

RAPID BAY JETTY

Environmental Impact Assessment

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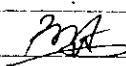
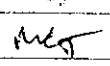
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Revision History

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Rapid Bay Jetty

Environmental Impact Assessment

1 Introduction

The existing jetty at Rapid Bay, located approximately 100 km south of Adelaide on the Fleurieu Peninsula, is a popular recreational fishing and diving site.

The jetty has been closed to the public forward of bent (pile) 26 since December 2004 and follows on from the closure of the jetty to public use forward of bent 79 following storm damage in June 2003. A recent report (August 2005) by the Pavement and Structures section of the Department of Transport, Energy & Infrastructure (DTEI) has recommended closure of the remainder of the jetty due to its poor condition.

Plans are now in progress to demolish and rebuild sections of the jetty to allow for reinstatement of recreational fishing and diving demand by the local community, recreational groups and tourist operators. Numerous options have been presented to DTEI for consideration (Rapid Bay Jetty Future Options Study, 2005, KBR AEJ501-Z-REP-001 Rev. 2). A modified version of Option 3B in the above referenced report has been progressed further into a concept design. Drawings showing the concept are enclosed in Appendix A to this report.

This report is an Environmental Impact Assessment for the proposed concept design, based on a marine survey carried out in November 2005.

2 Background

The Rapid Bay jetty was constructed in 1941 by BHP Proprietary Limited (BHP) for transfer of limestone from quarrying activities. Numerous works (such as dismantling of the conveyer belt system) have been carried out prior to the transfer of ownership to the Department of Marine and Harbours in 1982.

The jetty has been present for over 60 years and as a result is now part of the local marine environment with large amounts of marine flora and fauna present on piles in both the shallow and deeper water areas as well as other species which use habitat

provided by the sessile flora and fauna. Reports from various diving businesses suggest that there is also a large amount of debris and jetsam (such as sections of conveyor belts, fold up chairs and fishing equipment) directly under the jetty.

3 Construction methods

The original jetty consists of timber piling driven to the seabed in bents, or sets of piles at approximately 4.9 m spacings. To these sets of piles, steel crosshead sections are fitted which in turn support the longitudinal steel beams supporting the legacy conveyor system and the walkway decking.

As reported in the Structural Condition Report compiled by the Department of Transport and Urban Planning (December 2004), and the Bents 1 to 26 Steel Thickness Measurement Report compiled by DTEI (August 2005), the substructure (piling) and the superstructure is in a severely corroded condition which has necessitated the closure of the jetty for public use.

The preferred concept design solution for the jetty includes the demolition of the structure from the shore abutment to bent 80, the removal of timber decking and walkway bridges linking dolphins at the T-head, and replacement with 264 m of new jetty from the shore abutment. The remainder of the T-head section will be retained. Refer Appendix A for concept design drawings.

This solution does not fully replace the existing jetty nor connect to the existing T-head and requires that divers swim more than 70 m to the T-head.

Existing piles will require removal to sea bed level to avoid potential health and safety issues for divers and small boat operators navigating around the jetty structure. None of the existing piles from shore to bent 80 will be retained.

It is preferred that the existing jetty will be segmentally removed by mechanical plant placed on the existing structure, which will remove firstly the walkway and decking structure, followed by the sequential removal of the timber piling. Some gas in arc metal cutting will be required to remove the superstructure elements, such as beams and crossheads, while the piles are proposed to be cut at sea bed level by the use of compressed air driven cutting equipment. All removed elements would then preferably be back loaded onto vehicles located behind lifting equipment placed on the jetty and subsequently transported to shore for sorting and removal from site. However, this land-based methodology is highly dependent on the ability of the existing jetty to carry live loads from the mechanical plant. Given the condition of the structure, and the likely loads from plant, it is possible that for safety reasons, mechanical plant will need to be mounted on floating plant. Flexibility on the permitted methodology for demolition is desirable to allow tendering contractors to demonstrate innovation to overcome the constraints applied by the existing structure's condition.

