Shark Bay Salt, pond expansion, Useless Inlet

Shark Bay Salt Joint Venture

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
of Western Australia
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The Environmental Protection Authority has assessed a proposal by the Shark Bay Salt Joint Venture to expand the pond system at Useless Inlet in order to increase the production of salt. The proposal itself is quite simple, to construct a levee across Useless Inlet using earthen material quarried from borrow pits on either side of the Inlet. This is the specific proposal which this report deals with, though the Environmental Protection Authority has found it necessary to examine a number of other factors which relate to the overall environmental acceptability of the proposal.

These other factors relate to the historical context of the development of the Shark Bay Solar Salt Industry Agreement Act and grant of the mining lease, the boundaries of the area nominated for World Heritage and the potential for adverse environmental impacts upon the nominated area.

The Shark Bay Salt project operates under the Agreement Act which defined the project area (Figure 1) and acknowledged that expansion within the project area was possible under certain conditions.

In 1975 the Environmental Protection Authority released a report on proposed reserves for the Shark Bay region (Environmental Protection Authority, 1975), and specifically excluded all of Useless Inlet, Useless Loop and the northern parts of Heirisson Prong from its recommendations for both terrestrial and marine reserves. The Shark Bay Region Plan did not endorse all of the recommendations for reserves made by the Environmental Protection Authority but did exclude the area of the salt mining operation from its proposals for reserves (State Planning Commission, 1988).

With regard to the salt mining operation, the area nominated for World Heritage listing excluded the main parts of the project area, comprising the part of the mining lease covering Useless Inlet and an area encompassing the part of the mining lease covering Useless Loop plus the ship loading facility and the former gypsum mining areas south of Useless Loop. The Environmental Protection Authority considers that prior government decisions have acknowledged that the project area of the salt mine is a development enclave within the Shark Bay region.

The specific proposal which was assessed involves the construction of a levee across Useless Inlet to enclose about 2600 hectares adjacent to the existing primary concentration pond system (Figure 2). The key environmental issues associated with this proposal are related to the isolation of the habitat from the rest of the marine environment, the loss and modification of the biological components of the proposed pond area, the impact upon the commercial and recreational fisheries, environmental management, the protection of mangroves, the rehabilitation of the quarries and other disturbed sites, seepage/bitterns disposal, the impact of an increase in shipping and decommissioning.

Isolation of the habitat will remove an additional 16.3% of the area of Useless Inlet to make a total of 34% of the Inlet which will not be connected to the open marine environment (apart from the tidal flap gates). The habitat will still be biologically productive (in biomass terms it will be more productive) but it will become modified to contain a similar biological assemblage to that presently contained within the existing primary concentration pond, which is less diverse. The proposed pond area has no biological components which have a high conservation value and the area does not support species or sedimentary processes, such as dugongs or stromatolites, that are rare and/or of high conservation value.

The impact upon the existing commercial and recreational fisheries is significant in terms of the loss of nursery areas, productive fishing grounds and access to Useless Inlet. An estimate of the annual income loss to the prawn and beach seine fishing industries has been made by the Department of Fisheries and compensatory measures have been suggested by the proponent. The proponent has made commitments to address the impacts upon both the commercial and

recreational fisheries. The Environmental Protection Authority has endorsed these commitments and recommends that the issue of an agreement on compensation should be resolved by government before the commencement of construction (Recommendation 2).

Because of the environmental management issues associated with the expansion proposal and the on-going issues involved with the existing operation, the Environmental Protection Authority considers that the on-going environmental management of the existing and expanded salt mining operation should be more structured, rigorous and auditable than at present. The proponent has made appropriate commitments as part of an Environmental Management Programme outlined in the Public Environmental Review (Appendix 2). The Environmental Protection Authority has incorporated these commitments into Recommendation 1 and makes a specific recommendation (Recommendation 3) to address the issue.

The issue of the protection of the mangroves has been addressed by the proponent in locating the levee to avoid impounding the mangroves in the large tidal embayment on the eastern side of Useless Inlet. The operation and rehabilitation of the quarries and other disturbed sites would be manageable under conditions to control potential dust and erosion problems and ensure satisfactory rehabilitation. The operation and rehabilitation of the proposed western quarry and access road would require particular care because of the potential for erosion and dune blowouts. Specific recommendations to address the issues of the protection of the mangroves and the rehabilitation of the quarries have been made (Recommendations 4, 5).

The proponent is conducting on-going studies to address the issue of seepage from some of the ponds and bitterns disposal because of its relationship to both the efficiency of the operation and the potential, long-term impact of the seepage plume. It appears that the seepage losses from some of the ponds is of the order of 20% of the brine pumped into them and it seems that measures to seal the ponds and/or recover the brine could be implemented. Seepage from the bitterns ponds is the current method of disposal and monitoring will continue to ensure that there is no impact upon the surrounding biotic communities. The proponent is proposing to conduct further hydrological investigations and continue to implement measures to address the issue.

The increase in shipping and the resultant potential for oil spills and ballast water discharges of toxic micro-organisms is an issue that is being addressed by both the proponent and the Federal and State Government agencies which deal with shipping and quarantine matters; their on-going efforts are the most appropriate mechanism to address this issue.

The Environmental Protection Authority believes that, at the appropriate stage, it is important for adequate plans to be in place to manage both the possible care and maintenance and the final decommissioning and rehabilitation of the entire salt mining project area. The proponent has made a commitment to conduct certain measures but there may be other options and there are further details required at the appropriate time. The Authority has made a recommendation to address the issue (Recommendation 6).

Recommendation 1

The Environmental Protection Authority recommends that the proposal to construct a levee across Useless Inlet, as modified by the interaction between the proponent, the Environmental Protection Authority and the public and government agencies consulted, is environmentally acceptable. In reaching this conclusion, the Authority identified the main issues as being related to the isolation of the marine habitat, loss of biological components of the proposed pond area, impact on the fishing industries, environmental management, protection of mangroves, rehabilitation of the disturbed areas such as the quarries, seepage/bitterns disposal, increased shipping and decommissioning. The Environmental Protection Authority considers that these and other issues have been properly considered by the proponent and could be addressed by the

recommendations in this report or by the commitments made by the proponent (Appendix 2).

