Oakajee deepwater port, Oakajee, Shire of Chapman Valley

Minister for Resources Development

Report and recommendations
of the Environmental Protection Authority

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Summary and Recommendations

The Minister for Resources Development proposes to construct a deepwater port to service fully loaded Panamax sized vessels (65 000 DWT) at Oakajee, approximately 23 kilometres north of Geraldton (Figure 1). This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors, conditions and procedures relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Environmental Factors

It is the EPA's opinion that the following are the environmental factors relevant to the proposal:

(a) rare and priority flora and vegetation communities;

(b) rare and endangered fauna;

(c) seagrass and benthic primary producer habitat;

(d) macroalgae (beach cast seaweed);

(e) marine fauna;

(f) introduced marine organisms;

(g) shoreline stability;

(h) marine water and sediment quality;

(i) dust;

(j) noise and vibration;

(k) public health and safety;

(l) heritage;

(m) recreation; and

(n) fishing.

The large number of relevant factors reflects the complexity and significance of the proposal.

Other Advice

The EPA has also provided other advice on the following matters related to the proposal:

(a) Oakajee River training;

(b) port design alternatives;

(c) quarry siting and management;

(d) services and infrastructure;

(e) transport;

(f) unexploded ordnance;

(g) shipping.

Conclusion

The EPA has considered the proposal by the Minister for Resources Development to establish a deepwater port at Oakajee, north of Geraldton. This assessment involved consideration of an in-shore design option at three locations within the Oakajee study area. The assessment of the Oakajee deepwater port proposal has been undertaken on the conceptual design of the proposed port.

The work to date has not identified an environmental factor where, with appropriate management, the EPA's objective in relation to that factor cannot be achieved. However, further environmental investigations are required to obtain more detailed information on a number of factors to ensure that environmental requirements can be met and are incorporated into the final design.

Noting that the assessment has been undertaken at the conceptual design stage, the EPA has concluded that an Environmental Management Plan for the proposal will be required and that it will need to be a comprehensive document to be developed in parallel and prior to the finalisation of the project detailed engineering design. It will also need to reflect the outcome of current and proposed environmental studies.

The EPA has provided additional advice on various aspects associated with the proposal including: Oakajee River training; port design alternatives; quarry siting and management; services and infrastructure; transport; unexploded ordnance and shipping.

Recommendations

The EPA recommends that:

1. The Minister for the Environment considers the report on the relevant environmental factors of rare and priority flora and vegetation communities (3.2), rare and endangered fauna (3.3), marine habitats (3.4), macroalgae (3.5), marine fauna (3.6) introduced marine organisms (3.7), shoreline stability (3.8), marine water and sediment quality (3.9), dust (3.10), noise and vibration (3.11), public health and safety (3.12), heritage (3.13), recreation (3.14) and fishing (3.15).
2. The Minister for the Environment notes that the EPA has concluded that:
    - this environmental assessment has been undertaken on the conceptual design of the proposed port;
    - the work to date has not identified an environmental factor where, with appropriate management, the EPA's objective in relation to that factor cannot be achieved;
    - further environmental investigations are required to obtain more detailed information on a number of factors to ensure that environmental requirements can be met and are incorporated into the final design.
3. The Minister for the Environment imposes the conditions and procedures consistent with Section 4 and set out in formal detail in Appendix 4 of this report.
4. The proponent (Minister for Resources Development) gives consideration to the inclusion of significant coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative vegetation community types.
5. Prior to finalisation of the detailed design, the proponent undertake an analysis to determine the impact on the onshore and nearshore environment of the proposed training of the Oakajee River and that this be referred to the EPA for consideration of the environmental impacts.
6. The Minister for Resources Development and the Minister for Planning consider the long-term protection of transport corridors to the Oakajee industrial estate and port through planning mechanisms.

7. The Minister for the Environment and relevant Government agencies note that the EPA will require separate referral of the proposed infrastructure, services and sources of rock material for the Oakajee industrial estate and deepwater port, for assessment. Service corridors should be developed to minimise any potential environmental impacts.

8. The State Committee for Combating Marine Oil Spill Pollution initiate a study of risks associated with tanker and other shipping traffic along the Western Australian coast.

Conditions

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal, and following discussion with the proponent the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for and commitment to continuous improvement in environmental performance. The commitments then form part of the conditions to which the proposal should be subject if it is to be implemented.

The EPA may, of course, also recommend conditions additional to that relating to the proponent's commitments.

The EPA recommends that the following conditions, which are set out in formal detail in Appendix 4, be imposed if the proposal by the Minister for Resources Development to construct a deepwater port at Oakajee is approved for implementation:

(a) the proponent shall fulfil the commitments in the Summary of Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) in order to manage the relevant factors and EPA objectives contained in this bulletin, and subsequent conditions and procedures authorised by the Minister for the Environment, the proponent shall be required to prepare, prior to implementation of the proposal, environmental management system documentation with components such as those adopted in Australian Standards AS/NZ ISO 14000 series;

(c) prior to finalisation of detailed design (unless otherwise stated), the proponent shall prepare and implement an Environmental Management Plan, to the requirement of the Environmental Protection Authority on advice of the Department of Environmental Protection and other agencies, where relevant.

This Plan should provide strategies and actions to implement the following requirements.

Rare and priority flora and vegetation communities

1. vegetation clearing is kept to a practical minimum;
2. a Dieback Management Plan is formulated as part of the Rehabilitation and Coastal Management Plan;
3. weed control measures are implemented;
4. the Rehabilitation Plan and Coastal Management Plan is formulated to protect, retain or replace identified environmental values of remnant coastal vegetation;

Marine fauna

5. a survey is undertaken of the area for marine mammals prior to any blasting and that blasting is avoided should any marine mammals be present.