The construction of the new jetty is envisaged to be conducted with a land-based approach with piling plant firstly driving the shore end piling, erection of the new crosshead and decking beams. The piling and lifting plant is then proposed to be

mounted on this initial structure and will proceed to incrementally complete a section of the jetty forward of its position before relocating to that forward position to construct the next seaward section. This method ensures that floating plant is not used for at least the new construction works and offers the opportunity to sequentially 'launch' a section of the new jetty at a time. This method was successfully used to reconstruct the Glenelg jetty and is now common industry practice.

4 Marine flora and fauna survey results

A marine dive survey was carried out on the 18 November 2005. Individual bents were filmed using underwater video to provide a record of those species that currently occur in the vicinity of the jetty. The species documented for this report should be considered indicative of species diversity during the spring months only.

The results of the survey are detailed based on ten (10) bent intervals, as seen in the marine survey DVD.

Bents 7 to 55

This section details the flora and fauna species diversity for those bents that will be removed and replaced. Bents 0 to 7 have been excluded from this report as these are either located on land or have very limited species diversity.

Flora

Species of red and brown algae dominate the piles of bents 7 to 55. These species include:

Table 1 Marine flora observed between bents 7 to 55

Common name	Marine flora
Brown algae	<i>Cystophora</i> spp.
Brown algae	<i>Dictyopteris muelleri</i>
Brown algae	<i>Ecklonia radiata</i>
Brown algae	<i>Scaberia agardhii</i>
Brown algae	<i>Sargassum</i> spp.
Brown algae	<i>Zonaria</i> spp
Red algae	Coralline algae
Red algae	<i>Halosaccion</i> sp.

Species diversity in this area is reasonably high with over seven different species occurring on the piles of bents 7 to 55. The dominant species are several different brown algae primarily *Cystophora* spp., *Ecklonia radiata* and *Scaberia agardhii*. These species are not unique to the region and occur regularly along the Adelaide coastline.

None of the species noted at the time of the survey are protected or listed under current State or Commonwealth legislation.

Fauna

Several invertebrates were dominant in this area. These include the Serpulid worm, *Galeolaria caespitosa*, often found in large colonies on jetty piles. Periwinkle (*Bembicium* sp.), and the turban shell (*Turbo* sp and *Astralium* sp.), these species of gastropods are also common on jetty piles. The seastar, *Pentagonaster duebeni*, was also observed attached to jetty piles between bent 45 and bent 55, The pencil urchin, *Phyllocanthus irregularis* and the Oyster, *Saccostrea* sp was also observed in this area. Several species of sponges were observed between bents 7 and 55.

Chordate species, commonly defined as, any animal of the phylum Chordata having a notochord or spinal column, diversity increases towards bent 55, the highest amount of species was observed between bent 35 and 55. These species include:

Table 2 Marine fauna observed between bents 7 to 55

Common name	Marine fauna
Colonial ascidian	<i>Didemnum</i> sp. and <i>Aplidium</i> sp.
Grouped ascidian	<i>Clavellina</i> sp.
Stalked colonial	<i>Sigillina</i> sp.
Solitary ascidian	<i>Pyura</i> sp.
Black spotted wrasse	<i>Austrolabrus maculate</i>
Magpie perch	<i>Cheliodactylus nigripes</i>
Dusky morwong	<i>Dactylophora nigricans</i>
Moonlighter	<i>Tilodon sexfasciatus</i>
Morwong	<i>Cheliodactylus</i> sp.
Morwong	Pomacentrid
Yellow headed hulafish	<i>Trachinops noarlungaea</i>
Zebra fish	<i>Girella zebra</i>
Squareback butterflyfish	<i>Chelmonops curiosus</i>
Sweep	<i>Scorpiis</i> sp.
Yellow striped leatherjacket	<i>Meuschenia flavolineata</i>

None of the species noted at the time of the survey are protected or listed under current State or Commonwealth legislation.

Bents 55 to 85

Under the current proposal for jetty design, the new jetty will extend to bent 55, with the remaining bents to the T-section removed permanently. The T-head section will remain intact and is discussed in the following section.

Flora

There is no significant change in algal species diversity between bents 7 and 85. The dominant species include brown algae as:

- *Cystophora* spp.
- *Dictyopteris muelleri*
- *Ecklonia radiata*
- plus red algae as Coralline algae.