Other recommendations to address the specific issues are as follows -

Recommendation 2

The Environmental Protection Authority recommends that the proponent should reach an agreement on compensation with the fishing industries affected by the proposal, prior to the commencement of construction, to the satisfaction of the Minister for the Environment, on advice of the Ministers for State Development and Fisheries.

Recommendation 3

The Environmental Protection Authority recommends that, prior to the commencement of construction, the proponent prepare and subsequently implement an Environmental Management Programme to the satisfaction of the Minister for the Environment, on advice of the Environmental Protection Authority, to address the management, monitoring, auditing and reporting of :

- **construction procedures and workforce management; and**
- **construction phase and on-going environmental management.**

Recommendation 4

The Environmental Protection Authority recommends that the proponent be required to construct and manage the facility such that there are minimal direct impacts upon the mangroves and that there would be no significant adverse indirect impacts to mangroves off-site, to the satisfaction of the Environmental Protection Authority. In the event that monitoring shows that any areas of the mangroves are likely to be or have been significantly adversely affected by the project, the Environmental Protection Authority recommends that the proponent submit and subsequently implement a plan for the protection of the mangroves or the rehabilitation of any affected areas to the satisfaction of the Environmental Protection Authority.

Recommendation 5

The Environmental Protection Authority recommends that the proponent should rehabilitate the disturbed areas, such as the quarries, to the satisfaction of the Environmental Protection Authority.

Recommendation 6

The Environmental Protection Authority recommends that, at least six months before the end of the project, the proponent should develop and subsequently implement a plan to manage the decommissioning and rehabilitation of the entire project area, including all those facilities already in place at the time of this proposal, to the satisfaction of the Environmental Protection Authority. In the event of the project being placed on a short-term, care and maintenance basis, it is recommended that a plan to ensure that adverse environmental effects will be managed should be submitted at least three months prior to the suspension of operations, and subsequently implemented, to the satisfaction of the Environmental Protection Authority.

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1. Introduction

The Environmental Protection Authority received a proposal to expand the pond system in Useless Inlet from the Shark Bay Salt Joint Venture in January 1989 and a level of assessment of Public Environmental Review was set in February. Earlier proposals for the expansion of the crystalliser ponds at the mouth of Useless Loop and for the dredging of the shipping channel in Denham Sound were withdrawn.

The Public Environmental Review was released for an eight week period from early September to 30 October 1990 and a total of 19 submissions were received. The proponent responded to the issues raised in the submissions, a summary of which is appended (Appendix 1).

The proposal is to construct a levee across Useless Inlet near the northern boundary of the mining lease to enclose a further 2600 hectares of the Inlet as a primary concentration pond. Tidal flap gates would be installed to allow the intake of sea water on flood tides and the pond would be fertilised to promote algal growth, which organically seals the pond floor and increases the turbidity and, therefore, the evaporation rate.

This is the specific proposal which this report deals with, though the Environmental Protection Authority has found it necessary to examine a number of other factors which relate to the overall environmental acceptability of the proposal.

These other factors relate to the historical context of the development of the Shark Bay Solar Salt Industry Agreement Act and grant of the mining lease, the boundaries of the area nominated for World Heritage and the potential for adverse environmental impacts upon the nominated area.

1.1 Historical context

The Shark Bay Salt project operates under the Shark Bay Solar Salt Industry Agreement Act, 1983, which defined the project area and acknowledged that expansion within the project area was possible under certain conditions. The project area consists of a mining lease in two parts, a general purpose lease for the ship loading facility on Slope Island, a general purpose lease for the flume and several miscellaneous licences for roads and pipelines (Figure 1). The two parts of the mining lease and the general purpose lease covering the ship loading facility were specifically excluded from the area nominated for World Heritage.

In 1975 the Environmental Protection Authority released its report, based on the findings of the Conservation Through Reserves Committee, on the proposed reserves for the Shark Bay region (Environmental Protection Authority, 1975). The Authority specifically excluded all of Useless Inlet, Useless Loop and the northern parts of Heirisson Prong, most of which had already been used by the existing salt and gypsum mines, from its recommendations for both terrestrial and marine reserves.

The Shark Bay Region Plan did not endorse all the recommendations for reserves made by the Environmental Protection Authority but did exclude the area of the salt mining operation and recommended that : "prior to any further expansion of the salt mining at Useless Loop which would result in further closure of Useless Inlet, it is essential that the operator undertake a study to determine the potential effects on existing beach seine and other fishing activities and recreational potential. This needs to comply with the assessment procedures of the EPA." (State Planning Commission, 1988). The Environmental Protection Authority's response to the draft Region Plan acknowledged the continuing role for the existing solar salt mine and made no references to the activities within the project area (EPA Bulletin 305, 1987).

With regard to the salt mining operation, the area nominated for World Heritage listing excluded the main parts of the project area, comprising the part of the mining lease covering Useless Inlet