Introduced marine organisms

6. a best practice strategy for ballast water management, including the construction and use of a ballast water treatment facility, is developed to the satisfaction of the EPA so as to meet its objective for this factor;

7. prior to commissioning of the port, a marine fauna and flora survey is undertaken to the requirements of the DEP, to identify species present at the site. Bi-annual monitoring is to continue during the life of the project to identify the establishment of exotic marine species and contingency measures implemented if the species is deemed to present an unacceptable risk to the marine environment;

8. compliance with the Australian Quarantine Inspection Service (AQIS) or International Maritime Organisation (IMO) recommendations for ballast water control is achieved by the proponent and compliance with AQIS and IMO guidelines is actively promoted to port users;

9. hull scrubbing in the port and nearby waters is prohibited;

Marine water and sediment quality

10. The following plans are prepared to the requirement of the EPA on advice from the DEP and relevant authorities, prior to finalisation of detailed design:
    - Breakwater Construction Management Plan;
    - Dredge and Dredge Spoil Management Plan;
    - Material Handling Environmental Requirement Specification;
    - Accidental Spillage Management Plan;
    - Drainage Design and Treatment Specification;
    - Oil Spill Contingency Plan;
    - Port Waste Management Plan;
    - Water and Sediment Quality Monitoring and Management Plan;

11. prior to finalisation of detailed design, and as part of the EMP, a detailed monitoring and management plan for maintenance of environmental values in relevant areas is prepared, to the requirements of the EPA on advice from the DEP;

12. prior to construction, a baseline survey of water quality and sediments is completed with due account taken of seasonal variation;

Dust

13. an Air Quality Management Plan is implemented to manage dust to an acceptable level during construction, operation and transport of materials;

Noise

14. a program of noise monitoring for the port to assess noise impacts, including cumulative noise, and which is integrated with the noise monitoring for the industrial estate is developed and implemented;

Heritage

A Heritage Management Plan is prepared including, but not limited to:

15. detailed ethnographic and archaeological surveys, including consultation with local Aboriginal groups;

16. ethnographic and archaeological surveys in the vicinity of the Oakajee River training works prior to finalising detailed design, if the northern port option is developed;

17. a detailed assessment of the likely effects of the development on any sites, including ground disturbance, chemical emissions and altered surface hydrology;

Recreation

18. a Recreation Plan is developed in consultation with the public which makes adequate provision for public access to available recreational areas;

The proponent shall make this Environmental Management Plan publicly available.

Procedure

In addition to the conditions, the following procedures are to be implemented:

1. The preparation of a Fishing Management Plan, to be negotiated between the proponent and fishing interests, to be developed prior to commencement of construction.
2. Consideration be given to the inclusion of significant coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative sections of vegetation community types.

Contents

Contents (cont'd)

Page

Tables

Appendices

1. Introduction and background

The Minister for Resources Development, the proponent, proposes to construct a deepwater port capable of berthing and servicing up to three "Panamax" sized vessels (65 000 DWT) at Oakajee. Three site locations (north, south and central) and two different design options (in-shore and off-shore) were considered in developing the proposal. The design option favoured by the proponent is an in-shore port design at the northern sector (Figures 2 and 3). The port study area is approximately 23 kilometres north of Geraldton.

The port will service the Oakajee industrial estate to be established adjacent to the port area. The Environmental Protection Authority (EPA) has provided advice to the Minister for the Environment on a strategic assessment of the Oakajee Industrial Estate Concept (EPA Bulletin 848) and Oakajee Deepwater Port Concept (EPA Bulletin 849) under Section 16 (e) of the *Environmental Protection Act 1986*. In EPA Bulletin 849 the EPA advised that the environmental factors likely to be important could be managed to meet the EPA's objectives for those factors subject to further studies and implementation of management recommendations.

The EPA required that the proposal for the deepwater port be subject to assessment at the level of Public Environmental Review (PER). The PER document (Tingay and Welker 1997a) was released for public comment between 12 May and 9 June 1997.

Further details of the proposal are presented in Section 2 of this Report. Section 3 discusses environmental factors relevant to the proposal. Conditions and procedures to which the proposal should be subject if the Minister determines that it may be implemented are set out in Section 4. Section 5 presents other advice on matters related to the proposal. Section 6 presents the EPA's conclusion and Section 7 the EPA's recommendations.

Appendix 1 provides figures relating to the proposal. A list of people and organisations that made submissions is included in Appendix 2. References are listed in Appendix 3, and a copy of recommended draft conditions and procedures is presented in Appendix 4.

The Department of Resources Development, on behalf of the Minister for Resources Development, has published a summary of comments made during the public submission period and their responses, together with a consolidated list of commitments for this project. That document is available in conjunction with this Report.

During the assessment process, the following additional studies were provided to the EPA by the proponent relating to the port - sediment transport (MP Rogers and Associates 1997a), wave breaks (MP Rogers and Associates 1997b), water circulation (MP Rogers and Associates 1997c) and windsurfing (Tourism Coordinates 1997).

The Minister for Resources Development is the proponent for the Oakajee deepwater port, on behalf of the Government of Western Australia, and has been nominated as the "proponent" for this proposal under Part IV of the *Environmental Protection Act 1986*. The EPA notes that the operator of the port may be an existing port authority or a private operator and that the environmental approval and conditions will transfer to the port operator, when appointed. For the purposes of this assessment, the Minister for Resources Development represents both the builder and operator of the Oakajee deepwater port, and is responsible for the associated environmental conditions.

The Departments of Resources Development and the Department of Transport are jointly co-ordinating technical studies associated with design of the deepwater port, on behalf of the Minister for Resources Development and the Government.

2. The proposal

A number of different port options have been previously considered including extending the existing port facilities at Point Moore, or establishing new facilities west of the existing Point Moore facility. Other sites for ports have been considered at Georgina, Bradley, Bookarra south of the Greenough River, or at Bonniefield north of Dongara (Geraldton Region Plan Review Taskforce 1997; Tingay and Welker 1997a). The Oakajee area was identified as having the best combination of site characteristic for a deepwater port (Tingay and Welker 1997a).

Final design characteristics for the Oakajee deepwater port are yet to be determined, however, the main proposal characteristics as outlined in the PER (Tingay and Welker, 1997a) are included in Table 1 below.