Benthic diversity notably increases in this region of the jetty with the presence of seagrass. Small patches of *Zostera* was observed between bents 55 and 65, this species was not present around any of the previous sections of jetty. *Posidonia* sp. is dominant on the seabed between bents 55 and 85.

Fauna

Invertebrate species diversity does not vary greatly between those species noted between bents 7 to 55. The only additions to the species list are the Red bait crab, *Plagusia chabrus* and another genus of Seaster, *Plactaster* sp. A moderate diversity of sponges is also common on the piles of this section.

The fish species present in this area, vary from those present in the shallower waters of bents 7 to 55. Some of the species observed include:

- *Cheliodactylus nigripes*, Magpie perch
- *Chelmonops curiosus*, Squareback butterflyfish
- *Scobinichthyes granulatus*, Rough leatherjacket
- *Trachinops noarlungaea*, Yellow headed hulafish
- *Austrolabrus maculate*, Black spotted wrasse.

Several ascidian species (grouped, solitary and stalked) were also present in this area of the jetty.

None of the flora and fauna noted at the time of the survey are protected or listed under current State or Commonwealth legislation.

T-head section and dolphins

This section of the jetty is not being removed or rebuilt. The structure will remain in place with the exception of removal of the decking, and linking bridges between mooring dolphins.

Flora

Flora species in this section are consistent with those present between bents 7 and 85. Algal species diversity is slightly less in this section, with a reduction in the diversity of brown algae species. *Scaberia agardhii*, coralline algae, *Zonaria* sp. and *Halosaccion* sp. were not observed in this section of the jetty. *Posidonia* sp. is also dominant on the seabed of this section. *Zostera* sp. was not observed.

Fauna

Faunal species diversity does not vary greatly from those observed on previous sections of the jetty. Invertebrates are commonly sponges (*Darwinella* sp. and *Dendrilla* sp.) and sea stars with *Plagiatus chabrus* (red bait crab) also observed in the vicinity of the eastern dolphins.

The highest number of fish in this section of the jetty is in the vicinity of the T-head. The majority of species present in this section were also observed between bents 7 and 85, with the exception being *Enoplobus armatus* (Old wife) which had not been observed at any other location.

A full species list is included in Appendix C.

5 Environmental constraints

The environmental issues associated with jetty rehabilitation and construction considered to be higher risk are detailed below.

Marine Protection Area (MPA)

The South Australian Department for Environment and Heritage has released the Encounter Marine Park (www.environment.sa.gov.au) which includes the Rapid Bay jetty. MPAs protect an area by managing some or all of the human activities that take place within it.

There are many different types of MPAs. The Rapid Bay jetty has been classified within a proposed Habitat Protection Zone. Habitat Protection Zones offer a level of protection to the marine ecology within it, whilst still allowing a range of recreational and commercial activities that do not harm or interfere with the marine habitat.

Therefore under this regime, disturbance to the area must be kept to a minimum to prevent long-term damage to habitat and population numbers of marine flora and fauna. Pile removal will result in the loss of all algal species located on the existing piles. Pile replacement may affect benthic and algal species located in the vicinity of the jetty. The proposed construction methods are such that minimum increases in turbidity would be expected; the currents in this area are also quite strong and should quickly disperse any sediment.

Environment Protection and Biodiversity Conservation Act (EPBC Act), 1999, Protected Matters Report

An EPBC Act Protected Matters search was carried out to determine if any of the species known to occur around the jetty or other species predicted to occur, are listed under EPBC Act criteria. A listed species is classified under EPBC Act criteria as "occurring in the area or species habitat occurs in the area". The results of the search showed that some species of pipefish and seahorse are listed species (as well as the Leafy seadragon).

A listed species is defined as a matter of environmental significance under the EPBC Act assessment and approval provisions. At the time of the survey no listed species were noted in the area, however consideration needs to be given to the fact that they have previously been observed at this location. A summary of the EPBC Act Protected Matters Search is in Appendix B.

Water quality

Water quality within the immediate area will be affected during removal and placement of piles. Some physical and biological parameters will be temporarily altered as a result of the construction process.