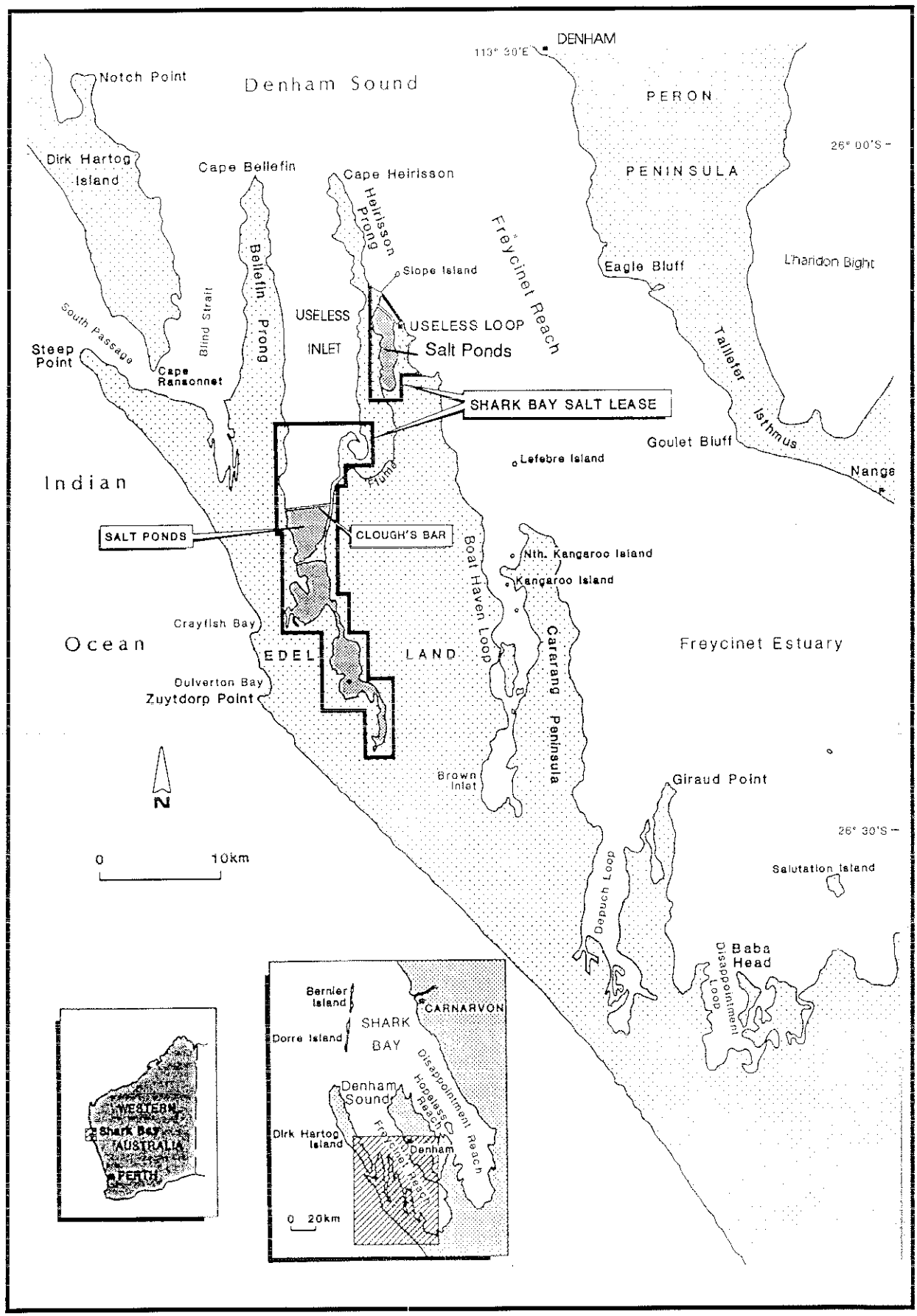

Figure 1. Shark Bay Salt project area

and an area encompassing the part of the mining lease covering Useless Loop plus the ship loading facility.

The Environmental Protection Authority considers that prior government decisions have acknowledged that the project area of the salt mine is a development enclave within the Shark Bay region.

Solar salt proposals typically affect large tracts of coastal tidal flats or shallow marine environments which can have special environmental values. Past experience has shown that premature termination of salt mining operations without appropriate decommissioning and rehabilitation procedures can result in major environmental impacts. The Environmental Protection Authority was therefore concerned to establish that each of the four proposals referred to the Authority for assessment would be unlikely to close prematurely and that each proponent could guarantee to undertake appropriate decommissioning or mothballing if necessary.

As part of its assessment of the environmental effects of this and other current proposals for expanded solar salt production in Western Australia, the Environmental Protection Authority called for information regarding market factors and regional environmental setting. The Department of State Development provided the information below on the market factors and its view on the need for expansion.

1.2 The market for salt and the need for expansion

The total world output for salt is around 180 million tonnes per year, of which 22 million tonnes is traded internationally. Western Australia supplies 27% of this and is the largest exporter of salt in the world. In 1989 this amounted to nearly 6 million tonnes, worth about $112 million.

The 1989-90 period was characterised by continuing interest in capacity expansion throughout the industry in Western Australia, brought about by improved world prices for salt, as increasing demand relieved the over-supply problems common to the 1970s and early 1980s. The current situation in Western Australia is:

- Dampier Salt at Lake Macleod has increased capacity to 1.5 million tonnes per annum (mta);
- Dampier Salt at Karratha, proposed expanded capacity from 2.5 to 3.0 mta (granted environmental approval 23 November 1990);
- Shark Bay Salt at Useless Inlet, proposed expanded capacity from 0.65 to 1.2 mta, currently under Environmental Protection Authority assessment (this proposal);
- Leslie Salt near Port Hedland, proposed expanded capacity from 2.25 to 2.75 mta, assessment complete, awaiting Ministerial decision; and
- Gulf Holdings' new proposal at Onslow, for 1.5 mta, assessment complete, awaiting Ministerial decision.

Overall the demand for salt in the major consuming Asian countries is expected to increase by no more than 2% compound for the next few years. However, domestic salt production in Taiwan and Korea is very inefficient and takes place upon increasingly scarce and valuable coastal land. The eventual closure of these fields is likely, resulting in an increased demand for imported salt, predominantly from Australia, for the large chemical (chlor-alkali) industries in those countries.

If all the current salt proposals world-wide come to fruition in the next year or so, it is certain that there will be an over-supply of salt in 1993/4. However, the operators have the following options if demand is poor:

- taking excess crystallisers temporarily out of the brine cycle;
- leaving a thicker salt floor in the crystallisers as an unharvested stockpile; and
- increasing harvested stockpiles.

Salt production is an activity in which Western Australia, and specifically the large areas of the Pilbara, enjoys significant advantages due to the favourable climate, terrain and coastline. While Mexico can compete with Western Australia in this regard it is further from the major North Asian markets and transport costs become a significant economic factor.

Existing producers have operational and commercial reasons to expand; these being:

- the need for a 20-25% buffer of excess capacity; this may be necessary to build up stocks in case the operation is affected by cyclonic rain, or to meet a sudden surge in demand caused by adverse climatic conditions elsewhere;
- the solar salt industry could be selling to its theoretical capacity in under three years, which is a serious constraint given the two to three year lead time for saltfield expansion to become productive; and
- the need to reduce unit costs and so improve world-wide competitiveness.

1.3 Regional setting

The Shark Bay Salt project pond expansion is proposed for a marine embayment in Edel Land province, Shark Bay. The Shark Bay region generally has natural and cultural features of extraordinary quality : the world's most extensive seagrass banks, rare stromatolites, hypersaline embayments, offshore islands, spectacular cliffs, special plant communities, rare animals such as the dugong, the site of the first European landing in Australia and other heritage sites recording the early European exploration of Western Australia.