Table 1: Summary of proposal characteristics for the in-shore port design.

Proposal Aspect	Description
Breakwater	Extending approx. 1.6 km offshore with 8 million tonnes of fill required.
Dredge spoil volume	Up to 8 million m^3 (for fully dredging harbour to RL 15.5m and shipping channels).
Area of marine habitat to be affected	Up to 170 ha.
On-shore storage area	50 ha.
Transport corridor linking to the industrial estate	30 - 60 ha depending on final location of port.

The proposal is for a land-backed, breakwater enclosed port. The port area would be dredged to about -16.5m Australian Chart Datum (ACD), and spoil from the dredging would be used to reclaim land along the southern breakwater. The proponent has indicated that maintenance dredging will be required infrequently, perhaps once a decade (Tingay and Welker 1997a) and disposal areas have not been defined at this time. Although the design has yet to be finalised, the breakwaters are likely to be mass armoured rock and fill structures. The proposal also includes an onshore storage area of about 50 ha and a service corridor connecting the port to the Oakajee industrial estate.

The service corridor between the port and the industrial estate which is about 1 km inland, will ultimately include two-way roads, conveyor belts, pipe racks and other facilities. Water will be supplied to the port from the pipeline constructed to service the industrial estate.

The scope of the present proposal does not include fuel storage and bunkering facilities for oil tankers, however, should this be considered in the long term it will be referred to the EPA for consideration of the environmental impact, at that time. The operation of the port will include some refuelling of vessels using the port.

The onshore storage area is expected to cover an area of about 50 ha and will be approximately 1.5km in length (south to north) and 400m wide (west to east). The inshore harbour option is expected to extend over about 1.6 km of coastline.

The proposal includes the definition of three management areas around the port:

- Statutory Control Area - the port operator would be given statutory control over a large area of ocean surrounding the port to enable management of the port, to ensure that shipping is not constrained and that public safety is maintained. The Statutory Control Area has not been determined at present.
- Special Management Area - an area around the general location of the Oakajee port will be defined as the Special Management Area for the purposes of port management. The area is likely to include the land between the industrial estate and coast, extending to north of the Oakajee River for about 1 km and south to the Buller River, and offshore for about

3km (Tingay and Welker 1997a). Within this area non-port activities may be restricted to ensure safety with respect to ship movements.

- Main Port Operations Area - this will include the port itself, defined shipping channels approaching the port, and a limited area adjacent to and outside of the breakwaters. It is anticipated that the marine environment in this area will be affected by shipping operations, maintenance dredging and incidental or potentially accidental spillage's of material during port operations (Tingay and Welker 1997a).

Figure 3 shows the boundaries of the Special Management Area and the Port Operations Area for the northern port location option, the proponent's preferred port location area.

The initial port users are likely to be the Geraldton steel plant, shipping steel slabs, and a hot briquetted iron plant.

3. Environmental factors

3.1 Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following are the environmental factors relevant to the proposal:

(a) rare and priority flora and vegetation communities;

(b) rare and endangered fauna;

(c) marine habitat;

(d) macroalgae (beach cast seaweed);

(e) marine fauna;

(f) introduced marine organisms;

(g) shoreline stability;

(h) marine water and sediment quality;

(i) dust;

(j) noise and vibration;

(k) public health and safety;

(l) heritage;

(m) recreation; and

(n) fishing.

The large number of relevant factors reflects the complexity and significance of the proposal. The relevant environmental factors are discussed in Sections 3.2 to 3.15 of this report.

3.2 Rare and priority flora and vegetation communities

Description

The port proposal requires up to 110 ha of land to be cleared for construction of a transport corridor to the industrial estate and for an on-shore storage area. The land to be affected consists mainly of Stable Dune Heathland, Mobile Dune Heathland and Limestone Ridge Heathland and Shrubland which closely resemble dune communities at Lancelin and Dongara (Dames and Moore, 1993). The remnant vegetation communities are shown in Figure 4. The area was assessed as average to poor in species richness and there were no unusual assemblages (Dames and Moore 1993). The terrain with the greatest floristic richness was the Sandplain, followed by the River Margins and then the Limestone Ridge. Sandplain and River Valleys were assessed to be the most useful habitats for fauna.

No declared rare flora (DRF) was identified in the vicinity during the 1993 flora survey, however, some species are not evident until they bloom in Spring. The proponent has recently (late August 1997) undertaken a follow-up Spring flora survey for declared rare or priority flora in areas likely to be disturbed by development of the port.

Preliminary results from the Spring 1997 survey (Muir Environmental 1997) indicate that no declared rare flora or significant plants were identified in the limestone ridge and coastal margins. The Spring 1997 survey did identify some declared rare flora and priority flora but these were located in the buffer to the industrial estate and other areas not previously surveyed or to be affected by the current proposal.

The survey also indicated that weed infestations are present over the whole area surveyed and that dieback disease has been visually identified in the *Banksia prionotes* on sandplain. Due to the nature of the soils (sandy and well drained) overland spread of the disease should be slow, however, the infected areas have the potential to become sources of infection of other non-infected areas. Muir (1997) further recommended that a dieback management plan be formulated to control on-site operations which may involve vehicle movement from infected to uninfected areas.

Generally, clearing should be kept to a practical minimum to reduce any erosion potential and to retain conservation values.

Muir Environmental (1997) further concluded that the long-term viability of the vegetation is limited.

Assessment

The area considered for assessment is the primary and secondary dune areas, and areas of remnant vegetation adjoining the Port Location Area. This area lies within the Geraldton Sandplain biogeographical region (Thackway and Cresswell, 1995).

The EPA's objective in regard to this environmental factor is to protect rare and priority flora consistent with the provisions of the *Wildlife Conservation Act 1950* and to maintain the abundance, diversity, geographic distribution and productivity of vegetation communities.

The Department of Conservation and Land Management (CALM) has advised that the project does not appear to raise any conservation issues of concern to that Department. However, CALM has also advise that some specific issues may be identified when detailed evaluation of various components occur, such as rail and power utilities and construction material sourcing.

