



**SOUTHERN  
PORTS  
AUTHORITY**

4 December 2014

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## Port of Bunbury

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Our ref: PRJ1/8

Dear Mr Sutton

### **Construction of a Revetment Wall at Point Busaco, Bunbury Request for Additional Information**

The Environmental Protection Authority (EPA) advised the Southern Ports Authority, Port of Bunbury (PoB) on 31<sup>st</sup> October 2014 that further information was required to support the section 38 referral under the *Environmental Protection Act 1986*. Specifically, the EPA required that the PoB provide advice on the potential impacts of the Revetment Wall (the Project) against the EPA's factors and objectives in EPA Environmental Assessment Guideline Number 8. This letter has been prepared in response to this request for additional information.

#### **1.1     EPA Factors and Objectives**

The EPA has requested that additional information is provided for three factors in Guidance Statement 8. These factors and their EPA objectives are:

Coastal Processes:              *To maintain the morphology of the sub-tidal and supratidal zones and the local geophysical processes that shape them.*

Marine Environmental Quality: *To maintain the quality of water, sediment and biota so that the environmental values both ecological and social, are protected.*

Marine Fauna:                    *To maintain the diversity, geographic distribution and viability of fauna at the species and population level.*

The following text provides additional information for each of these three factors.

#### **1.2     Coastal Processes**

##### **Background**

Koombana Beach is a highly modified beach located to the east Casuarina Point (Figure 1). It was originally part of the narrow coastal barrier seaward of Leschenault Estuary before a discrete beach was formed during the 1970's as part of the substantial modifications to the Estuary to reduce the threat of

flooding to Bunbury, and works to construct the Bunbury Inner Harbour. Works influencing the beach structure included construction of training walls for Leschenault Inlet entrance and Bunbury Inner Harbour, along with placement of a significant volume of dredged spoil (approximately 100,000m<sup>3</sup>) on the western portion of the beach. The placed material was substantially redistributed, with erosion along the eastern foreshore since the late 1970s and net westerly sediment transport causing significant accretion on the east side of Koombana Yacht Club groyne west of the Inner Harbour.



Figure 1. Koombana Beach in 1969 and 2008

From 2003, the Port of Bunbury (PoB) identified that ongoing erosion to the west of the Inner Harbour (eastern foreshore) provided an increasing threat to Cristal's site, including an existing access track adjacent to the site. In badly affected areas undermining required track relocation. By 2011, the erosion had progressed to a degree where further relocation of the access track to landward was not possible. The PoB subsequently commissioned a preliminary detailed design for a revetment (referred to as the Point Busaco revetment) to provide erosion protection along a 240m length of foreshore. As part of design investigations, it was identified that a revetment constructed in isolation is likely to transfer erosive pressure west, where existing infrastructure towards the centre of Koombana Beach already had limited foreshore setback (Damara WA 2011). Facilities potentially under threat without wider consideration of coastal processes along Koombana Beach include the Dolphin Discovery Centre, footpaths, roads, and car parks.

A study was subsequently commissioned by the City of Bunbury (CoB), with the support of PoB and the Department of Transport (DoT), to investigate erosion occurring along the wider Koombana Beach and determine an appropriate coastal management strategy that achieves optimal outcomes for all stakeholders, including the Dolphin Discovery Centre (DCC), PoB, CoB and DoT. The study reviewed available information to further the existing understanding of coastal processes to inform the development of effective management strategies (Seashore Engineering 2014a). Information on coastal processes and management strategies is provided below.

### Coastal Processes

Koombana Beach is significantly sheltered from prevailing south-westerly and west offshore wave conditions from the Outer Harbour breakwater. The structure of the Bay is exposed to the north, which enables an extended fetch for locally generated waves from the north through to northeast, with the most energetic conditions typically occurring during northerly storms.

