For further context of the project, see information provided by key stakeholders in Appendix A.

## 1.2 Scope and purpose of this report

Engagement with key stakeholders was identified as a critical component in the review of the Marion Bay boat launching facility. Engagement was undertaken as part of a previous study completed in 2010 (of which relevant documents were provided by YPC as part of the tender for this review).

Lessons learnt from the previous engagement include:

- The need for key stakeholders to be involved in coming up with a solution rather than being 'told' by experts.
- The need to identify and communicate with key stakeholders.
- The need for clarity in the message of the project aims (previous issues had arisen due to confusion and misunderstanding).

In response to the above needs, a community and stakeholder engagement plan was developed as part of the current project. The plan identified key stakeholders to be engaged in the review, the level of engagement required and potential issues and concerns that would need to be addressed.

The purpose of this report is twofold. Firstly, it is to demonstrate how the engagement plan was implemented by providing an overview of the engagement process in which key stakeholders provided input into the review of the boat launching facility. Secondly, it identifies key themes and issues which emerged through the engagement process and key drivers that should guide the development moving forward.

## 2. Key stakeholders and meetings

There has been engagement undertaken at several stages of the development of the Options Review Report for the Marion Bay Boat Launching Facility. The engagement has consisted of a mixture of 1:1 conversations and small working group discussions.

Below is a summary of the engagement activities undertaken and key participants.

Key stakeholders were identified in collaboration with Council (Andrew Cameron and Cr Rich) and invited to participate in the consultation process. Stakeholders were identified for the following reasons:

- To include a variety of perspectives and viewpoints.
- Enable useful knowledge to be shared.
- Ensure an accurate representation of local communities in the area.

Key stakeholders were engaged by GHD during one on one meetings between May and June 2016. Meetings were conducted either in person or via teleconference at stakeholders convenience. The key stakeholders that have been consulted in the development of the Options Review Report include:

- Councillor John Rich.
- Mark Davidson.
- Rob Rigoni.
- Josh Harkin.
- Peter Hickman.
- Councillor Adam Meyer.
- Ian Janzow.
- Dr Rick Nunes-Vaz.
- Paul Sanders.
- Danny Simpson.

Following the feedback from key stakeholders, GHD developed a draft Concept report for consideration and discussion with Council and DPTI. A meeting was held at GHD on 18 November 2016, which was attended by GHD, Council (Andrew Cameron and Councillor Rich) and DPTI to discuss the draft report. In response to further discussion at GHD amended the draft report.

On the 20 February 2017 an email with an attachment of the draft report was sent to key stakeholders seeking comments and feedback on the draft report by 10 March 2017.

GHD received several comments and suggestions from Reference Group members in response to the draft report numerous comments. To allow consideration of these comments GHD met with Council representatives (Andrew Cameron and Councillor Rich) on the 28 March 2017 to review the submissions, discuss and agree on any changes to the draft report. It was also agreed at this meeting that it was essential to consult with the reference group prior to reporting back to Council.

Subsequently key stakeholders were invited to attend one of two meetings to discuss the recommendations in the report and the next steps in the project.

The meetings were held as follows:

- Friday 5 May 2017, GHD Offices, Level 4, 211 Victoria Square, Adelaide, 2pm - 3.30pm
- Monday 8 May 2017, Marion Bay Community Centre, 1pm - 2.30pm where received from GHD for further consideration in the development of the Report.

Following these meetings the Options Review Point was finalised for considered by Council for broader community consultation.

## 3. Key Themes and Drivers

### 3.1 Key Themes

From consultation with key stakeholders, a number of key themes that should be considered in the project emerged and are outlined below (detailed notes from the stakeholder consultation are contained in Appendix A).

#### **Maintenance and Cleaning**

Maintenance and cleaning of the ramp surface and adjoining car park was a recurring theme throughout discussions with key stakeholders. This is largely due to seaweed wrack – waves wash seaweed wrack onto the boat ramp. The wrack is sometimes carried up into the adjoining car park on the axles of car trailers. There is no current contractor or body that takes responsibility for maintenance, and it therefore falls upon individuals to clean/clear it when they can. To a lesser extent, dumping of fishing waste is also a problem as there is no fish cleaning area or supporting facilities. Sand accumulation on the boat ramp is not a major issue.

#### **Safety**

Safe launching and retrieval from the boat ramp was identified as an issue due to the current state of the boat ramp, wave conditions of the area, and non-local visitors who are unfamiliar with these conditions. The current boat ramp has a drop off at the end of the ramp. Damage to vehicles/trailers has occurred when reversing into the drop off.

The boat ramp is not sheltered from wave action. This exposes users to a variety of wind and wave conditions from several directions, and which can be exacerbated by the stage of the tide. Ramp users who are inexperienced or unfamiliar with the local conditions and the ramp itself are at greatest risk of capsize or damage to vessels and/or vehicles. It is also not possible to safely transfer persons from vessels onto the existing jetty under even moderately small wave conditions.

#### **Economic Drivers**

Some stakeholders identified a strong link between the usability/quality of the boat ramp (and associated facilities for boats) and the economic well-being of the area. There is a need for such infrastructure to cater to tourists as a decline in tourism has resulted in a decline in property values and a surplus of private rental properties available (many are slow to sell).

#### **Access and Supporting Infrastructure**

Improved access to the boat ramp and provision/improvement of supporting facilities will assist in addressing some of the issues outlined above (maintenance and cleaning, safety, economic drivers).

Currently, the width of the boat ramp is perceived as being too narrow – stakeholders have suggested that it needs to be doubled to accommodate vehicles and boats of varying sizes. Improved maintenance of the boat ramp (regular clearing of seaweed wrack from the boat ramp and car park) would also improve accessibility.

Alongside access, provision of infrastructure that supports use of the boat ramp and associated activities is also important. There are a number of safety issues discussed above that could be lessened or mitigated through provision of basic/additional/upgraded infrastructure, namely:

- Signage to advise/warn all users of dangers and conditions.
- Lighting for launching and retrieval (e.g. fluoro or floodlights).
- Provision of a boat holding structure.
- Upgrades to the adjoining jetty to prevent damage to berthing boats.
- Provision of areas to tie up boats.

In addition to the above, improved infrastructure would also support the tourism industry and, in turn, greater economic development for the area. Suggestions include:

- A fish cleaning facility.
- Pontoon.
- Rubbish collection.
- Toilet facilities.
- Fuel near the ramp (the supply at the store has run out previously).
- Skip bins.
- Upgraded car park with clear definition of parking spaces.
- Provision of facilities where boats can refuel, access fresh water, as well as pulling in to stay for a day or so.

### **Environmental Considerations**

There are a number of environmental issues that need to be considered in conjunction with the development of a new or improved boat launching facility, namely:

- Avoiding siltation and/or seaweed wrack accumulation within main navigable areas.
- Water quality/clarity during any recurrent dredging (if needed).
- Water quality inside and outside any captive water body.
- Sand drift and changes to the bay sediment dynamics in the region (potential for erosion/accretion).
- Impacts upon any sensitive aspects of the local ecology such as seagrasses or changes to the coast associated with projected sea level rise (e.g. possible future calls to build a sea wall).

In addition to the above, it is important to be aware that there may be a number of other potential changes that may also come into play.