The proponent has recently undertaken a follow-up Spring flora survey for declared rare or priority flora which indicated that no declared rare flora or significant flora were identified in the port location area. The proponent has also committed to develop a Rehabilitation Plan and a Coastal Management Plan for the area.

The EPA notes the statutory requirements for the protection of rare and priority flora under the *Wildlife Conservation Act 1950.*

Having particular regard to the:

(a) vegetation surveys conducted in the Summer of 1993;
(b) the preliminary results of the follow-up Spring 1997 survey for rare and priority flora;
(c) the presence of dieback disease and weed infestation;
(d) the commitment to develop a Rehabilitation Plan and a Coastal Management Plan to the requirements of the EPA; and
(e) protection provisions for rare and priority flora under the *Wildlife Conservation Act 1950,*

it is the EPA's opinion that the proposal is unlikely to compromise the EPA's objectives, provided:

(i) vegetation clearing is kept to a practical minimum;
(ii) a Dieback Management Plan is formulated as part of the Rehabilitation and Coastal Management Plan;
(iii) weed control measures are implemented;
(iv) the Rehabilitation Plan and Coastal Management Plan is formulated to protect, retain or replace identified environmental values of remnant coastal vegetation.

The EPA further recommends that the:

Proponent give consideration to the inclusion of coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative vegetation community types.

3.3 Rare and endangered fauna

Description

The port proposal requires land to be cleared for construction of a transport corridor to the industrial estate and an on-shore storage facility. Rare and endangered fauna may use habitat that is proposed to be cleared for construction of port associated facilities. The vegetation communities are shown on Figure 4.

Construction of the port, transport corridor and storage area will result in the direct loss of up to 110 ha of habitat. The proponent has committed to developing a Rehabilitation Plan and Costal Management Plan to protect remaining vegetation.

No evidence of rare and priority fauna was detected in a fauna survey conducted in 1993 (Dames and Moore, 1993). However, this survey found that twelve rare species (Schedule 1 and 2) may occur in the wider Geraldton region. The 1993 survey identified the sandplain areas, followed by the River Valleys, as the most useful faunal habitat (Dames and Moore, 1993). The earlier survey also indicated that the area may be a significant breeding site for the Bustard and that the area may be rich in Echidna .

The proponent commissioned a further re-evaluation of the fauna and flora of the area which was carried out in late August 1997 (Muir Environmental 1997). Preliminary results from the Spring 1997 survey indicated that there were no habitats which were so unusual that they could be expected to contain highly specialised fauna. In addition, no evidence was found that the area was a breeding site for Bustard and that Echidna were not present (Muir Environmental 1997).

Rare and endangered fauna are protected under the provisions of the *Wildlife Conservation Act 1950.*

Concerns were expressed in public submissions about the lack of detailed studies on the potential effects on rare and endangered fauna, including breeding and feeding grounds. The Spring 1997 survey has been undertaken since these comments were received.

Assessment

The area considered for assessment is the primary and secondary dune areas, and areas of remnant vegetation, adjoining the Port Location Area. This area lies within the Geraldton Sandplain biogeographical region (Thackway and Cresswell, 1995).

The EPA's objective in regard to this factor is to protect rare and endangered fauna consistent with the provisions of the *Wildlife Conservation Act 1950.*

The EPA notes the results of the 1993 fauna assessment and the preliminary results of the August 1997 re-evaluation of flora and fauna.

Having particular regard to:

(a) the fact that no rare or endangered species have been recorded at the site;
(b) the requirements of the *Wildlife Conservation Act 1950,*

it is the EPA's opinion that the proposal can be managed to meet its objective for this factor.

3.4 Marine habitats

Description

The marine environment off Oakajee has six distinct habitat types with associated flora and fauna (Figure 5), and are described in detail in the PER:

- sandy beaches;
- shallow sandy sea floor;
- extensive area of high reef;
- flat (shallow) limestone pavement;
- low reef ridges;
- deep limestone pavement.

The shallow water habitats are important areas of primary productivity, they also form a refuge for marine fauna by providing crevices or caves in reefs, or shelter within the algal and mixed algal seagrass communities (Tingay and Welker 1997a). Marine fauna that utilise this habitat include a wide range of reef fish and a large number of invertebrates including puerulus, juvenile and adult rock lobster.

This proposal could impact on up to approximately 170 hectares of benthic marine habitat (Tingay and Welker, 1997a).

The marine habitat to be affected by this proposal is generally described in the Marine Parks and Reserves Selection Working Group (MPRSWG) Report (1994) and is well represented along the mid-west coast between Port Gregory and Port Denison. There is extensive pristine seagrass cover in and around the Geraldton area, however, there are no seagrass meadows in the project area (Figure 6).

The lack of off-shore reefs in this high energy area precludes the growth of extensive seagrass meadows. Sparse seagrass growth (*Amphibolis antarctica* and *Thalassodendrum sp.*) does, however, occur on the limestone pavement and on the upper surfaces of reefs beyond the 10 metre depth contour within the project area (Tingay and Welker, 1997a).

No locally or regionally significant seagrass species or other benthic primary producers have been identified within or near the project area.

Concerns have been raised by members of the public over the potential impacts the loss of seagrass cover will have on the nursery requirements of juvenile Rock Lobster. The EPA notes however, that the area of marine habitats to be lost has only sparse seagrass cover and similar habitat is well represented elsewhere near the project site.

Assessment

The area considered for the assessment of potential impact on marine habitats is the area from Coronation Beach to Buller River out to the 20 m depth contour. An area of approximately 19 square kilometres (1900 hectares).

The EPA's objective in relation to this environmental factor is to maintain the abundance, species diversity, productivity and geographic distribution of marine habitats.