Erosion predominantly occurs during occasional northerly storms, with a severe storm on 16th May 2003 and recent events coincident with high mean sea levels in 2011-2012 contributing significantly to the scarp recession along the eastern foreshore, which has averaged 0.5m/yr from 1991 to 2012. Beach recovery following storm events is uneven, with greater accumulation towards the west. This is possibly influenced by locally generated waves due to the north-easterly winds typically occurring during winter post-storm conditions. Analysis of survey information between 1991-2012 suggests the following net

transport rates at Koombana Beach (refer Figure 2):

1.  $-500\text{m}^3/\text{yr}$  net erosion from the eastern foreshore, which is transported to the west;
2.  $-900\text{m}^3/\text{yr}$  net erosion immediately offshore along the central section of the beach, which is transport to the west;
3.  $+1,500\text{m}^3/\text{yr}$  accretion along the western beach, which is sourced from 1) and 2);

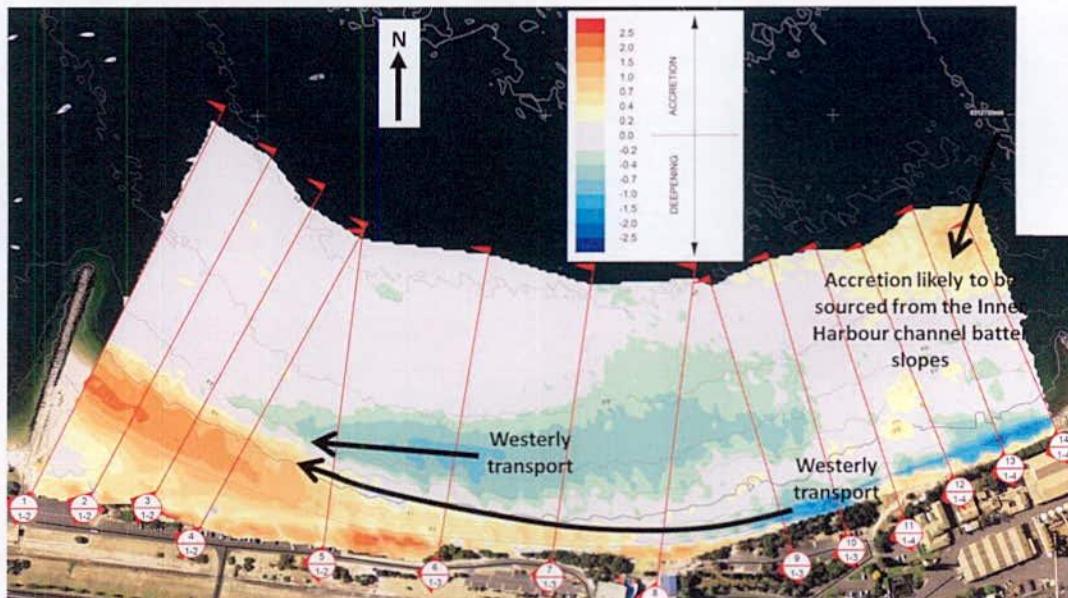


Figure 2. Depth Difference Plot Showing Sediment Transport Pathways (1991-2009)

### Recommended Management Strategy

Eight management strategies were considered to manage ongoing erosion along the eastern foreshore and the threat of erosion to City of Bunbury infrastructure. This included consideration of the Coastal Hazard Adaptation hierarchy (avoid, retreat, accommodate, protect) outlined in the WA State Planning Policy (SPP2.6). The nature of the site (highly modified, heavy industry) and the ongoing nature of the erosion means the option of either avoiding, retreating or accommodating this persistent erosion are not feasible at this site in the short, medium or long term.

The recommended management strategy was to

1. Construct the 240m Point Busaco revetment to provide protection to the Cristals Site;
2. Undertake beach renourishment with coarse sand sourced from the ocean side of the Outer Harbour breakwater to mitigate the transfer of erosive pressure to the central section of Koombana Beach (down drift erosion);
3. Monitor the beach and undertake adaptive renourishment as required.

The PoB is proposing to construct the revetment in February 2014. As its construction is likely to transfer some of the erosive pressure to the west, the PoB is committed to undertake renourishment works in conjunction to reduce beach loss and the erosion threat to existing foreshore infrastructure located with limited foreshore setbacks towards the centre of Koombana Bay.