The Shark Bay Salt project occurs in the Useless Inlet and Useless Loop areas which comprise two examples of the narrow inlet habitat type of the Edel Land province (Figure 1). There are six such inlets that form a distinct habitat type which is only found in Edel Land within the Shark Bay region. Useless Loop has already been irrevocably altered by the construction of the crystallisation ponds and associated salt producing facilities and 17.7% of the area of Useless Inlet has been irrevocably altered by the construction of the existing primary concentration ponds. The proposed pond expansion in Useless Inlet would increase this area to 34%.

Most of the shallow sandflats of Useless Inlet have already been altered, probably by the pearl shell fishing which took place from the 1870s till the 1930s (Hancock, 1989). The seagrass meadows have been markedly depleted and currently there is only a sparse, patchy *Posidonia australis* meadow over much of the sublittoral sandflats in the southern parts of Useless Inlet, including the proposed pond.

2. The proposal

The Shark Bay Salt Joint Venture proposes to increase its production capacity by constructing a levee across Useless Inlet near the northern limit of the mining lease which is about 7 km from Clough's Bar (Figure 2). The levee would be constructed of earthen materials taken from two quarries on either side of Useless Inlet and would have an engineering design similar to that of other breakwaters, such as at Hillary's Marina, with a relatively impermeable core of sandy material and an outer covering of rock. There would be two tidal flap-gates that allow seawater to enter on flood tides but prevent its escape on ebb tides.

The levee would traverse the fringing, shallow sandflats where the depth of water is generally less than 2 metres and a central basin area where the depth of water is generally greater than 7 metres. The amount of fill would be considerably more than that required for Clough's Bar and

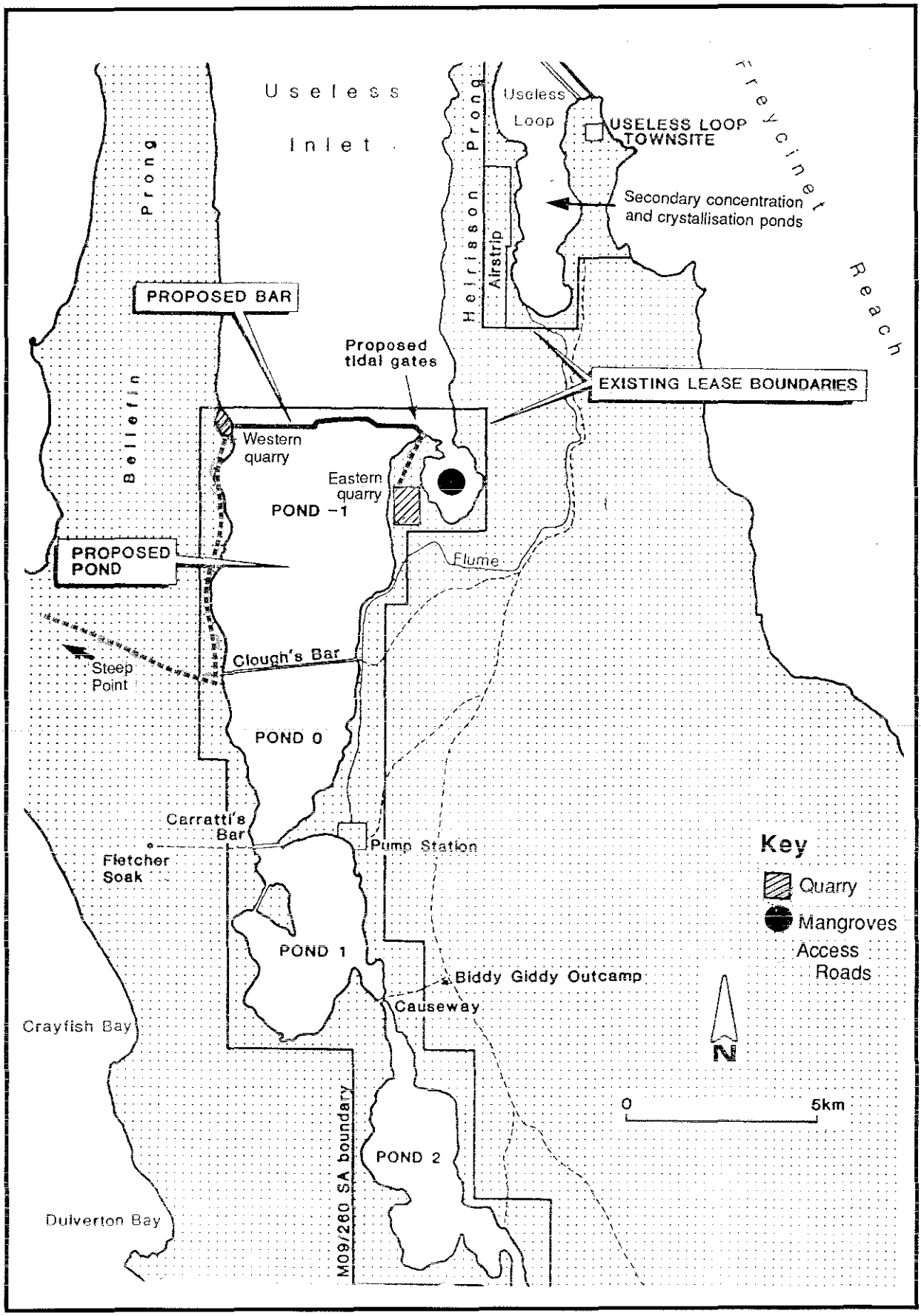

Figure 2. Shark Bay Salt pond system

would require large quarries totalling about 19 hectares in area, with the larger on the eastern side of about 15 hectares and a smaller quarry on the western side of Useless Inlet (Figure 2).

The positioning of the levee on the eastern side of Useless Inlet would avoid directly affecting a large tidal embayment which contains about 15 hectares of mangroves and areas of algal mats and samphire vegetation. The marine resources of the proposed pond area would be lost or modified under the different environmental conditions and these include a small patch of *Turbinaria* corals, less than 1 hectare of mangroves and the generally sparse *Posidonia* seagrass meadows which occur on the sublittoral sandflats. Biomass productivity would increase, however, due to the favourable conditions for algal and fish growth but in a way quite different to the natural environment.