The area from Point Moore to Port Gregory contains approximately 7760 hectares of seagrass and seagrass meadows in near pristine condition (adapted from Tingay and Welker, 1997a). From information provided in Fisheries Department resource maps produced in 1986 (Tingay and Welker 1997a), this proposal will not result in the loss of any seagrass meadows. Some sparse seagrass cover will, however, be lost from the 170 hectares of benthic habitat to be permanently affected by this proposal.

The percentage loss of primary producer habitat was assessed for the northern, central and southern port options and over the relevant area described above, the relative loss of marine habitat is 8% for the Northern sector, 15% for the Central sector and 14% for the Southern sector (DRD 1997b).

The above assessment shows the relative impacts on benthic primary producer habitat resulting from construction and operation of the proposed port at the three site options under consideration. The southern and central sectors will result in larger losses of primary producer habitat because of the larger areas of limestone pavement that occur in these regions. A port in the northern sector has a greater proportion of sand habitat, primarily due to a sand filled paleo-drainage channel running out from the mouth of the Oakajee River.

Having particular regard to:

(a) the loss of marine habitat and that this is well represented along the Mid-West coast;
(b) the loss of benthic primary producer habitat in the relevant areas;
(c) there being no areas of seagrass meadows which will be directly affected by this proposal;
(d) the seagrass meadows in the surrounding area are in pristine or near pristine condition,

it is the EPA's opinion that the proposal can be managed to meet the objective of maintaining the abundance, species diversity, productivity and geographic distribution of marine habitat. The EPA further considers that the northern option is the preferred site for the protection of benthic primary producer habitat.

3.5 Macroalgae (Beach Cast Seaweed)

Description

The Mid-West Coast of Western Australia provides habitat for substantial macroalgal communities. The algae itself provides habitat for marine animals, but also contributes significantly to seaweed which is cast up on the shoreline. The decomposition of beach-cast macroalgae releases nutrients and particulate carbon to the near-shore environment and is considered to be a source of nutrients in Western Australia's oligotrophic marine waters (Kirkman and Kendrick, 1997). This proposal will affect the natural movement of beach-cast macroalgae up and down the coast in the vicinity of the breakwater and may locally alter the natural nutrient and carbon cycling processes that occur.

With an in-shore port design it is expected that significant macroalgal wrack will accumulate on the northern and southern breakwaters as a result of wind driven current movement. This is expected to peak at times of seagrass senescence and after storm events when wind and wave driven currents detach seagrass and macroalgae from the seafloor and force it up against the breakwaters.

Accretion of sediments along the southern side of the breakwater from northern longshore drift is expected to occur at the rate of approximately 20 000 to 70 000 m^3/yr (M P Rogers and Associates, 1997a). Southward longshore sediment transport is expected to result in accretion against the northern breakwater at a rate of about 10,000 to 50 000 m^3/yr. There is a net movement of sediment to the north, in the order of 15 000 to 30 000 m^3/yr. It is expected that northern and southern longshore movement of macroalgae would be similarly affected.

Assessment

The area considered for assessment of this environmental factor is the coastal area from Buller River to Coronation Beach.

The EPA's environmental objective in regard to this factor is to minimise interference with the process of nutrient and carbon cycling from beach cast macroalgae.

It is expected that large accumulations of macroalgae will occur on the northern breakwaters during times of northerly winds and currents and on southern breakwaters during times of southerly winds and currents. While the build up of large quantities of seaweed on the beaches in and around the relevant area is an annual occurrence, natural processes have allowed for the decomposition and redistribution of the build-up along the beach back into the marine environment. As a result of the breakwaters preventing this longshore littoral drift, redistribution along the beach is unlikely to occur in the vicinity of the port. To prevent odour problems from large quantities of decaying seaweed and localised water quality problems from detrital build up, mechanical redistribution of algal wrack around the port facility will be required.

The proponent has committed to monitor the accumulation of seaweed wrack and redistribute large accumulations by mechanical means to areas within the Special Management Area when it is evident that seaweed wrack accumulation has decreased.

Having particular regard to:

(a) the fact that macroalgae regularly accumulates on the coastal area identified as the Port Location Area;
(b) the closest residential properties will be at least 2 kilometres away should decomposition lead to odour; and
(c) the proponent's commitments to monitor seaweed wrack accumulation and undertake re-distribution as required,

it is the EPA's opinion that the proposal can be managed to meet its objective for this factor of minimising interference with the process of nutrient and carbon cycling from beach cast macroalgae.

3.6 Marine fauna

Description

The proposal will impact on up to 170 ha or marine habitat of varying types (Tingay and Welker, 1997a). The marine habitat to be affected at each of the three port sites is presented in the PER. Each site consists of high and low reef, shallow pavement and sand in varying proportions. The direct impact on habitat from each site option is presented in the PER and summarised in Table 2.

Table 2: Summary of marine faunal habitats to be directly affected by port development at each port site location option (all figures in hectares).

Site Location Option	High Reef	Shallow Pavement / Reef / Sand	Deep Pavement / Sand	Shallow Sand	Total
Northern	42	30	8	57	137
Central	108	30	5	4	147
Southern	45	80	6	26	157

(Source: Modified from Tingay and Welker 1997a)

The greatest impact on habitat will occur between the coast and the 10 metre depth contour as this is where the highest diversity of biota and greatest productivity is located. Of the nearshore habitats, the high reef and shallow pavement/reef/sand support the greatest diversity of marine habitat. The deep limestone pavement is supported by a low density of algae and small populations of other marine fauna.

The northern site option would have the least impact on the highly diverse high reef and shallow pavement/reef/sand habitat and a central site option would have the largest impact. The construction of the breakwater would have the effect of changing habitat from sand, pavement and low reef to rocky reef.

The marine habitat to be affected by this proposal is generally described in the MPRSWG Report (1994) and is well represented along the mid-west coast between Port Gregory and Port Denison. Juvenile Western Rock Lobster settle among seagrasses and large numbers live under patch reef ledges (MPRSWG, 1994).