### 3.2 Recommended Key Drivers for the Project

In relation to the key themes outlined above, there are a number of key drivers that should determine the feasibility and scope of the boat launching facility moving forward. These have been recommended by Dr. Rick Nunes-Vas who holds expertise in marine related assessments that are of particular relevance to this project (for full details, see Appendix B). These key drivers are:

- The target number of launch/recovery events per day to be accommodated (and how these might change through the expected life of the facility).
- The existing and projected demand for launching/retrieval.
- Accommodation for related vehicles (car trailer units, etc.).
- The size and type of vessels to be serviced (e.g. deeper draught commercial vessels vs small tinnies).
- Perceived/desired economic stimulus for Marion Bay in particular and/or that region of the Yorke Peninsula.
- Perceived importance/desirability of proximity to the Marion Bay commercial area.
- Perceived need for a safe haven/harbour in this part of SA.
- The acceptability and proximity of alternative sites that could meet the brief.
- Thresholds of acceptability of possible impacts on the environment and other stakeholders/users.
- Independent longer term developments in the Marion Bay region that might interact with the boating facility or require changes/adjustments to a facility.

## 4. Conclusion

The consultation process was identified as a critical component in the review of the Marion Bay boat launching facility. Input provided by key stakeholders was sought in order to understand current issues and concerns and build upon local knowledge and technical expertise specific to Marion Bay.

This was initially through reviewing the Recreational Boating Strategy Plan that identified existing boat launching facilities provided at Marion Bay are in need of an upgrade, as well as engaging with key stakeholders.

Key stakeholders were identified by GHD in collaboration with Council based on their ability to represent a variety of perspectives and viewpoints, expert knowledge and accurate representation of local communities in the area.

Through desktop review and key stakeholder meetings, a number of key themes and issues emerged:

- The facility is critical to supporting the local economy.
- There is a need for regular cleaning and maintenance to be put in place for the facility.
- There are a number of safety risks that must be addressed.
- Environmental impacts should be considered in conjunction with the development of a new facility.
- There is a need for improvement to associated infrastructure that supports the facility.

Further to these themes, several key stakeholders who hold marine specific knowledge were able to recommend key drivers that should be used to guide future development of the boat launch facility. All of this knowledge has been used to provide a contextual background to support the identification of redevelopment options and the forming of appropriate assessment criteria to guide such a redevelopment, which is put forward in the associated Options Review Report.

## Appendices

# Appendix A – Notes from Key Stakeholder Discussions

## General

*The comments below were provided during the stakeholder engagement process but cannot be traced to a specific stakeholder.*

- Extra signage at the ramp is not warranted.
- Concerns that rescues will bring people in who should not have gone out in the first place.
- There are not many people who undertake night fishing – lighting will not necessarily bring more people to the ramp.
- Concerns that any infrastructure will be more problematic for maintenance – main focus is to improve capacity and avoid future problems.
- There are not many people who go out on their own, but occasional people do.
- Ramp surface has a good grip – it does not get slimy – however, Council doesn't maintain it, private owners simply move seaweed and other obstructions from the ocean.
- There are a minority of users who do not look after the ramp properly and cause issues for the majority of users.
- The boat ramp has been in the same location at Marion Bay for a long time.
- People may be willing to pay per use for the facility if it was a good facility that did not clog up.
- Most people are not bothered by the seaweed.
- There are concerns that having the ramp in that location encourages people to go fishing even when it is not safe.

## Peter Hickman

*Cray fisherman, Sea Rescue*

- Does not think that with sand/swell exposure, the project is worthwhile.
- Capacity, rather than availability, should be increased.
- The area is full of seaweed – if a facility is built; it will cause more problems.
- Water levels have exceeded the area.
- Concerns that provision of a new facility encourages people to go fishing when conditions are not suitable.
- Peter is of the view that if you cannot launch then you should not go out.
- Sometimes easterly winds can cause problems.
- Often when there is a westerly wind, conditions are calm for launching but conditions are too rough offshore.
- Seagrass beds are very shallow and boats cannot get through them.
- The jetty should be used as a quick drop off point – there should be no tying up.
- The ramp slope is not an issue.

- A fish cleaning facility should be exposed to the swell.
- Lighting would assist.
- Due to the seabed levels off the end of the ramp, there is very little to be gained.

### Mark Davison

#### *Head Ranger, Innes National Park*

- There is small swell during low tides and 3-foot swell during high tides.
- There are gale force south easterly winds that cause dangerous conditions.
- Long term locals:
  - Are content with the ramp as it is;
  - Understand how to use the ramp under various conditions;
  - Only use the ramp for 4WD launching – there would be trouble using a 2WD;
  - Find seaweed waste is an issue – there is no current contractor to clear the jetty;
  - Find that sand movement that can cover the existing ramp is a problem;
  - Are concerned in regards to the colonisation of seagrass;
  - Would like the ramp widened for safety (currently, it is too narrow) and the drop off fixed.
- Non-locals face the following dangers/challenges:
  - They are mainly from Adelaide and not used to the swell;
  - Oblique waves approaching the ramp
- There is a boat ramp at Pondalowie Bay but this only provides a beach launch and 4WD access. However, it is great for the south east.
- The ramp should provide for all sizes of boats (including both local and deep sea);
- Most locals use 4WD vehicles or tractors. In addition to the boat launching facility, the township and surrounding area would benefit from the following:
  - Pontoon;
  - Rubbish collection;
  - A fish cleaning station;
  - Toilet facilities (currently, the nearest toilets are at the local town hall approximately 200 metres south).
- There is a limestone reef which is shallow and all offshore (within the crayfish catching area).
- Currently, the town does not have facilities to support a major influx of tourism.
- There is seaweed wrack up to 1 metre high.
- There is a danger of water going up pathways, potentially up onto the roads under big swell conditions – mitigation of this should be considered.
- The new design should take into account sea level rise and the design's life.
- Positives of the boat ramp are that there is existing infrastructure already in Marion Bay (fuel, tavern, carpark, etc.)

- Fuel at the ramp
  - Who would run it?
  - What would happen if there was a power blackout? (Generators)
  - Fuel supply – limited amount at the store (the supply of diesel ran out over Easter)
- Car parking – sand can cover up marking area to the north.
- There are issues with seaweed and sand in the car park – sometimes trailers bring more up on their axles.
- The beach launch and ramp are at the same location.
- Away from the township, consideration should be given to:
  - Not disturbing locals;
  - Dropping speed on the highway near the town entrance to 70km/hour;
  - Not impacting on locals.
- The following challenges need to be addressed:
  - Sand movements;
  - Seaweed wrack.
- Murray Townsend from the Coastal Protection Board has access to relevant studies.
- There is a major development occurring to the North of Marion Bay, which involves a residential and small commercial centre but no improvement in the permanent workforce (very little employment provided).
- There are navigation challenges around Norris Reef – there are no new markers.
- There should be a light on the end of the jetty for fishing only.
- Currently, there are no maps at the ramp provided about the reef.
- There is radio variability (VHF/UHF/etc.) but nothing is indicated on the signage – locally, everyone uses VHF.
- Due to there being no fish cleaning area, dumping has become an issue.
- Lighting should be provided for launching/retrieval such as fluoro and floodlights that are key operated.
- There should be peak time skip bins provided with limited openings.
- The carpark could double as a helipad – check power lines.
- If a boat was washed northwards, there would be no way of getting a tractor onto the beach onto the north (there is a rock levee north).

### Josh Harkin

*Tavern Owner and President, Township Committee*

- Concerns:
  - Usability of the current ramp;
  - Dangerous to inexperienced boaters or those who are experienced but not used to non-fair weather ramps;
  - People are told not to go out;
  - The ramp is used around 200 days per year and people have to anchor their boat whilst returning the car.