The beneficial impacts of the proposal are discussed in the Public Environmental Review and include additional export earnings, additional employment, it consolidates the commercial viability of the operation and it potentially could develop commercial fish and aquaculture industries. Comprehensive details of the proposal are contained in the Public Environmental Review.

3. Existing environment

A full description of the existing environment, both regionally and in Useless Inlet, is contained in the Public Environmental Review. The pertinent aspects of the environment of the proposed pond area in particular and the adjacent environment will be described here to set the proposal in context.

The Shark Bay Salt project is located in Edel Land on the western side of the Shark Bay region and utilises two inlets, Useless Loop and part of Useless Inlet, which are on the east and west sides of Heirisson Prong respectively (Figures 1, 2). Edel Land is characterised by a series of long, narrow peninsulas (Prongs) with six narrow inlets characterising the easternmost peninsula, Heirisson Prong. Each inlet is a drowned interdunal depression and has developed, to some extent, the geomorphic features of barrier banks, tidal channels, central basins, sublittoral platforms, rocky and/or sandy intertidal platforms/beaches and supratidal flats.

Useless Inlet is classified as a tidal dominated inlet and is some 40 km in length and 5 km wide at the mouth. The main tidal channel at the entrance is about 1.5 km wide due to the development of the barrier sills (shallow sandflats) on either side of the channel. The southern 13 km of the inlet has been isolated from the open waters of the inlet by the existing salt mining operation and the proposed expansion would isolate a further 6 km; this represents a total of 34% by area of the inlet.

The marine biota of the proposed pond area is relatively impoverished as illustrated by the paucity of seagrass cover, which is probably a reflection of the pearl shell fishing that occurred mainly between the 1870s and the 1930s (Hancock, 1989). The diversity of benthic infauna in the denser seagrass meadows has recovered to similar, though lower, levels to the other Edel Land inlet studied for the Public Environmental Review, Boat Haven Loop, and the abundance and biomass is slightly lower.

There are a small number of *Turbinaria* corals occurring in an area of about 200 metres diameter in the basin of the proposed pond area. This genus of coral is well represented elsewhere in the Edel Land province and the Shark Bay region. Other marine biotic communities in Useless Inlet are described in the Public Environmental Review but there is none which has a high conservation value.

The proponent was specifically requested to carry out a survey of the proposed pond area to ascertain dugong usage, particularly with regard to mating behaviour. It was already known

that the area was not a feeding ground for dugongs because of the lack of edible seagrass meadows. The survey found very little usage of the area by dugongs and did not find any evidence of dugong usage of the proposed pond area which might be related to mating behaviour.

The land systems, including the flora and fauna, of the proposed quarry sites are well represented throughout the region; no declared rare flora were identified. An archaeological survey was conducted and several sites of various Aboriginal purposes and significance were identified. The recommendations from the survey, such that there is no impact upon those sites, would be incorporated into the detailed planning for the proposal.

4. Assessment and recommendations

The Environmental Protection Authority has assessed the proposal to construct a levee across Useless Inlet to enclose a further 2600 hectares. The Authority has identified the key environmental issues requiring detailed consideration as:

- isolation of the habitat from the open waters of Useless Inlet;
- loss and modification of the biota of the proposed pond area;
- impact upon the commercial and recreational fisheries;
- environmental management;
- protection of mangroves;
- operation and rehabilitation of the quarries;
- seepage/bitterns disposal;
- impact of increased shipping; and
- decommissioning.

The Environmental Protection Authority has assessed these issues, along with the other factors affecting the environmental acceptability of the proposal, and has concluded that the issues are manageable and the adverse impacts are outweighed by the beneficial aspects of the proposal. Accordingly, the Environmental Protection Authority makes the following recommendation:

Recommendation 1

The Environmental Protection Authority recommends that the proposal to construct a levee across Useless Inlet, as modified by the interaction between the proponent, the Environmental Protection Authority and the public and government agencies consulted, is environmentally acceptable. In reaching this conclusion, the Authority identified the main issues as being related to the isolation of the marine habitat, loss of biological components of the proposed pond area, impact on the fishing industries, environmental management, protection of mangroves, rehabilitation of the disturbed areas such as the quarries, seepage/bitterns disposal, increased shipping and decommissioning. The Environmental Protection Authority considers that these and other issues have been properly considered by the proponent and could be addressed by the recommendations in this report or by the commitments made by the proponent (Appendix 2).

The assessment of the key environmental issues and the Authority's specific recommendations or the commitments by the proponent to address them are discussed below.

The isolation of the habitat does not appear to be crucial to the conservation and ecology of the narrow inlet habitat type, particularly considering the depauperate nature of the biotic communities in the proposed pond area. Also, the proposed pond area has no biological components which have a high conservation value and the area does not support species or sedimentary processes, such as dugongs or stromatolites, that are rare and/or of high conservation value.

4.2 Impact on the commercial and recreational fisheries

One of the key issues involved with the proposal is the conflict between the existing users of the resource and the proposed use. The existing direct users include the commercial seine and, to a lesser extent, recreational fishing industries, and, indirectly, the commercial king prawn fishery, because of the nursery function of the area.

The Fisheries Department conclude that Useless Inlet is a regionally distinct and productive nursery habitat for fish and king prawn species and that the construction of the pond would be removing a significant part of this habitat. The Fisheries Department report that, from their assessment of the data provided in the Public Environmental Review plus historical fisheries data, there would most likely be an annual income loss of between $73,000 and $164,000 to the existing commercial seine and prawn fishing industries if the proposed pond is built.

The question of compensation to the commercial fisheries is complex with Shark Bay Salt indicating that it does not consider it is legally obligated because the mining lease was granted without compensation though it was requested by the fishing industry at that time. One form of compensation offered by the proponent to the seine fishing industry is for access to the proposed pond; there is no similar compensatory measure that applies to the prawn fishery. The only feasible form of compensation to the prawn fishing industry would be the buy-back scheme and the proponent has indicated that it would discuss the issue with the industry if requested by government.

The Fisheries Department also report that recreational fishing would be adversely affected because of the loss of open water access and nursery area; no quantitative estimate of the loss is possible. The Western Australian Recreational and Sportfishing Council Inc. support the proposal despite the loss of open water access and nursery area, though indicate that this could be alleviated by the provision of shoreline access on the western side to the pond and the provision and maintenance of camping facilities at the western end of the new bar.