Pile driving is known to increase turbidity and will result in some damage to marine flora and fauna. The expected turbidity levels from the pile driving process are unknown at this point, however some marine flora and fauna are known to react negatively to only minor increases in turbidity. Other impacts on the marine ecology may result from issues such as noise and vibration associated with construction machinery and pile driving. It is likely that pipefish, seahorses and seadragons will be affected due to turbidity, noise and vibration. This Syngnathidae family of pipefish is composed of free floating species; however they are slow moving and will be exposed to the effects of turbidity if they are present in the area at the time of construction.

Total suspended solids and total dissolved solids would also increase as a result of turbid waters. Increases in dissolved solids, may also have a negative impact on marine flora and some sessile fauna. This will be dependent on the relative depth of the flora and fauna – those that are benthic or located towards the bottom of individual piles may survive increases in dissolved solids, others located in shallow waters or towards the top of the water column may not be able to tolerate this increase. Likewise, suspended solids will also increase during the removal and placement of piles.

One of the higher risk water quality issues associated with removal and refurbishment of the jetty piles is in relation to biological oxygen demand (BOD) and nutrients (nitrogen, phosphorous etc.). The quantity of life present on the piles being replaced may become an issue as a result of organic fouling material (bodies) if piles are removed or dumped. Decomposing marine life may result in elevated odour as well as nutrient levels.

Further water quality issues may arise as a result of construction activities, for example spills of hydrocarbon based liquids may occur. A detailed construction EMP will be required to provide mitigation techniques for potential environmental risks associated with use of machinery, disposal of construction waste and various other environmental issues.

Despite these potential issues, the bay is a high energy environment, an exposed coast and subject to periods of naturally high turbidity at all times of the year during storm and runoff events, therefore minor, short-term plumes from the works may not be significant as communities are already adapted to far higher episodic levels of turbid waters.

Marine biodiversity

Benthic marine communities under the jetty and on the piles are dominated by macrophytes (large algae communities composed of red, green and brown algae) and dominated by brown algae such as *Cytophthora* spp., *Ecklonia radiata* and *Sargassum* spp. None of the species observed during the field survey are unique or protected by Commonwealth or State legislation. *Posidonia* (a seagrass) also occurs under the jetty in the deep water sections (bent 75 through to the T-head and dolphins section) along with many of the macrophytes. A small area of *Zostera* was noted around bents 55 to 65.

Species of invertebrates were present on and around piles along the jetty. These species will be affected due to pile removal. All of these species are common along the coastline and it is expected that these would recruit quickly following placement of new piles.

Fish and ascidians were common throughout the length of the jetty. The various species of fish observed will more than likely move out of the area whilst construction takes place and may return following completion. Species numbers are not likely to be severely affected by environmental changes due to construction. Seagrass beds provide important habitat for fish species such as Wrasse. The neighbouring seagrass beds should provide protection from minor changes in turbidity and suspended solids. Various species of ascidian are present on piles throughout the length of the jetty. Removal of bents 0 to 80 will result in depletion of ascidian numbers. The species of ascidian located in the shallow areas of the jetty are not present on piles on the deeper water and would be lost once pile removal has taken place. However, there is a large community of grouped, stalked and solitary ascidians present on the T-head and dolphins and these will provide a source of recruitment stock to the new structure.

The coast is high energy in the shallows, with apparently limited species diversity and abundance present. The seabed profile is relatively steep near the beach and in the deeper water areas >10 m. The seabed is dominated by open silty sands. There are a number of smaller infaunal species, such as polychaete worms, common throughout the area. These are not considered to be unique or environmentally significant, since recruitment following disturbance occurs relatively quickly.

From a public perspective the most obvious and significant issue is that the jetty provides habitat to a large number of resident and vagrant fish species (old wives, black spotted wrasse, dusky moorwong, leatherjackets etc.). It is likely that some of the fish species would shift to the T-head during construction works and are therefore unlikely to be permanently displaced. Smaller species such as blennies and anglers that live amongst the fouling on the piles are likely to be impacted. However, these species are not unique in the region. The habitat disturbance impacts will include impacts on food sources and shelter, this may subsequently effect processes such as predation. Impacts will likely be on an individual level rather than a species level as the species involved are common in Southern Australia.