- Launching a boat is a 2 to 3-person operation and problematic for older people.
- People turn away for launching if it is too difficult.
- There is difficulty depending on the tide.
- There is concern over the drop off at the end of the ramp - it can cause axles to rip off.
- People visiting use their boats less frequently and are therefore less experienced with a ramp like that at Marion Bay.
- If moorings are in the wrong spot, this can be problematic.
- At low tide water depth, it is deeper closer to Norris Reef – 10 centimetres at low tide, causing boats to lose keels on the reef.
- Vision:
  - Anything that can grow business.
  - Provide fishermen with ready access.
- Infrastructure:
  - There is a need for a total revamp.
  - Parking can be ruined by one bad park.
  - Lots of people launch their boats at night and there are no lights at the current facility.
  - Users don't register so they (the Tavern staff) record number plates for safety.
  - Provision of a boat holding structure
  - Provision of areas where larger boats can refuel and access fresh water.
  - Facilities where boats can pull in and stay for a day or so.
- When boats are launching they either:
  - Travel east;
  - Towards Foul Bay;
  - Those who are more experienced head south to go out to sea.
- Safety:
  - If the facility looks as if it is safe, then people will assume that it is safe.
  - The slope does not appear to be a problem.
- There used to be a beach ramp between the ramp and jetty.
- A single ramp is sufficient for most of the time – Easter Saturday and Sunday are particularly busy (160 boats parked).
- Marion Bay cannot be fished for more than 100 days per year (on a good year).
- Boats cannot be launched when there is a southern swell and easterly wind.
- An all-weather launch is to go around the corner – if it is messy, vehicles turn around and come back.
- A key issue is the retrieval of boats that have encountered issues in deep water.
- Any solution must consider issue comprehensively.
- Marion Bay does warrant an improvement but will be limited by what is feasible.
- Scouring on the northern side – rocks have been here for ten plus years and they routinely scrape sand/weed off and place on the down drift side.
- Worst waves are a southerly swell.

- The boat ramp is approximately 50 years old – there is a better place for it off of Penguin Point as:
  - It goes into deeper water;
  - It is in an area where kids can learn to surf;
  - In Marion Bay, it is likely that there would be major community outrage if there was a ramp installed.
- A new boat launching facility may be unlikely to be funded as a blight on the landscape.
- Concerns over instability of cliffs, therefore the facility may not be suitable – the ramp possibly evolved as a result of proximity to the jetty.
- There are ten licenses for commercial fishing which are run out of Pondalowie.
- Due to the easterly winds in summer, such a facility at Marion Bay would be very exposed therefore boats may not fuel up at that location.
- Charter Boats:
  - Would board on charter;
  - A boat holding structure would help.
- Jetty is unstable – it has been used for unloading people and the conditions are not good for unloading, as there is no fendering (causing damage to your boat).
- If the ramp is upgraded and there is an all-weather launch, there are two lanes needed (with a single lane, traffic can wait up to 45 minutes in peak periods).
- There should be a location for tying up boats as currently, people are unable to hold their boats.
- People are reluctant to launch their boat at Marion Bay due to damage to vessels and vehicles (including water coming into the back of cars when people reverse in and wait for the boat to float off trailer).
- Marion Bay can get 28 feet catamarans so there is a need to provide big CTU spaces.
- Sand and wrack have to be cleaned off every few days (mainly wrack from May to October; rarely get sand build up on the ramp otherwise throughout summer).

### **Paul Sander**

#### *Fatfish Charters*

- Launch off beach – 6 tonne trailers.
- Don't use mooring.
- Currently, there is no safe access from the jetty and the boat ramp cannot be accessed via the jetty – this creates safety threats, particularly for rescue services.
- The ramp is undermining on the northeast side.
- Sand needs to be removed.
- Boats cannot leave the ramp at low tide due to sand ridges.
- An excavator could be used to remove the sandbar.
- Inexperience with northeast swell creates risk.
- Consider widening of the boat ramp or use of a one-off boat pontoon.
- Four charters currently operate.

- Provide an area for cleaning fish.
- Provisions for trailers and boats.
- Most of the time, the car park works well although is overcrowded during peak periods between Christmas and the end of January.
- There should be designated parking places provided.
- There is conflict between the jetty and the boat ramp.
- There should be a second ramp that is designated for commercial vehicles.
- There is a boat launching facility at Pondalowie Bay that has been operating for twelve months.
- Currently, there are problems for recreational fishers and rescue – fisherman and rescuers cannot launch or retrieve.
- The water level is a problem.

### **Rob Rigoni**

*Marine dredging, local fisherman*

- Ramp corner.
- No one currently cleans the ramp of weeds or sand.
- Sand movement is less of a problem than seaweed.
- People do not consider safety enough, particularly in regards to swell, and they find the ramp difficult to navigate.
- Widening the ramp and providing an extra lane is important.
- Some people (local developers) think the boat launch facility should be at breakwater at Penguin Point – their interest is in improving property values.
- Rob is in support of sustainable development.
- At the end of the jetty (6 ft @ LAT) the westerly brings in water and storm swells go through boards of the jetty.
- Negatives of the current ramp are:
  - The weather/swell affects launching;
  - Shallow water is 20-50 meters out – some charters cannot launch because of this, especially with wrack;
  - It is only one lane – this is too narrow;
  - The dual lane allows launching and retrieval;
  - The ramp blocks the beach for vehicular access.
- Fifteen years ago, the ramp was extended and widened slightly.
- There was protection on the down drift side of the boat ramp placed after the ramp was extended (reactive).
- Historically, the car park used to receive swell prior to the ramp extension;
- Water is shallow at the end of the ramp (power on to the ramp 300mm deep).
- There is sufficient capacity for parking but it is not being used efficiently.
- There are very view conflicts between launching and beach users.

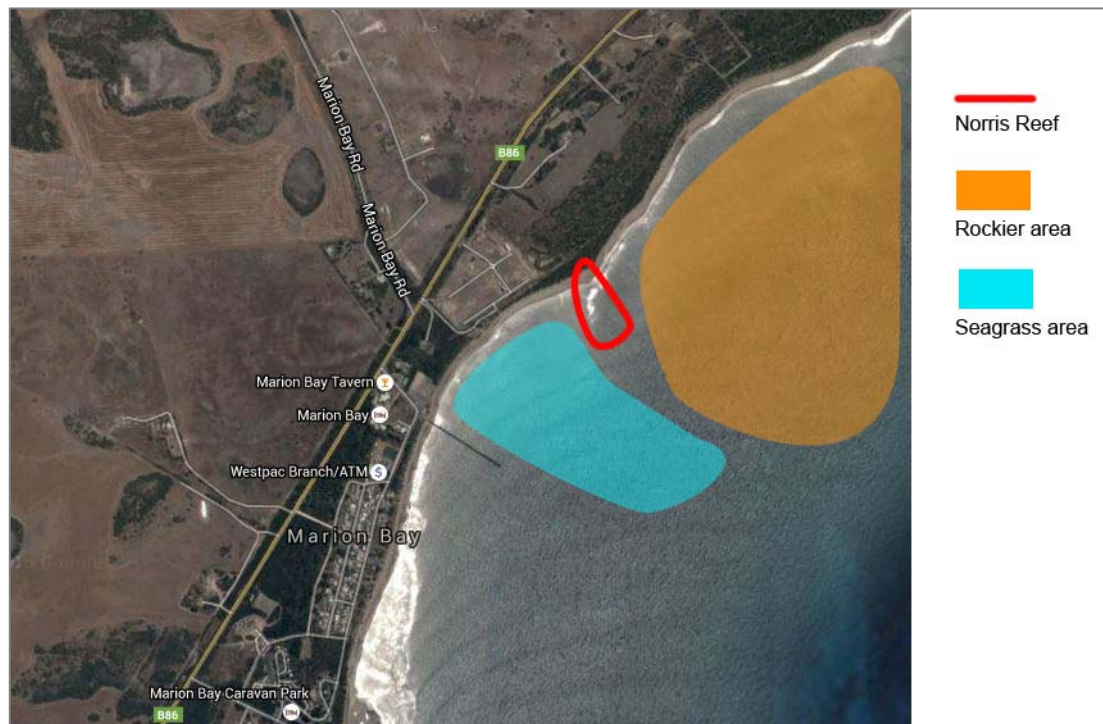
- No commercial operators are allowed to use the jetty.
- There is a cray fleet at Pondalowie Bay and therefore no commercial use – pedestrian/fishing use only.
- Fuel can be accessed at the tavern.
- The speed limit of the Yorke Highway is 90km/hour past Jetty Road (the turnoff to Marion Bay) – this is considered too fast for vehicles to slow down.
- Seagrass is important.
- Breakwater traps sand and rock.
- Erosion to the north of the ramp has already evidenced.
- Old shacks to the north of the ramp have been damaged by erosion (through reef focussed swell).
- There is no signage at the ramp alerting users to check the conditions – the nearest rescue is at Edithburg.
- Non-locals tend to launch their boats regardless of safety issues due to the distance they have travelled.
- Water depth is an issue for larger boats – permanent moorings off of the ramp.
- The ramp has been becoming busier over time due to cray fishing and big fishing for tuna.
- The area gets cruising boats mooring but not motoring over from Adelaide.
- Some people are suggesting causeways to overcome wrack (rocks could be sourced from Curramulka – a quarry which is a 200km round trip).
- Land based construction (too rough for marine based).
- Generally, swell is reasonably predictable – it is small in the morning and big at night (if trees are moving in the morning, do not go out in the afternoon).
- Cost should be balanced against the life expectancy of the of the facility.
- Although it is important to have signage at the ramp, people will only read what they want to read (particularly those who have travelled for a long way – they are likely to go out regardless).
- Rescues – these will increase the patronage of people not reading the conditions.
- The nearest sea rescue is half an hour away at Edithburgh – at 16 degrees, someone will pass out after one hour in the water (consider an ageing rescue team).
- There should be a conceptual model of sediment transport.
- Commercial operators (with a conflict of interest) would like Marion Bay to develop – otherwise, there are holiday shacks, retirees and those who fly-in/fly-out.