Shark Bay Salt indicate that it will provide appropriate access and fishing rights in accordance with its current policy of assisting recreational fishing in the region as long as it does not interfere with its salt producing operation. However, access to the western end of the bar is opposed by the Department of Conservation and Land Management because of the proposed future status of the area as a biosphere reserve and the potential for the creation of dune blowouts. Access to the eastern end of the new bar is opposed by the proponent because of the potential for vandalisation of facilities such as the flap gates. Also, there are potential environmental impacts upon the mangrove embayment from uncontrolled recreational fishing and tourism. It would appear that recreational access to the open waters of Useless Inlet via land access at the southern end would be stopped.

The Environmental Protection Authority requested specific written advice from the Fisheries Department regarding compensation, regional ecological impact and specific measures to address the issue of the undoubted effect of the proposal on the commercial fisheries of the region. The Fisheries Department consider that compensation would be morally, if not legally, due to the commercial fishing industry and that the proposed pond area is not crucial to the commercial fisheries. Also, the Fisheries Department advise that the Environmental Protection Authority should insist that the proponent install a lock system for access and also an escape

mechanism for fish. The proponent has indicated that neither of these measures would be cost effective.

The Environmental Protection Authority considers that the issue should be resolved by the Minister for the Environment, on advice from the Ministers for State Development and Fisheries, prior to the commencement of construction.

Recommendation 2

The Environmental Protection Authority recommends that the proponent should reach an agreement on compensation with the fishing industries affected by the proposal, prior to the commencement of construction, to the satisfaction of the Minister for the Environment, on advice of the Ministers for State Development and Fisheries.

4.3 Environmental management

The construction phase of the proposal would involve large, earth-moving equipment operating close to a tidal embayment of high conservation value, plus impacts on the marine environment of Useless Inlet from the dumping of large quantities of material and, also, there are potential impacts associated with the issues of seepage and shipping that require management. The Environmental Protection Authority considers that the on-going environmental management of the existing and expanded salt mining operation should be more structured, rigorous and auditable than at present. The on-going reporting of the environmental management of the salt mine is catered for under the Agreement Act, however, the management of the pond expansion proposal requires a specific programme, which can be integrated with the existing reporting programme following commissioning of the new pond.

The proponent has made appropriate commitments as part of an Environmental Management Programme outlined in the Public Environmental Review (Appendix 2). The Environmental Protection Authority has incorporated these commitments into Recommendation 1 and makes a specific recommendation (Recommendation 3) to address the issue.

Recommendation 3

The Environmental Protection Authority recommends that, prior to the commencement of construction, the proponent prepare and subsequently implement an Environmental Management Programme to the satisfaction of the Minister for the Environment, on advice of the Environmental Protection Authority, to address the management, monitoring, auditing and reporting of :

- **construction procedures and workforce management; and**
- **construction phase and on-going environmental management.**

4.4 Protection of mangroves

The Environmental Protection Authority has endorsed some general principles regarding the protection of arid zone mangroves. These principles are that there should be minimal direct loss of mangroves and no significant indirect loss caused by the effects of developments near mangroves. The Shark Bay Salt proposal is directly affecting about 7 ha of mangroves, though 6 ha of those are within the existing pond and are already exhibiting signs of stress. Less than 1 ha would be enclosed within the new pond and would not be expected to survive in the long term.

With regard to indirect effects, the proponent is aware of the high conservation value of the 15 ha of mangroves in the large tidal embayment and has agreed to implement measures to ensure that the effects of dust from the quarrying operation and increased sedimentation from the levee would not adversely impact on the mangroves.

Recommendation 4

The Environmental Protection Authority recommends that the proponent be required to construct and manage the facility such that there are minimal direct impacts upon the mangroves and that there would be no significant adverse indirect impacts to mangroves off-site, to the satisfaction of the Environmental Protection Authority. In the event that monitoring shows that any areas of the mangroves are likely to be or have been significantly adversely affected by the project, the Environmental Protection Authority recommends that the proponent submit and subsequently implement a plan for the protection of the mangroves or the rehabilitation of any affected areas to the satisfaction of the Environmental Protection Authority.

4.5 Operation and rehabilitation of the quarries

The provision of earthen materials for the construction of the levee will require large quarries totalling about 19 hectares in area, 15 ha on the eastern side and 4 ha on the western side of Useless Inlet (Figure 2). The quarry on Heirisson Prong would be relatively large and would involve blasting, bull-dozing, screening and transport of earthen material along an access track to the eastern abutment of the levee. Major impacts such as dust, noise and erosion would need to be comprehensively addressed because of the potential impact upon the large tidal embayment immediately to the east of the quarry, which is considered to be of high conservation value.

The position of the levee at the eastern abutment, as shown in the Public Environmental Review, is considered to be too close to a secondary tidal channel and small embayment which is connected to the larger tidal embayment. The predicted effects of sedimentation in the lee of the levee may impact upon the hydrodynamics of the tidal channel of the small embayment in particular but possibly for the larger embayment as well. The proponent, in discussion with the Environmental Protection Authority, has agreed to position the levee so that this will not happen.

The quarry on the western side (Bellefin Prong) would require the upgrading of an access track from Clough's Bar and the development of a small quarry immediately adjacent to the western abutment of the levee. Bellefin Prong is dissected by several massive dune blowouts emanating from the western shoreline and it is obvious that the area is sensitive to erosion. The management of the quarry and access track during construction would require on-site control and the subsequent rehabilitation and access control would also have to be of the highest standard.

Recommendation 5

The Environmental Protection Authority recommends that the proponent should rehabilitate the disturbed areas, such as the quarries, to the satisfaction of the Environmental Protection Authority.

4.6 Seepage/bitterns disposal

The issue of seepage/bitterns disposal is relevant to the efficiency of the salt production operation and, also, to the potential long-term impact of the seepage plume. The Shark Bay

Salt project currently has primary concentration ponds of 3330 hectares (ha) in Useless Inlet and produces 0.65 million tonnes per annum (mta); the main primary concentration pond is 1150 ha. The project has secondary concentration/crystalliser ponds in Useless Loop with an area of 770 ha. The proposed pond has an area of 2600 ha which will expand the primary concentration pond system to 5930 ha and the salt production to a target of 1.2 mta.