The Humpback, Southern Right and Blue Whales migrate through the Geraldton region. Sea-lion colonies exist in the Abrolhos Islands and the Geraldton Harbour. Dugongs normally live in the Shark Bay area and have been sighted in small numbers in the Geraldton area. There are no seagrass meadows at Oakajee and it is likely that this area is too far south of their natural range for permanent habitation. The Green Hawksbill turtle (a non-declared species) is occasionally seen in the Geraldton Region.

The Oakajee area has not been identified as providing a feeding or nesting habitat and accordingly has not been identified as important to the survival of any of these species.

Under the *Wildlife Conservation (Specially Protected Fauna) Notice 1996* of the *Wildlife Conservation Act 1950* a number of marine species are protected throughout Western Australian waters. The list includes most of the species noted above.

The proponent has indicated that during dredging operations, drilling and blasting may be required to break up the seabed. The need for blasting hard caprock material prior to dredging of the inner port and shipping channels will be confirmed after detailed engineering and geotechnical studies have been undertaken. The northern location will require less blasting than the central and southern locations.

The proposed mooring area for ships will consist of deep pavement and deep sand with little to no vegetation and is considered of low value as marine habitat area. This type of habitat is well represented elsewhere in the deeper off-shore waters of south-western Australia.

The loss of Western Rock Lobster habitat and fishing grounds was raised as a major concern during the public review period for the PER.

Assessment

The area considered for assessment of this environmental factor is the coastal area between Buller River and Coronation Beach, including the port approach channel.

The EPA's environmental objective in regard to this factor is to maintain the abundance, species diversity and geographic distribution of marine fauna.

The Western Australian rock lobster fishery extends from Shark Bay to Bunbury. The Oakajee fisheries block extends from Oakabella Creek to the Buller River and contains the Oakajee port location areas (Figure 7). An analysis of the Western Rock Lobster fishery for the Oakajee area is presented in Appendix 2 of the PER. The annual average catch for the years 1991/92-1995/96 from the Oakajee Block is about 51 000 kg along the 17km of coastline. The Block extends from the coast to the line separating the coastal fishery from the Abrolhos Islands fishery, however, most of the catch (about 42 000 kg) is taken from the waters up to 18 m in depth. The average annual production of 51 000 kg from the Oakajee Block represents about 0.5% of the annual average catch of the State's Western Rock Lobster fishery.

Part of the fishing habitat which would be lost is the productive in-shore grounds (0-18 m depth) of the Oakajee Block. Assuming that the catch is evenly distributed along the coastline of the Oakajee Block, the marine habitat close to the shoreline (and which would be affected by an inshore deepwater port) in the central sector produces approximately 8% (or about 4 000 kg) of the annual average catch for this Block. The northern location for a port would have the least impact on professional fishing because of the lower impact on high reef and shallow limestone pavement, which are the preferred habitat of crayfish (Tingay and Welker 1997a). Tingay and Welker (1997a) estimate that the impact of a port in the northern sector may be reduced by about 50% to 60%.

The construction of the port will lead to the loss of up to 170 hectares of marine habitat suitable for use by the Western Rock Lobster in various stages of its lifecycle. The habitat to be lost is primarily used by juvenile Rock Lobsters and it is envisaged that the construction of the breakwater will at least partially off-set the loss of natural habitat. The breakwater will provide additional habitat able to be colonised by communities that favour rock and reef habitat. This will alter the community structure around the facility but is unlikely to significantly alter the marine community over the relevant area or within a regional perspective.

The northern option will impact the least on the diverse high reef habitat. The breeding grounds of the Western Rock Lobster occur in deeper waters from 40 to 80 metres (Tingay and Welker, 1997b). Therefore the impacts from this proposal on breeding stock are unlikely to cause a significant environmental impact.

The area is only infrequently used by the protected species listed above and it is unlikely that any of the species permanently inhabit the area. While the EPA notes that marine mammals have been sighted infrequently in the Geraldton area, the EPA considers that a precautionary approach should be adopted to the management of risk to marine fauna and that prior to commencement of blasting, the area should be surveyed for vulnerable fauna and detonation avoided should any marine mammals be sighted in the area.

The proponent has committed to the preparation and implementation of a Construction Management Plan, a Dredge and Dredge Spoil Management Plan (DDSDMP) and an ongoing Water and Sediment Quality Monitoring Program to ensure the protection of habitat and marine fauna identified in the relevant area.

Having particular regard to the:

(a) marine habitat being well represented along the coastline between Port Gregory and Port Denison;
(b) infrequent use and sighting of marine mammals and turtles in the area that are protected under the *Wildlife Conservation Act 1950*;
(c) potential for blasting to be required in the area prior to dredging of the sea bed;
(d) proponent's commitments to develop a Construction Management Plan, DDSDMP, and a Water and Sediment Quality Monitoring and Management Plan,

it is the EPA's opinion that the proposal can be managed to meet its objective of maintaining the abundance, species diversity and geographic distribution of marine fauna provided that:

(i) the area is surveyed for the presence of marine mammals prior to blasting and that blasting is avoided should any marine mammals be present.

3.7 Introduced marine organisms

Description

A concern with the development of a bulk cargo port in the Mid West region is that exotic organisms might be introduced from ships' ballast waters or from hull fouling. The introduction of exotic marine pests has the potential to significantly impact on the marine environment, fisheries and aquaculture industries and shipping operations (AQIS, 1997; DEP, 1997).

The marine environment in the vicinity of the Oakajee Port area is well represented along the coastline between Port Gregory and Port Denison (MPRSWG, 1994). The area is in near pristine condition and no exotic species have been identified in the Oakajee region or in the Geraldton Port area. However, with Panamax size vessels loading for export at Oakajee, it is expected that the potential volume of ballast water discharged into the environment around Geraldton/Oakajee will increase the risk of introduction of exotic organisms.

Ballast water management is controlled by the Federal Government through the Australian Quarantine Inspection Service (AQIS). AQIS has developed an Australian Ballast Water Management Strategy which is being introduced through all main Australian ports with voluntary compliance by operators of foreign-going vessels. It is further expected that within two years ballast water management strategies will become mandatory for all international vessels visiting Australia and for coastal Australian shipping (AQIS, 1997). In addition, the International Maritime Organisation is developing a mandatory ballast water management code. The adoption of these strategies are being strongly promoted by a number of countries (DEP, 1996).