## **Danny Simpson**

### ***Marine knowledge, Engineering***

- Danny Simpson identified two further stakeholders who should be kept in the loop:
  - Kent Van Rieseger (a local fisherman who works in the area).
  - Paul Hanna.
- A double width boat launch facility is ideal.

- It is important to keep weeds off the boat ramp and provide protection from the swell.
- Currently, there is nowhere to clean fish or access for people to use the ramp.
- In the township there should be a fish cleaning facility (including a septic tank in the northern corner) and shelters for/at the end of the jetty – these could be funded by recreational grants.
- There has been a big escalation in fishing and larger boats coming in (up to 30 foot).
- The car park is at capacity, particularly on long weekends.
- The main issues are swell and wind chop for the southern area.
- The sand is away from Norris Reef and there is seagrass



**Ian Janzow**

### **Engineering Consultant**

- Safety is a major issue.
- Potential studies may be required.
- Coastal dynamics cannot be changed – those in the area should learn to swim/surf.
- The area is a key location for migrating birds.
- Swell causes sea grass to cluster around the jetty.
- The boat launch facility should be widened and lengthened (rather than having a second exit).
- The trailer park is very busy.
- The new facility should cater for tourists as there has been a decline in tourism resulting in the following economic impacts:
  - A decline in property values;
  - A surplus of private rental properties available – much of it is slow to sell.

- The development is located within a marine park (the Southern Spencer Gulf Marine Park) and nearby a sanctuary zone (Chinamans Hat Sanctuary Zone) which is southwest of the development location.
- Consideration should be given to safety, practicality, and future uses.
- Stenhouse Bay holds potential for redevelopment and has depth but needs break water (\$20 million) – protection of the jetty.
- Jolly beach (south of Marion Bay) is too shallow – currently, more boats use the boat ramp at West Cape Bay.
- Consider looking at a creative town centre.
- Consider protection for “floating pontoons” with a captive water body.
- Consider staging
- Cray fishermen use boat ramp at Pondalowie Bay – there may be a charter conflict.

### **Adam Meyer**

*Councillor of Innes Pentonvale Ward (During this meeting, Adam was also joined by Sprios and Andrew, who are State and Local government clients who also provided input).*

- Marion Bay has been identified as a potential location for a safe haven.
- Whole of life costs need to be considered.
- Air Sea Rescue will not come to Marion Bay to use the facilities but tends to go to facilities at Pondalowie Bay, Edithburgh, Port Victoria, and Point Turton.
- Due to Air Sea Rescue not coming to Marion Bay, Marion Bay has to use a helicopter or get charter vessels to go out.
- Adam believes that there are conditions that are okay, but it is still unsafe for launching.
- There should be a greater focus on safety.
- Sometimes, charter boats break moorings and wash up onto the beach.
- Rocks are placed on the northern side of the beach to stop vehicles getting onto the beach, not for erosion protection.
- Standard signage should be placed at the facility.
- Line marking to Australian Standards can reduce the capacity of car parking.
- Previous consultants acknowledged that the ramp was not perfect, but held concerns about environmental and shoreline impacts of any protection works.



# Appendix B – Recommended key drivers for project

The recommendations in this appendices have been provided by Dr. Rick Nunes-Vas, a marine scientist with expertise of particular relevance to this project which is as follows:

- Five years assisting the Olympic Dam expansion EIS marine assessment team (this work added to the weight of evidence that supported the siting of a desalination plant near Bonython Park);
- Twenty plus years as a research oceanographer, largely focussing on the SA Gulf Waters;
- Authored oceanography chapter in recent Natural History of Spencer Gulf book;
- Lead the Defence Science and Technology Organisation's research on strategic risk analysis.

His recommended key drivers for the project are as follows:

- The target number of launch/recovery events per day to be accommodated (and how these might change through the expected life of the facility);
- The number of simultaneous launches and/or recoveries required/desired;
- Accommodation for related vehicles (trailers, etc.);
- The scope and type of vessels to be serviced (e.g. deeper draught commercial vessels);
- Perceived/desired economic stimulus for Marion Bay in particular and/or that region of the Yorke Peninsula;
- Perceived need for a safe haven/harbour in this part of SA waters (and the role of federal funding options);
- The acceptability and proximity of alternative sites that could meet the brief;
- Thresholds of acceptability of possible impacts on the environment and other stakeholders/users;
- Independent longer term developments in the Marion Bay region that might interact or require changes/adjustments.

Issues that should be given consideration:

- There is a need to avoid siltation at the entrance of any proposed captive water body;
- There are a number of potential changes that may come into play, namely:
  - Water quality/clarity regarding any recurrent dredging (if needed);
  - Water quality inside and outside any captive water body;
  - Sand drift and changes to the bay sediment dynamics in the region (potential for erosion/accretion);
  - Impacts on any sensitive aspects of the ecology such as seagrasses or changes to the coast associated with sea level rise (e.g. possible future calls to build a sea wall).
- There is a need to avoid siltation at the entrance of any proposed captive water body but there are a number of other potential changes that may also come into play.

Concerns to address:

- How studies (including environmental) triggered by initial consultation that need to be done to inform the feasibility/viability of options that may come up will be phased alongside narrowing down the range of viable solutions and options (e.g. ensuring that adequate information is available for the decision process while not initiating expensive studies that don't add value).
- Provision of additional information from past studies that informs some of the marine environmental questions.