By comparison, the Leslie Salt project has primary concentration ponds totalling 5673 ha (the main pond being 1225 ha) and secondary concentration/crystalliser ponds totalling 1075 ha; the project produces 2.2 mta of salt. Hence, following the proposed expansion Shark Bay Salt will have about the same total area but be able to produce only 55% of Leslie Salt's current production. The proponent is proposing to conduct further hydrological investigations and continue to implement measures to address the seepage issue.

With regard to bitterns disposal, the current method utilises the seepage situation and there are no plans to resume direct ocean discharge. There is no evidence of an impact upon the surrounding environment since direct ocean disposal was ceased and the proponent considers that the potential for the high density seepage plume to affect surficial biotic communities is low. The proponent is committed to monitoring the bitterns seepage and seagrass distribution.

4.7 Impact of increased shipping

The proposal would lead to an increase in salt production which would involve an increase in shipping from 33 to 60 ships per annum at the stated target production level. All the ships have to deballast as they are being loaded because of the configuration of the loader and, hence, the potential for oil and/or toxic micro-organism discharges would be nearly doubled compared to the present risk.

With regard to ballast water discharges, Shark Bay Salt report that the ships are engaged from Southeast Asia where the risk from the particular toxic dinoflagellates identified by the Australian Quarantine Service is lower. No occurrences of the discharge of toxic dinoflagellates have so far been recorded in the Shark Bay region.

With regard to oil discharges from ballast water or oil spills from ship wrecks/groundings, the Department of Marine and Harbours report that the minor oil spillages attendant with ballast water discharges, which have undoubtedly been occurring, would be expected to increase and that contingency plans for oil spill clear-up operations should consider groundings as well as wrecks.

Shark Bay Salt report that because of the sandy bottom in Denham Sound the chances of a ship wreck or grounding leading to a major oil spill is low. Shark Bay Salt are co-operating with the Department of Marine and Harbours as part of the National Plan for oil spill containment, and are storing oil spill containment equipment at Useless Loop and training staff to use it. Shark Bay Salt are committed to the preparation of an oil spill contingency plan and to co-operating with the Australian Quarantine Service. The Environmental Protection Authority considers that the on-going efforts of the Australian Quarantine Service and the Department of Marine and Harbours are the most appropriate mechanisms to address the issue. The Environmental Protection Authority has incorporated the proponent's commitments on the issue in Recommendation 1.

4.8 Decommissioning

The issue of temporary or permanent rehabilitation and decommissioning plans for the entire salt mining project area has only been partially addressed with some general clauses under the Agreement Act. The existing project has disturbed 41 square kilometres (km^2) and the proposed expansion will affect a further 26 km^2. The Environmental Protection Authority believes that, at the appropriate stage, it is important for adequate plans to be in place to manage

both the possible care and maintenance and the final decommissioning and rehabilitation of the entire project area. The proponent has made a commitment to conduct certain measures but there may be other options to consider and there are further details required at the appropriate time.

The Department of Conservation and Land Management, as the management agency for the adjacent Shark Bay Marine Park (gazetted 30 November, 1990), has supported this position and indicated that, for example, there may be a need to remove all or most of certain levees for permanent decommissioning. The possibility of decommissioning is related to the on-going commercial viability of the operation. Shark Bay Salt and the Department of State Development indicate that there is a long term demand for salt and that, as long as unit costs can be kept competitive, the commercial viability of the existing operation appears secure in the long term.

Recommendation 6

The Environmental Protection Authority recommends that, at least six months before the end of the project, the proponent should develop and subsequently implement a plan to manage the decommissioning and rehabilitation of the entire project area, including all those facilities already in place at the time of this proposal, to the satisfaction of the Environmental Protection Authority. In the event of the project being placed on a short-term, care and maintenance basis, it is recommended that a plan to ensure that adverse environmental effects will be managed should be submitted and implemented, at least three months prior to the suspension of operations, to the satisfaction of the Environmental Protection Authority.

4.9 Other issues

Other issues considered by the Environmental Protection Authority include the potential impacts of the proposal on the area nominated for World Heritage and possible further expansion proposals.

With regard to the potential impacts on the area nominated for World Heritage, the construction of the levee would produce effects such as turbidity during construction and changes to the hydrodynamics of Useless Inlet afterwards. These effects have been evaluated in studies for the Public Environmental Review and are predicted to be minor in scale compared to natural processes. The more significant of these effects would be the turbidity generated during construction. The only biotic assemblage at risk is the *Posidonia australis* seagrass community which is only sparsely distributed anyway after surviving the effects of pearl shell fishing. Similar communities survived the effects of the construction of Clough's Bar and, because of the temporary and variable nature of the impact, the communities at risk would be expected to survive.

Another potential effect on the area nominated for World Heritage relates to the increase in the disposal of bitterns. The proponent no longer discharges bitterns directly to the ocean and will not be resuming this method of disposal. The current (since 1989) and future method of disposal will be by seepage from the unlined bitterns ponds in Useless Loop. There is no evidence of an impact upon the surrounding environment since direct ocean disposal was ceased and the proponent considers that the potential for the high density seepage plume to affect surficial biotic communities is low. The proponent is committed to monitoring the bitterns seepage and seagrass distribution.

Further expansion proposals associated with achieving or exceeding the stated production target of 1.2 mta would have to be referred to the Environmental Protection Authority for assessment. The environmental acceptability of such proposals would be determined at that stage based on the same objectives and principles used to assess this proposal.

Other relatively minor issues were raised during the assessment process and have been adequately resolved by the proponent's response or commitments (Appendix 2). This includes a commitment to allow bird watchers access to the ponds to study the important birdlife which utilise the ponds.

The Environmental Protection Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

The Environmental Protection Authority recognises that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the designs and specifications which have been examined as part of the Authority's assessment. The Authority believes that subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

5. Conclusions

In assessing this proposal, the Environmental Protection Authority has considered both the environmental issues involved with the proposal as well as factors such as the historical context of government approvals of the current salt mining operation, the impact of the proposal on the area nominated for World Heritage and possible further expansion proposals involved in achieving the stated production target.

With regard to the issues related to the proposal, the Environmental Protection Authority has concluded that the area of the proposed pond has no biological components which have a high conservation value, that the biophysical impacts of the construction of the levee are manageable and that the only significant outstanding issue is related to the impact on the regional fishing industries.