The volume of renourishment to be undertaken is  $7,500\text{m}^3$  based on potential alongshore losses from the central section of beach that may occur over a 3-5 year period. This will involve trucking of clean coarse sand accumulated within a sand trap on the ocean (western) side of the Outer Harbour breakwater and its placement in front of the revetment to increase the eastern beach width by 10-15m. This material will gradually move toward the west and replenish the central areas of the beach.

Machinery will be used to distribute the sand from the toe of the revetment into the littoral zone, where tides and waves will rework the material to form a typical beach profile. This will occur on an 'as required' basis.

The need for future renourishment exercises will be evaluated in consultation with the City of Bunbury.

### **1.3      Marine Environmental Quality**

The construction of the revetment and beach renourishment is required to provide protection to the Cristal's Sands site and City of Bunbury infrastructure towards the centre of the beach. Construction works for the revetment and renourishment will be conducted entirely using land based machinery. The works are not anticipated to impact on the quality of water, sediments and biota in the vicinity and the following is noted in this regard:

- A silt curtain will be installed around construction areas for the revetment to contain turbidity generated from excavation (including dewatering), and placement of rock;
- Core rock will be graded to remove fines, to minimise turbidity as far as reasonably practicable. Handling of armour and core rock will ensure contamination with finer material is minimised;
- No refuelling will be undertaken on beach areas;
- No stockpiling of smaller core rock will occur on the beach;
- The placement of sand for renourishment will be limited to shallow areas and will restore the beach to a previous position following ongoing erosion. Machinery used to distribute the sand from the toe of the revetment into the littoral zone will not be required to enter the water as tides and waves will be allowed to redistribute material to form a typical beach profile; and
- Any turbidity generated as a result of the renourishment is anticipated to be relatively short-lived and localised to the placement area based on:
  - The material to be used is very coarse clean beach sand, with previous sediment size analysis indicating the sand has a D<sub>50</sub> of 0.85mm. Based on settling velocity calculations, the fine fraction (D<sub>10</sub> - 0.4mm) is estimated to settle out of the water column between 5-10 seconds. Any turbidity generated from the works is expected to dissipate when construction works cease (typically at 5pm);
  - The material to be used for re-nourishment is wave-washed and will be sourced from the sand trap on the ocean side of the Outer Harbour breakwater. There is limited opportunity for any organic debris to have accumulated which may cause turbidity.

### **1.4      Marine Fauna**

Dolphins are commonly present in Koombana Bay. However, sensitive activities such as breeding do not occur in the area where the revetment wall is to be constructed. The Dolphin Discovery Centre was consulted and concerns over impacts on dolphins were not raised.

The staff at the Centre advised that the Bottlenose Dolphin population in Koombana Bay has high social and economic value attracting more than 60,000 visitors per year. There is an estimated resident population of 20-40 females with calves present all year round, with a smaller population of males present at breeding times.

The construction work for the revetment is entirely land based and will not impact the marine fauna. The placement of the renourishment sands will occur in shallow water and therefore would not directly impact marine fauna. Any turbidity that may occur is anticipated to be relatively short-lived and localised to the placement area. Any turbidity generated from the works is expected to dissipate overnight, when

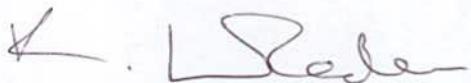
construction works cease. The activity at Point Busaco will not impact the marine fauna in Koombana Bay.

### 1.5 Conclusion

No impacts on the water quality, sediment, biota or marine fauna are expected from the construction activities associated with the revetment and renourishment. In particular, no impacts are expected on the Dolphin population in Koombana Bay. The EPA objectives which relate to marine environmental quality and marine fauna will be met.

It is likely that the construction of the revetment will transfer erosive pressure to the west. This will be mitigated through beach renourishment using clean sand derived from a BPA operated marine sand trap, with the need for future renourishment exercises evaluated in consultation with the City of Bunbury. This management will ensure that the EPA objective which relates to coastal processes will be met.

Yours sincerely



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### References

- Damara WA (2011) Point Busaco Revetment Preliminary Detailed Design  
Seashore Engineering (2014) Koombana Beach Erosion Study