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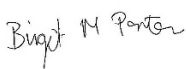


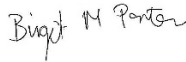
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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	G Priest	B Porter		J Ewers		9/12/2016
1	G Priest	K O'Malley-Jones		B Porter		16/02/2017
2.	B Porter					

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## Appendix C – Cost Estimate

## Marion Bay Boat Ramp

Order of Cost Estimate No. 1 (November 2016)

Draft

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## Marion Bay Boat Ramp

Order of Cost Estimate No. 1 (November 2016)

### Project Details

#### Description

##### ***Basis of Estimate***

This estimate is based upon measured quantities to which we have applied rates and conditions we currently believe applicable as at November 2016. We assumed that the project will be competitively tendered under standard industry conditions and form of contract.

This cost estimate is based on the documentation listed under the "Documents" section and does not at this stage provide a direct comparison with tenders received for the work at any future date. To enable monitoring of costs this estimate should be updated regularly during the design and documentation phases of this project.

##### Scope of Works

In preparing this estimate we, in conjunction with the project team, have assumed the following scope of works;

- Option 2 - Ramp and Wave Attenuation
- Option 3A - Causeway Ramp, Breakwater and Wave Attenuation
- Option 3B - Elevated Access Ramp, Breakwater and Wave Attenuation
- Option 4 - Causeway Ramp and Connected Breakwater

##### ***Items Specifically Included***

This estimate specifically includes the following:

##### Contingencies and Escalation

The estimate includes the following contingency allowances:

- Design Development Contingency which allows for issues that will arise during the design and documentation period as the design team develops the design through to 100% documentation.
- Construction Contingency which allows for issues that will arise during the construction period including for latent conditions, design errors and omissions, design changes, client changes, extension of time costs and provisional sum adjustments.
- Locality Loading which allows for the differential in pricing between the base of Adelaide and the actual project locality of Marion Bay and allows for the additional labour, material, transport and associated costs of contraction in this location.

##### ***Items Specifically Excluded***

The estimate specifically excludes the following which should be considered in an overall project feasibility study:

##### Project Scope Exclusions

- Dredging works
- Boat washing facilities
- Structural upgrade works to jetty
- Work outside site boundaries

##### Risk Exclusions

## Marion Bay Boat Ramp

Order of Cost Estimate No. 1 (November 2016)

### Project Details

#### Description

- Relocation and upgrade of existing services
- Contaminated ground removal and reinstatement
- Staging/phasing costs

#### Other Project Cost Exclusions

- Statutory authorities fees and charges
- Land costs
- Legal fees
- Holding costs and finance charges
- Escalation in costs beyond 2016
- Goods and Services Taxation

#### **Documents**

The following documents have been used in preparing this estimate:

Drawings provided by GHD

Date Received: 31/10/2016

- Option 2 Plan - MBBR SK200 Option 2
- Option 3 Plan - MBBR SK300 Option 3
- Option 4 Plan - MBBR SK400 Option 4
- Survey - MBBR Survey

**Marion Bay Boat Ramp**

Order of Cost Estimate No. 1 (November 2016)

Option 2 - Summary

Rates Current At November 2016

Location		Total Cost
<b>2 OPTION 2 - RAMP AND WAVE ATTENUATION</b>		
2A	Ramp	1,640,765.00
2B	Carpark	688,116.00
2C	Wave Attenuation	509,500.00
<b>2 - OPTION 2 - RAMP AND WAVE ATTENUATION</b>		<b>\$2,838,381.00</b>
<b>ESTIMATED NET COST</b>		<b>\$2,838,381.00</b>
<b>MARGINS &amp; ADJUSTMENTS</b>		
Design Contingency	20.0 %	\$569,000.00
Construction Contingency	10.0 %	\$342,000.00
Professional Fees and Charges including Project Management	10.0 %	\$376,000.00
Locality Loading	15.0 %	\$621,000.00
Statutory Fees and Charges	0.05 %	\$4,000.00
Escalation Beyond 2016 (Programme Unknown)		Excl.
Goods and Services Taxation		Excl.
<b>ESTIMATED TOTAL COST</b>		<b>\$4,750,381.00</b>

**Marion Bay Boat Ramp**

Order of Cost Estimate No. 1 (November 2016)

Option 2 - Elemental Breakdown

**2 OPTION 2 - RAMP AND WAVE ATTENUATION**

2A Ramp

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>SB Substructure</b>				
34 Install larger rock base (20% larger area than ramp slab)	m <sup>2</sup>	903	55.00	49,665.00
46 Reinforced precast concrete panel sections including crushed rock binding layer, geotech fabric, thickenings, sulphate resistant concrete and surface finish	m <sup>2</sup>	753	1,200.00	903,600.00
36 No allowance for armor rocks adjacent to boat ramp	Note			Excl.
<b>Substructure</b>				<b>\$953,265.00</b>
<b>BT Boat Ramp Items</b>				
24 No allowance for floating walkway	Note			Excl.
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>Excl.</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			203,500.00
<b>Preliminaries</b>				<b>\$203,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			81,500.00
<b>Builders Margin</b>				<b>\$81,500.00</b>
<b>YY Special Provisions</b>				
44 PC Sum allowance for barge and craneage	Sum			400,000.00
<b>Special Provisions</b>				<b>\$400,000.00</b>
<b>RAMP</b>				<b>\$1,640,765.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 2 - Elemental Breakdown

**2 OPTION 2 - RAMP AND WAVE ATTENUATION**

2B Carpark

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>FT Fitments</b>				
13 Allowance for direction, statutory and informational signage	Item			7,500.00
42 Allowance for sundry bollards, protection angles, etc.	Item			10,000.00
<b>Fitments</b>				<b>\$17,500.00</b>
<b>PD Sanitary Plumbing</b>				
41 Allowance for hydraulic services connections/alterations (details pending)	Item			10,000.00
<b>Sanitary Plumbing</b>				<b>\$10,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
4 Site preparation including gravel base removal, site leveling as required and compaction	m <sup>2</sup>	4,811	25.00	120,275.00
9 Allowance for removal of sundry items including gravel mounds, statutory signage and the like	Item			2,500.00
43 Allowance for bulk civil works	Item			15,000.00
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>\$137,775.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
5 150mm deep crushed rock base course	m <sup>2</sup>	4,811	18.00	86,598.00
6 40mm thick heavy duty bitumen hotmix	m <sup>2</sup>	4,811	35.00	168,385.00
7 Linemarking	m	681	3.00	2,043.00
15 Precast concrete wheel stops (only to waterfront carparks)	No	9	100.00	900.00
11 Minor allowance for interfacing works with existing bitumen entry road	Item			2,500.00
14 Allowance for directional and sundry linemarking	Item			750.00
16 No allowance for gutters or kerbing	Note			Excl.
<b>Roads, Footpaths and Paved Areas</b>				<b>\$261,176.00</b>
<b>XB Outbuildings and Covered Ways</b>				
12 No allowance for upgrade works to existing covered structures	Note			Excl.
<b>Outbuildings and Covered Ways</b>				<b>Excl.</b>
<b>XL Landscaping and Improvements</b>				
19 PC Sum allowance for minor landscapings works	Sum			15,000.00
<b>Landscaping and Improvements</b>				<b>\$15,000.00</b>
<b>XK External Stormwater Drainage</b>				
18 Side inlet pit	No	1	2,500.00	2,500.00
17 Gross pollutant trap	No	1	37,000.00	37,000.00
29 Headwall, rock outlet and associated civil works	No	1	5,000.00	5,000.00
30 Limited kerbing adjacent to side inlet pit	No	1	2,500.00	2,500.00
<b>External Stormwater Drainage</b>				<b>\$47,000.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 2 - Elemental Breakdown

**2 OPTION 2 - RAMP AND WAVE ATTENUATION**

2B Carpark (continued)