With regard to the historical context of the current salt mining operation, it must be recognised that government approvals commencing in 1963 have established the land use endorsement of the area now defined as the project area in the 1983 Agreement Act. That endorsement is for the development of the salt mine and this was recognised in the drafting of the boundaries of the area nominated for World Heritage.

With regard to the impact of the proposal on the nominated World Heritage area, the Environmental Protection Authority considers that the existing and expanded salt mining operation could be managed such that there are no significant impacts. Any further expansion proposals would have to achieve the same objective. Any expansion proposals which are outside of the existing mining lease would have to show that they are clearly environmentally acceptable.

6. References

1. Environmental Protection Authority, 1975. Conservation Reserves for Western Australia, Systems 4, 8, 9, 10, 11, 12.
2. State Planning Commission, 1988. Shark Bay Region Plan.

3. EPA Bulletin 305, 1987. Implications of the Shark Bay Region Plan for Conservation in System 9.

4. Hancock, D A, 1989. A review of the Shark Bay pearling industry. Fisheries Management Paper No.27, Fisheries Department of Western Australia, Perth.

Appendix 1

Significant issues raised in submissions

Issue	Proponent's Response
1. The proposed pond may not support a viable fishery.	Agreed, the pond would support some level of fishing if not at a commercial level, future catches would have to be monitored.
2. The recreational fishery could suffer.	Agreed, Shark Bay Salt will continue to provide facilities and support for recreational fishing to compensate.
3. The interpretation of some of the fisheries data in the Public Environmental Review is not supported.	Some of the re-interpretation is supported and some is not. The details can be agreed when the issue of compensation arises.
4. The quarry sites would be visually disturbing and difficult to rehabilitate.	The quarry sites will not be visible from commonly used public vantage points; in the long term the rehabilitation would be successful.
5. Increased shipping would mean increased risk of oil spills and toxic ballast water discharges.	Shark Bay Salt will co-operate with Government authorities as indicated in the Public Environmental Review.
6. Mangroves will be lost and, in the embayment, under threat.	Less than 1 ha of mangroves will be impounded and a further 6 ha of mangroves within the existing pond would probably be lost; the mangroves in the embayment will be protected by dust control measures.
7. The local seine fishery would be adversely affected.	Compensatory measures will be discussed with the industry.
8. Other options for increasing production have not been evaluated.	They have and no other option can achieve the same production level.
9. There is a lack of data on the non-commercial biota of the pond.	This is not true.
10. Full decommissioning scenarios are not presented.	There is little chance of them being needed, they will be developed in response to the Environmental Protection Authority's recommendation.
11. Quarry operations should be kept to the eastern side.	The use of a small quarry on the western side will save 5 months construction time, a lot of fuel and mean a smaller eastern quarry.
12. Intake of fish into the pond is excessive.	The original fences were not very successful and no response has been received from the Denham Fishermen's Association regarding better designs. Fish migrate in and out of the pond.
13. Increased bitterns discharge would need management.	Agreed.
14. Loss of significant proportion of narrow inlet habitat.	The proposal will increase the amount of habitat isolated from open waters to 17.3% from the existing 10.3%. The area is relatively biologically depauperate from other narrow inlets.

Issue	Proponent's Response
15. Impact on dugongs not yet assessed.	The results of a dugong survey have been distributed; it shows no evidence of dugong usage for mating and little other use because of the lack of edible seagrass meadows.

Appendix 2

Proponent's commitments

The following commitments summarise the environmental management programme outlined in the Public Environmental Review document for the Shark Bay Salt Joint Venture.

1. Pre-construction phase

   (i) Determine the occurrence and use made of the proposed pond area in Useless Inlet by dugongs during the spring/early summer by aerial survey.

2. Construction phase

   (i) Locate levee 400m south of Lease Boundary to avoid containment of the large mangrove embayment in Useless Inlet.

   (ii) Minimise vehicular traffic along the western access track.

   (iii) Ensure continued use by tourists and recreational fishermen of the Clough's Bar access to Steep Point.

   (iv) Transfer any marine mammal or turtle from the pond area to open water prior to completion of the levee and pond closure.

3. Post construction phase

   (i) Continue to provide public access to Steep Point across Clough's Bar.

   (ii) Continue to provide cleared areas at the ends of Clough's Bar for overnight camping by tourists.

   (iii) Rehabilitate or vacate the construction access track along the western foreshore if required. Contour quarry sites to configuration prescribed by appropriate Government Agencies. Revegetate by agreed methods to approved standards. Manage the residual maintenance quarry site.

   (iv) If directed by EPA or requested by CALM, provide camping areas and boat launching ramp at the western end of the new bar for recreational fishing purposes.

   (v) If considered appropriate by CALM and/or Fisheries Department, allow public access to the new bar to tourists, fishermen, bird watchers, etc.

   (vi) If considered appropriate by CALM and/or Department of Fisheries, enable vehicular access on the proposed levee from the western side to some agreed point to the west of the intake structures.

   (vii) Install appropriate termination/s to vehicular access at agreed locations.

4. Operations phase

   (i) Continue to monitor groundwater salinities and ionic composition in the Useless Loop area together with seagrass distribution to ensure adequate dilution of bitterns.

   (ii) Develop and implement an oil spill contingency plan in conjunction with the appropriate authorities.

   (iii) Assist in the implementation and operation of any routine ballast water monitoring programme established by the Port Authority.

   (iv) Subject to Section 7.3.3 of the Public Environmental Review, enable regulated access to fishermen for commercial fish harvesting within the pond system.

   (v) If requested pursuant to Section 7.3.3 of the Public Environmental Review, assist in aquaculture research programme under the auspices of the Department of Fisheries and the Western Australian Fisheries Industry Council (WAFIC).

   (vi) Validate the essential and relevant items by field survey as requested and directed by the appropriate Government agencies that have responsibility for ongoing environmental regulation.

5. Termination of project

There is no predictable lifetime to a solar salt field and production can continue while demand provides for commercially viable continuance. The project could continue for hundreds of years.

Whenever the project does reach the end of its practical life the following shall occur:

(i) breach levees and remove all pipes and gate structures so that tidal flushing of the whole ponded area can resume;

(ii) remove infrastructure such as pump station, flume, washery, jetty, shiploader and townsite facilities, unless otherwise required by the State, all in accordance with Clause 27(b) of the 1983 Lease Agreement.