Species

Phycodurus eques (Leafy seadragon)

The Leafy seadragon is classified as a protected species in South Australian waters under the Fisheries Act 1982 (SA) and is a listed species under the EPBC Act.

It inhabits rocky reefs, seaweed (algal) beds, seagrass meadows and structures colonised by algae. It is known to be a free swimming species and has been observed around the T-head section of the jetty. As the species is a slow free swimmer, in the event of disturbance from construction works they would be likely to move away to the T-head area or other areas of the bay.

Other species of pipefish and the common sea dragon are also noted as occurring in the area (Dragonsearch database. www.dragonsearch.asn.au) and are listed species under the EPBC Act. At the time of the survey no pipefish or seadragons were recorded under the jetty.

Environmental mitigation

Mitigation will depend on the final jetty design option and construction methods. However, based on the current preferred option (KBR 2005), it has been suggested through discussions with the Department for Environment and Heritage, that where possible the old piles are retained. Piles between bent 26 and bent 80 represent areas with important marine habitat and biodiversity. This matter will be considered, and, where possible some should be retained. It is recognised that this may not be possible due to health and safety risks associated with diving; however it should still be given consideration in the planning stages.

Retention of the piles from bents 11 to 26 should also be considered; these piles could be retained under the new jetty structure. Again, health and safety risks must also be considered, as some piles may be unstable and represent a high risk to divers and recreational fisherman.

Removal of the jetty piles between bents 0 to 80 will result in the loss of some habitat and species; however many of the old piles are unable to be retained due to health and safety risks associated with diving around the jetty.

Placement of the old piles on the seabed around and under the new jetty may be an option and could result in the recruitment of some species. There may also be a temporary decrease in the water quality of the area, following removal and refurbishment activities, due to the degradation of algae and marine fauna present on the piles.

It may be possible to dispose of solid demolition wastes (piles and deck) through the construction of an offshore reef, with larger material placed onto the bottom away from the shipping channel in approximately 15–20 m of water. This part of the coast has relatively few fishing and diving reefs and the addition of an artificial reef would create a high quality habitat for numerous large and small fish species as well as providing additional areas for recreational fishing and diving.

A separate issue will be the mitigation processes required during the construction works and in particular disposal such as organics from jetty scraping, old piles and

decking as well as paint residues containing heavy metals. To adequately address these issues, a Construction Environmental Management Plan (CEMP) will be critical to ensure that contractors carry out their works in an environmentally acceptable manner.

6 Summary

Rapid Bay jetty is one of the more species rich sites along this stretch of coastline. Removal and construction of the new jetty is likely to result in various impacts, including some severe environmental impacts, on marine flora and fauna. In summary, the primary environmental impacts associated with construction and rehabilitation of the jetty include:

- Disturbance and negative impacts on adjacent marine communities during construction as a result of changes to water quality. The adjacent marine communities may provide habitat to the various fish species present around the jetty.
- Direct impacts on marine life on or under the jetty. The marine life present on piles of the jetty between bents 0 to 80 will be destroyed. This will affect algae and invertebrate populations.
- Benthic marine life will also be negatively impacted due to the construction process. Algae, seagrasses and bottom feeding invertebrates will be affected by turbidity and disturbance to the sea floor.
- Release of contaminants to sea and disposal of construction wastes, e.g. dumping of organic wastes (primarily those stripped from piles and the sea bed). If these are not contained, further damage to the site could occur through alteration in sediment and water quality.
- Paint residues containing heavy metals (zinc chromate primer, lead based paints etc.). These will need to be carefully monitored to prevent any long-term sediment contamination and short-term water contamination.

7 References

1. Personal discussion with Mr Nigel Holmes, Senior Marine Biologist Environment Protection Authority, Qld.
2. Encounter Marine Park www.environment.sa.gov.au.
3. Marine Protected Areas (MPA) Program www.environment.sa.gov.au.
4. Dragonsearch www.dragonsearch.asn.au.