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>XD External Sewer Drainage</b>				
45 No allowance for sewer connection, pump stations, etc.	Note			Excl.
<b>External Sewer Drainage</b>				<b>Excl.</b>
<b>XE External Electric Light and Power</b>				
10 Carparking lighting including conduits, light poles, etc.	m <sup>2</sup>	4,811	15.00	72,165.00
20 Site power connection	Item			5,000.00
<b>External Electric Light and Power</b>				<b>\$77,165.00</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			85,500.00
<b>Preliminaries</b>				<b>\$85,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			34,500.00
<b>Builders Margin</b>				<b>\$34,500.00</b>
<b>CARPARK</b>				<b>\$688,116.00</b>



**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 2 - Elemental Breakdown

**2 OPTION 2 - RAMP AND WAVE ATTENUATION**

2C Wave Attenuation

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>WT Wave Attenuation</b>				
21 Wave attenuation panels including galvanised chain or straps to hang truck tires at close centres including galvanised fixing channel	m	220	1,900.00	418,000.00
<b>Wave Attenuation</b>				<b>\$418,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			63,500.00
<b>Preliminaries</b>				<b>\$63,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			25,500.00
<b>Builders Margin</b>				<b>\$25,500.00</b>
<b>WAVE ATTENUATION</b>				<b>\$509,500.00</b>

**Marion Bay Boat Ramp**

Order of Cost Estimate No. 1 (November 2016)

Option 3a - Summary

Rates Current At November 2016

Location		Total Cost
<b>3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION</b>		
3A OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION		
3A1 Causeway Ramp		1,659,370.00
3A2 Carpark		692,894.00
3A3 Breakwater and Wave Attenuation		898,565.00
3A - OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION		<u>\$3,250,829.00</u>
<b>3 - OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION</b>		<b><u>\$3,250,829.00</u></b>
<b>ESTIMATED NET COST</b>		<b><u>\$3,250,829.00</u></b>
<b>MARGINS &amp; ADJUSTMENTS</b>		
Design Contingency	20.0 %	\$651,000.00
Construction Contingency	10.0 %	\$392,000.00
Professional Fees and Charges including Project Management	10.0 %	\$431,000.00
Locality Loading	15.0 %	\$710,000.00
Statutory Fees and Charges	0.05 %	\$4,000.00
Escalation Beyond 2016 (Programme Unknown)		Excl.
Goods and Services Taxation		Excl.
<b>ESTIMATED TOTAL COST</b>		<b><u>\$5,438,829.00</u></b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3a - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION****3A OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION****3A1 Causeway Ramp**

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>RK Rock Supply and Placement</b>				
40 Supply and place toe stones, nominal 500mm dia. to create causeway	m <sup>3</sup>	1,484	55.00	81,620.00
<b>Rock Supply and Placement</b>				<b>\$81,620.00</b>
<b>SB Substructure</b>				
35 Reinforced concrete ramp including crushed rock binding layer, geotech fabric, thickenings, sulphate resistant concrete and surface finish	m <sup>2</sup>	450	1,200.00	540,000.00
38 Allowance for temporary access road over the laid rocks to form complete causeway	Item			20,000.00
<b>Substructure</b>				<b>\$560,000.00</b>
<b>BT Boat Ramp Items</b>				
25 2.0m wide floating walkway including adjacent piles	m	39	3,250.00	126,750.00
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>\$126,750.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			206,000.00
<b>Preliminaries</b>				<b>\$206,000.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			82,500.00
<b>Builders Margin</b>				<b>\$82,500.00</b>
<b>YY Special Provisions</b>				
44 PC Sum allowance for barge and craneage	Sum			600,000.00
<b>Special Provisions</b>				<b>\$600,000.00</b>
<b>CAUSEWAY RAMP</b>				<b>\$1,659,370.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3a - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3A OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION

3A2 Carpark

Rates Current At November 2016

Description		Unit	Qty	Rate	Total
<b>FT</b>	<b>Fitments</b>				
13	Allowance for direction, statutory and informational signage	Item			7,500.00
42	Allowance for sundry bollards, protection angles, etc.	Item			10,000.00
	<b>Fitments</b>				<b>\$17,500.00</b>
<b>PD</b>	<b>Sanitary Plumbing</b>				
41	Allowance for hydraulic services connections/alterations (details pending)	Item			10,000.00
	<b>Sanitary Plumbing</b>				<b>\$10,000.00</b>
<b>BW</b>	<b>Builders Work in Connection With Specialist Services</b>				
1	Builder's work in connection with specialist services	Item			2,500.00
	<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP</b>	<b>Site Preparation</b>				
4	Site preparation including gravel base removal, site leveling as required and compaction	m <sup>2</sup>	4,857	25.00	121,425.00
9	Allowance for removal of sundry items including gravel mounds, statutory signage and the like	Item			2,500.00
43	Allowance for bulk civil works	Item			15,000.00
8	No allowance for any site clearance, tree removal or the like	Note			Excl.
	<b>Site Preparation</b>				<b>\$138,925.00</b>
<b>XR</b>	<b>Roads, Footpaths and Paved Areas</b>				
5	150mm deep crushed rock base course	m <sup>2</sup>	4,857	18.00	87,426.00
6	40mm thick heavy duty bitumen hotmix	m <sup>2</sup>	4,857	35.00	169,995.00
7	Linemarking	m	681	3.00	2,043.00
15	Precast concrete wheel stops (only to waterfront carpark)	No	9	100.00	900.00
11	Minor allowance for interfacing works with existing bitumen entry road	Item			2,500.00
14	Allowance for directional and sundry linemarking	Item			750.00
16	No allowance for gutters or kerbing	Note			Excl.
	<b>Roads, Footpaths and Paved Areas</b>				<b>\$263,614.00</b>
<b>XB</b>	<b>Outbuildings and Covered Ways</b>				
12	No allowance for upgrade works to existing covered structures	Note			Excl.
	<b>Outbuildings and Covered Ways</b>				<b>Excl.</b>
<b>XL</b>	<b>Landscaping and Improvements</b>				
19	PC Sum allowance for minor landscapings works	Sum			15,000.00
	<b>Landscaping and Improvements</b>				<b>\$15,000.00</b>
<b>XK</b>	<b>External Stormwater Drainage</b>				
18	Side inlet pit	No	1	2,500.00	2,500.00
17	Gross pollutant trap	No	1	37,000.00	37,000.00
29	Headwall, rock outlet and associated civil works	No	1	5,000.00	5,000.00

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3a - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3A OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION

3A2 Carpark (continued)

Rates Current At November 2016

Description		Unit	Qty	Rate	Total
30	Limited kerbing adjacent to side inlet pit	No	1	2,500.00	2,500.00
<b>External Stormwater Drainage</b>					<b>\$47,000.00</b>
<b>XD</b>	<b>External Sewer Drainage</b>				
45	No allowance for sewer connection, pump stations, etc.	Note			Excl.
<b>External Sewer Drainage</b>					<b>Excl.</b>
<b>XE</b>	<b>External Electric Light and Power</b>				
10	Carparking lighting including conduits, light poles, etc.	m <sup>2</sup>	4,857	15.00	72,855.00
20	Site power connection	Item			5,000.00
<b>External Electric Light and Power</b>					<b>\$77,855.00</b>
<b>PR</b>	<b>Preliminaries</b>				
2	Builder's preliminaries and supervision	Item			86,000.00
<b>Preliminaries</b>					<b>\$86,000.00</b>
<b>MA</b>	<b>Builders Margin</b>				
3	Builder's margin and overheads	Item			34,500.00
<b>Builders Margin</b>					<b>\$34,500.00</b>
<b>CARPARK</b>					<b>\$692,894.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3a - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION****3A OPTION 3A - CAUSEWAY RAMP, BREAKWATER AND WAVE ATTENUATION**