The EPA notes that the proponent has committed to specifically target toxic dinoflagellates in the monitoring program for exotic marine organisms.

Concern was raised during the public review period for the PER over the potential impacts on the cray fishing industry from the introduction of foreign species from ballast water and the subsequent effects on the ecology of the area.

Assessment

The area considered for assessment of this environmental factor is the coastal waters between the Buller River and Coronation Beach, including the port approach channel.

The EPA's objective in regard to this factor is to minimise the risk of introduction of unwanted, non-indigenous marine organisms.

The most effective means of preventing the introduction of unwanted aquatic organisms from ships ballast water and sediments is to avoid, wherever possible, the discharge of ballast water. However, the choice of control procedures will depend on the organisms being targeted, the level of risk involved and its environmental acceptability.

Current guidelines are designed to prevent or minimise the risk of escape or establishment of exotic marine species and include measures such as non-release of ballast water, ballast water exchange and sediment removal at sea, practices aimed at preventing or minimising the uptake of contaminated water or sediment in ballasting and de-ballasting operations, discharge and treatment of ballast waters on-shore where such facilities are available and prohibition of hull scrubbing in ports.

The EPA supports best practice for the management of ballast water. The EPA is aware of the:

- importance of the site as being within the waters of Australia's most valuable fishery, that is, the rock lobster fishery extending from Shark Bay and Bunbury;
- increasing impact of introduced marine organisms in waters around Australia;
- opportunity at a new port site to consider and implement best practice plans;

the proponent has a responsibility to achieve the best possible methods of reducing the potential for the further impact by introduced marine organisms.

The EPA understands that onshore ballast water treatment facilities are in use in some parts of the world, and their construction and use should be implemented by the proponent in developing the best practice strategy.

It is the EPA's opinion that the proposal can be managed to meet its objectives for this factor provided that a best practice strategy for ballast water management, including the construction and use of a ballast water treatment facility, should be developed to the satisfaction of the EPA so as to meet its objective for this factor

In addition:

(i) prior to commissioning of the port, the port operator undertakes a marine fauna and flora survey to the requirements of the DEP, to identify species present at the site. Bi-annual monitoring should continue during the life of the project to identify the establishment of exotic marine species and contingency measures implemented if the species is deemed to present an unacceptable risk to the marine environment;

(ii) the proponent complies with AQIS or International Maritime Organisation (IMO) recommendations for ballast water control and actively promotes compliance with AQIS and IMO guidelines by port users;

(iii) there is a prohibition on hull scrubbing in the port and nearby waters.

3.8 Shoreline stability

Description

The coastal waters and the shoreline in the Oakajee vicinity are subject to moderate to strong on-shore winds throughout the year. During strong storm winds, large waves and swell occur. The prevailing winds, mostly from the south south-west but also ranging through east to north-west, can be moderate to strong in intensity, particularly in the summer. A port development in the locality would require a substantial breakwater system.

This breakwater system will act as a barrier to the longshore transport of sediment which may, without appropriate management, result in excessive accretion and/or erosion on either side of the breakwater potentially affecting beach stability. The prevailing wind and currents in the Oakajee region results in high gross movement of sediment in the order of 10 000 to 50 000 m^3/year north and similar gross movement south (M P Rogers and Associates, 1997a). This results in a highly mobile beach and shoreline system with a general pattern of summer accretion and winter erosion. The net longshore movement of sediments is approximately 15 000 to 30 000 m^3/year to the north.

It is expected that much of the longshore sediment flux would be trapped in the wave shadow and accrete against the southern side of the breakwater at a rate of approximately 20 000 to 70 000 m^3/year and against the northern breakwater at approximately 10 000 to 50 000 m^3/year (M P Rogers and Associates, 1997a). This is likely to result in erosion of the beaches down-drift and up-drift of the wave shadow, if not appropriately managed.

Assessment

The area considered for assessment of this environmental factor is the foreshore area between Buller River and Oakabella Creek and adjacent marine area.

The EPA's environmental objective in regard to this factor is to maintain the stability of the beaches.

In the absence of appropriate management measures, erosion of the coastline further to the north and south of the port could be expected. Similarly, significant volumes of sediment is expected to accumulate on the coast adjacent to both sides of the port (MP Rogers and Associates, 1997a). However, management measures such as sand by-passing and additional coastal structures can be used to mitigate the impacts of sediment movement and assist in maintaining the natural sediment movement processes.

The proponent has committed to monitoring coastal sand movement between Buller River and Coronation Beach and implementing appropriate management measures to maintain beach stability. The proponent has also committed to redistributing sand accumulated against breakwaters of the port if required, to minimise the possibility of shoreline erosion.

The EPA notes that the opportunity for incorporating sand by-passing systems needs to be considered in the detailed design of the port rather than retrofitting sand movement systems on the basis of monitoring. It is therefore appropriate for sand management options to be addressed at this time and incorporated into the port design.

Having particular regard to:

(a) the normal summer and winter flux of sediment north and south;
(b) the net sediment flux north of approximately 15 000 to 30 000 m^3/year; and
(c) the commitments provided by the proponent to monitor and manage coastal sand movement,

it is the EPA's opinion that the proposal has the potential to compromise the EPA's objective for this factor of maintaining stability of beaches unless:

(i) sediment movement is monitored either side of the port;

(ii) sand bypassing and management systems (including coastal engineering structures) are considered and adequate provision made in the detailed design of the port, to the requirements of the EPA upon advice of the DEP and the Department of Transport's Coastal Management Division.

3.9 Marine water quality and sediment quality

Description

The construction and operation of the port and on-shore storage areas could potentially impact on the water and sediment quality in and around the port.

Breakwater construction, on-going maintenance dredging, cargo movement, refuelling, stormwater run-off, shipping accidents, use of anti-fouling on ship hulls and poor water circulation could all potentially impact on the marine water quality and lead to sediment contamination in the Oakajee area.