3A3 Breakwater and Wave Attenuation

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>RK Rock Supply and Placement</b>				
27 Supply and place toe stones, nominal 900mm dia. to a depth of 1.5m of the breakwater	m³	4,648	95.00	441,560.00
28 Supply and place crushed rock up to 300mm dia. as infill	m³	3,691	55.00	203,005.00
<b>Rock Supply and Placement</b>				<b>\$644,565.00</b>
<b>BT Boat Ramp Items</b>				
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>Excl.</b>
<b>WT Wave Attenuation</b>				
21 Wave attenuation panels including galvanised chain or straps to hang truck tires at close centres including galvanised fixing channel	m	50	1,900.00	95,000.00
<b>Wave Attenuation</b>				<b>\$95,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			111,500.00
<b>Preliminaries</b>				<b>\$111,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			45,000.00
<b>Builders Margin</b>				<b>\$45,000.00</b>
<b>BREAKWATER AND WAVE ATTENUATION</b>				<b>\$898,565.00</b>

**Marion Bay Boat Ramp**

Order of Cost Estimate No. 1 (November 2016)

Option 3b - Summary

Rates Current At November 2016

Location		Total Cost
<b>3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION</b>		
3B OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION		
3B1	Elevated Access Ramp	1,975,750.00
3B2	Carpark	692,894.00
3B3	Breakwater and Wave Attenuation	898,565.00
<i>3B - OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION</i>		<i>\$3,567,209.00</i>
<b>3 - OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION</b>		<b>\$3,567,209.00</b>
<b>ESTIMATED NET COST</b>		<b>\$3,567,209.00</b>
<b>MARGINS &amp; ADJUSTMENTS</b>		
Design Contingency	20.0 %	\$715,000.00
Construction Contingency	10.0 %	\$430,000.00
Professional Fees and Charges including Project Management	10.0 %	\$472,000.00
Locality Loading	15.0 %	\$779,000.00
Statutory Fees and Charges	0.05 %	\$4,000.00
Escalation Beyond 2016 (Programme Unknown)		Excl.
Goods and Services Taxation		Excl.
<b>ESTIMATED TOTAL COST</b>		<b>\$5,967,209.00</b>



**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3b - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3B OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION

3B1 Elevated Access Ramp

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>SB Substructure</b>				
26 Reinforced concrete piles at 3.0m centres	No	58	4,500.00	261,000.00
37 Reinforced precast concrete panel sections	m <sup>2</sup>	450	800.00	360,000.00
39 Reinforced concrete beams to connect to piles	m	113	2,500.00	282,500.00
<b>Substructure</b>				<b>\$903,500.00</b>
<b>BT Boat Ramp Items</b>				
25 2.0m wide floating walkway including adjacent piles	m	39	3,250.00	126,750.00
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>\$126,750.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			245,000.00
<b>Preliminaries</b>				<b>\$245,000.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			98,000.00
<b>Builders Margin</b>				<b>\$98,000.00</b>
<b>YY Special Provisions</b>				
44 PC Sum allowance for barge and craneage	Sum			600,000.00
<b>Special Provisions</b>				<b>\$600,000.00</b>
<b>ELEVATED ACCESS RAMP</b>				<b>\$1,975,750.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3b - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3B OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION

3B2 Carpark

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>FT Fitments</b>				
13 Allowance for direction, statutory and informational signage	Item			7,500.00
42 Allowance for sundry bollards, protection angles, etc.	Item			10,000.00
<b>Fitments</b>				<b>\$17,500.00</b>
<b>PD Sanitary Plumbing</b>				
41 Allowance for hydraulic services connections/alterations (details pending)	Item			10,000.00
<b>Sanitary Plumbing</b>				<b>\$10,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
4 Site preparation including gravel base removal, site leveling as required and compaction	m <sup>2</sup>	4,857	25.00	121,425.00
9 Allowance for removal of sundry items including gravel mounds, statutory signage and the like	Item			2,500.00
43 Allowance for bulk civil works	Item			15,000.00
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>\$138,925.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
5 150mm deep crushed rock base course	m <sup>2</sup>	4,857	18.00	87,426.00
6 40mm thick heavy duty bitumen hotmix	m <sup>2</sup>	4,857	35.00	169,995.00
7 Linemarking	m	681	3.00	2,043.00
15 Precast concrete wheel stops (only to waterfront carpark)	No	9	100.00	900.00
11 Minor allowance for interfacing works with existing bitumen entry road	Item			2,500.00
14 Allowance for directional and sundry linemarking	Item			750.00
16 No allowance for gutters or kerbing	Note			Excl.
<b>Roads, Footpaths and Paved Areas</b>				<b>\$263,614.00</b>
<b>XB Outbuildings and Covered Ways</b>				
12 No allowance for upgrade works to existing covered structures	Note			Excl.
<b>Outbuildings and Covered Ways</b>				<b>Excl.</b>
<b>XL Landscaping and Improvements</b>				
19 PC Sum allowance for minor landscapings works	Sum			15,000.00
<b>Landscaping and Improvements</b>				<b>\$15,000.00</b>
<b>XK External Stormwater Drainage</b>				
18 Side inlet pit	No	1	2,500.00	2,500.00
17 Gross pollutant trap	No	1	37,000.00	37,000.00
29 Headwall, rock outlet and associated civil works	No	1	5,000.00	5,000.00

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3b - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3B OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION

3B2 Carpark (continued)

Rates Current At November 2016

Description		Unit	Qty	Rate	Total
30	Limited kerbing adjacent to side inlet pit	No	1	2,500.00	2,500.00
<b>External Stormwater Drainage</b>					<b>\$47,000.00</b>
<b>XD</b>	<b>External Sewer Drainage</b>				
45	No allowance for sewer connection, pump stations, etc.	Note			Excl.
<b>External Sewer Drainage</b>					<b>Excl.</b>
<b>XE</b>	<b>External Electric Light and Power</b>				
10	Carparking lighting including conduits, light poles, etc.	m <sup>2</sup>	4,857	15.00	72,855.00
20	Site power connection	Item			5,000.00
<b>External Electric Light and Power</b>					<b>\$77,855.00</b>
<b>PR</b>	<b>Preliminaries</b>				
2	Builder's preliminaries and supervision	Item			86,000.00
<b>Preliminaries</b>					<b>\$86,000.00</b>
<b>MA</b>	<b>Builders Margin</b>				
3	Builder's margin and overheads	Item			34,500.00
<b>Builders Margin</b>					<b>\$34,500.00</b>
<b>CARPARK</b>					<b>\$692,894.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 3b - Elemental Breakdown

**3 OPTION 3 - RAMP, BREAKWATER AND WAVE ATTENUATION**

3B OPTION 3B - ELEVATED ACCESS RAMP, BREAKWATER AND WAVE ATTENUATION

3B3 Breakwater and Wave Attenuation

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>RK Rock Supply and Placement</b>				
27 Supply and place toe stones, nominal 900mm dia. to a depth of 1.5m of the breakwater	m³	4,648	95.00	441,560.00
28 Supply and place crushed rock up to 300mm dia. as infill	m³	3,691	55.00	203,005.00
<b>Rock Supply and Placement</b>				<b>\$644,565.00</b>
<b>BT Boat Ramp Items</b>				
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>Excl.</b>
<b>WT Wave Attenuation</b>				
21 Wave attenuation panels including galvanised chain or straps to hang truck tires at close centres including galvanised fixing channel	m	50	1,900.00	95,000.00
<b>Wave Attenuation</b>				<b>\$95,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			111,500.00
<b>Preliminaries</b>				<b>\$111,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			45,000.00
<b>Builders Margin</b>				<b>\$45,000.00</b>
<b>BREAKWATER AND WAVE ATTENUATION</b>				<b>\$898,565.00</b>

**Marion Bay Boat Ramp**

Order of Cost Estimate No. 1 (November 2016)

Option 4 - Summary

Rates Current At November 2016

Location		Total Cost
<b>4 OPTION 4 - RAMP AND CONNECTED BREAKWATER</b>		
4A	Ramp	2,061,960.00
4B	Carpark	687,799.00
4C	Connected Breakwater	1,096,570.00
<b>4 - OPTION 4 - RAMP AND CONNECTED BREAKWATER</b>		<b>\$3,846,329.00</b>
<b>ESTIMATED NET COST</b>		<b>\$3,846,329.00</b>
<b>MARGINS &amp; ADJUSTMENTS</b>		
Design Contingency	20.0 %	\$771,000.00
Construction Contingency	10.0 %	\$463,000.00
Professional Fees and Charges including Project Management	10.0 %	\$509,000.00
Locality Loading	15.0 %	\$840,000.00
Statutory Fees and Charges	0.05 %	\$4,000.00
Escalation Beyond 2016 (Programme Unknown)		Excl.
Goods and Services Taxation		Excl.
<b>ESTIMATED TOTAL COST</b>		<b>\$6,433,329.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 4 - Elemental Breakdown

**4 OPTION 4 - RAMP AND CONNECTED BREAKWATER**

4A Ramp

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>RK Rock Supply and Placement</b>				
40 Supply and place toe stones, nominal 500mm dia. to create causeway	m <sup>3</sup>	1,832	55.00	100,760.00
<b>Rock Supply and Placement</b>				<b>\$100,760.00</b>
<b>SB Substructure</b>				
35 Reinforced concrete ramp including crushed rock binding layer, geotech fabric, thickenings, sulphate resistant concrete and surface finish	m <sup>2</sup>	686	1,200.00	823,200.00
<b>Substructure</b>				<b>\$823,200.00</b>
<b>BT Boat Ramp Items</b>				
25 2.0m wide floating walkway including adjacent piles	m	36	3,250.00	117,000.00
23 No allowance for wave attenuation panels, any alterations or works to existing jetty	Note			Excl.
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>\$117,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			256,000.00
<b>Preliminaries</b>				<b>\$256,000.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			102,500.00
<b>Builders Margin</b>				<b>\$102,500.00</b>
<b>YY Special Provisions</b>				
44 PC Sum allowance for barge and craneage	Sum			660,000.00
<b>Special Provisions</b>				<b>\$660,000.00</b>
<b>RAMP</b>				<b>\$2,061,960.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 4 - Elemental Breakdown

**4 OPTION 4 - RAMP AND CONNECTED BREAKWATER**

4B Carpark

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>FT Fitments</b>				
13 Allowance for direction, statutory and informational signage	Item			7,500.00
42 Allowance for sundry bollards, protection angles, etc.	Item			10,000.00
<b>Fitments</b>				<b>\$17,500.00</b>
<b>PD Sanitary Plumbing</b>				
41 Allowance for hydraulic services connections/alterations (details pending)	Item			10,000.00
<b>Sanitary Plumbing</b>				<b>\$10,000.00</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
4 Site preparation including gravel base removal, site leveling as required and compaction	m <sup>2</sup>	4,805	25.00	120,125.00
9 Allowance for removal of sundry items including gravel mounds, statutory signage and the like	Item			2,500.00
43 Allowance for bulk civil works	Item			15,000.00
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>\$137,625.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
5 150mm deep crushed rock base course	m <sup>2</sup>	4,805	18.00	86,490.00
6 40mm thick heavy duty bitumen hotmix	m <sup>2</sup>	4,805	35.00	168,175.00
7 Linemarking	m	728	3.00	2,184.00
15 Precast concrete wheel stops (only to waterfront carpark)	No	10	100.00	1,000.00
11 Minor allowance for interfacing works with existing bitumen entry road	Item			2,500.00
14 Allowance for directional and sundry linemarking	Item			750.00
16 No allowance for gutters or kerbing	Note			Excl.
<b>Roads, Footpaths and Paved Areas</b>				<b>\$261,099.00</b>
<b>XB Outbuildings and Covered Ways</b>				
12 No allowance for upgrade works to existing covered structures	Note			Excl.
<b>Outbuildings and Covered Ways</b>				<b>Excl.</b>
<b>XL Landscaping and Improvements</b>				
19 PC Sum allowance for minor landscapings works	Sum			15,000.00
<b>Landscaping and Improvements</b>				<b>\$15,000.00</b>
<b>XK External Stormwater Drainage</b>				
18 Side inlet pit	No	1	2,500.00	2,500.00
17 Gross pollutant trap	No	1	37,000.00	37,000.00
29 Headwall, rock outlet and associated civil works	No	1	5,000.00	5,000.00
30 Limited kerbing adjacent to side inlet pit	No	1	2,500.00	2,500.00
<b>External Stormwater Drainage</b>				<b>\$47,000.00</b>



**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 4 - Elemental Breakdown

**4 OPTION 4 - RAMP AND CONNECTED BREAKWATER**

4B Carpark (continued)

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>XD External Sewer Drainage</b>				
45 No allowance for sewer connection, pump stations, etc.	Note			Excl.
<b>External Sewer Drainage</b>				<b>Excl.</b>
<b>XE External Electric Light and Power</b>				
10 Carparking lighting including conduits, light poles, etc.	m <sup>2</sup>	4,805	15.00	72,075.00
20 Site power connection	Item			5,000.00
<b>External Electric Light and Power</b>				<b>\$77,075.00</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			85,500.00
<b>Preliminaries</b>				<b>\$85,500.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			34,500.00
<b>Builders Margin</b>				<b>\$34,500.00</b>
<b>CARPARK</b>				<b>\$687,799.00</b>

**Marion Bay Boat Ramp****Order of Cost Estimate No. 1 (November 2016)**

Option 4 - Elemental Breakdown

**4 OPTION 4 - RAMP AND CONNECTED BREAKWATER**

4C Connected Breakwater

Rates Current At November 2016

Description	Unit	Qty	Rate	Total
<b>RK Rock Supply and Placement</b>				
27 Supply and place toe stones, nominal 900mm dia. to a depth of 1.5m of the breakwater	m³	6,257	95.00	594,415.00
28 Supply and place crushed rock up to 300mm dia. as infill	m³	5,621	55.00	309,155.00
<b>Rock Supply and Placement</b>				<b>\$903,570.00</b>
<b>BT Boat Ramp Items</b>				
31 Assumed no dredging required	Note			Excl.
<b>Boat Ramp Items</b>				<b>Excl.</b>
<b>BW Builders Work in Connection With Specialist Services</b>				
1 Builder's work in connection with specialist services	Item			2,500.00
<b>Builders Work in Connection With Specialist Services</b>				<b>\$2,500.00</b>
<b>XP Site Preparation</b>				
8 No allowance for any site clearance, tree removal or the like	Note			Excl.
<b>Site Preparation</b>				<b>Excl.</b>
<b>PR Preliminaries</b>				
2 Builder's preliminaries and supervision	Item			136,000.00
<b>Preliminaries</b>				<b>\$136,000.00</b>
<b>MA Builders Margin</b>				
3 Builder's margin and overheads	Item			54,500.00
<b>Builders Margin</b>				<b>\$54,500.00</b>
<b>CONNECTED BREAKWATER</b>				<b>\$1,096,570.00</b>

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#### Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	J.Munro	J. Ewers	JRE	J Ewers	JRE	09.12.2016
1	J.Munro	K.O'Malley-Jones	JRE	J. Ewers	JRE	05.05.2017
2	JRE	G Lutton	GL	J Ewers	JRE	14.06.2017

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