The water quality in the Oakajee region is pristine, that is, low in contaminants. The natural turbidity in the area is very high, particularly during winter when wave activity is high and there is increased alluvial input from river discharges (LeProvost Dames and Moore, 1997). The associated marine habitats are likely to be adapted to periods of high turbidity and hence low light penetration. However impacts from smothering due to sediment settling and extended periods of low light penetration may adversely affect seagrass and reef habitats in the vicinity.

Work is currently being conducted to reduce leaching rates of tributyltin (TBT) from antifouling, however, it is likely that the sediments in the inner port area of the Oakajee port proposal will become contaminated with TBT over time. The sediments from the mooring areas and approach channels could also potentially become contaminated. Sediments in the inner port may also become contaminated from spillage's over time during the bulk loading of cargoes such as minerals and ores, should the port be used for this purpose, in the future.

The recently completed Southern Metropolitan Coastal Waters Study (DEP 1996) has found that the contamination of the marine environment from pesticides, hydrocarbons, and TBT tends to be concentrated in harbours and marinas, and near wharves and ships maintenance areas.

The EPA's water quality criteria are outlined in the Draft Water Quality Criteria for Fresh and Marine Waters (1993). These criteria have been further developed through the Southern Metropolitan Coastal Waters Study to include marine water and sediment quality criteria (DEP 1996).

The proponent has indicated that water quality and environmental criteria will be used in the monitoring program as follows:

- Within the Port Operations Area - to be determined in consultation with the EPA, recognising that the major beneficial use in this area will be port operations.

- Within the Special Management Area - in accordance with the Draft Water Quality Criteria for Fresh and Marine Waters (EPA 1993) for the values of "protection of aquatic ecosystems" and "recreational water quality and aesthetics".

- During Dredging Operations - in accordance with the Water and Rivers Commission (previously Waterways Commission) "Guidelines for the preparation of a Dredge and Dredge Spoil Disposal Management Plan".

The proponent has indicated that the management objective within the Special Management Area and the Statutory Control Area will be to maintain water and sediment quality to levels within the range of those recorded during the pre-development monitoring program, that is, within background levels (Tingay and Welker 1997a). The EPA endorses this approach.

The management objective for sediment quality will be to limit detectable increases of heavy metals and other contaminants to within the Port Operations Area (Tingay and Welker 1997a).

The EPA notes that the proponent has committed to the development of the Water and Sediment Quality Monitoring Programs to the requirements of the EPA, and has indicated that final water and sediment monitoring parameters and environmental criteria will be developed in consultation with the EPA. The monitoring program will also establish a baseline for existing water and sediment quality within and adjacent to the proposed deepwater port (Tingay and Welker 1997a).

Concerns were raised in submissions about the frequency of water and sediment monitoring proposed and the range of parameters to be measured.

Assessment

The area considered for assessment of this environmental factor is the coastal waters between the Buller River and Coronation Beach, including the port approach channel.

The EPA's environmental objective in regard to this factor is to maintain water and sediment quality to accepted criteria to protect the environmental values of recreation, aesthetics, aquatic life for human consumption and maintenance of aquatic ecosystems in agreed areas.

It should be recognised that the environmental quality objectives for water and sediment within the inner port area may differ from the objectives outside the port, recognising that the primary beneficial use within the Port Operations Area is port operations.

The primary potential sources of marine water contamination are presented below:

Breakwater construction

The breakwater is likely to be a mass armour style breakwater. This uses an outer armour over an inner core material. The inner core material is likely to contain relatively fine material dumped between the rocks. This is likely to result in increased turbidity levels in the vicinity of the breakwater during construction. While the natural turbidity levels are high in the winter months the breakwater is likely to take between 36 to 44 months to construct and without appropriate management, this could extend the period of low light levels and adversely effect marine flora in the vicinity of the proposal.

The proponent has committed to develop and implement a construction management plan for the proposal. This Construction Management Plan will be required to detail how turbidity will be managed during breakwater construction and the environmental measures to be employed including such aspects as control of dispersion of suspended sediment through the use of silt curtains.

Dredging

The northern in-shore design option will require less dredging than the central or southern options as it makes use of an existing paleo-drainage channel extending out from the mouth of the Oakajee River. Dredging in the port will occur in the inner port area and shipping channels out to approximately the 17 metre depth contour. Dredging will occur once the breakwaters have been constructed. The dredged material will be dumped directly adjacent to and inshore from the breakwaters to form a reclaimed area of land which may be used for storage and handling of commodities shipped through the port.

An area around the dredge zone will be defined as the boundary of sediment dispersal and dredge operations modified if sediment plumes disperse beyond this area. Maintenance dredging is predicted to be infrequent (perhaps once a decade) and relatively small scale, however, the proponent has indicated that a specific Dredging and Dredge Spoil Disposal Management Plan (DDSDMP) will also be prepared for maintenance dredging. The EPA expects that the proposal for maintenance dredging will be referred to it for consideration of the environmental impact, at that time. Offshore disposal of dredged material will be in accordance with the ANZECC (1996) Draft Guidelines for the "Environmental Assessment of the Sea Disposal of Dredged and Excavated Material".

The requirements of the DDSDMP and the infrequency of maintenance dredging will assist in minimising the impacts caused by dredging. The disposal of dredged material will be subject to the DDSDMP which is likely to include requirements such as an impermeable liner between rock bunding and sediment disposal. The proponent has committed to the preparation of a DDSDMP.

Cargo Movement

The movement of any cargo increases the potential for spillage, transfer loss or accidents. Even with best management practices some contamination of sediments within the port is likely if bulk loading of cargoes such as minerals and ore are proposed, in the future. It is noted, however, that initial cargoes are likely to be steel product.

Routine dredging operations within the port and shipping channels could result in the collection of some contaminated sediments. The proponent has indicated that maintenance dredging will be required infrequently, perhaps once a decade. Ocean disposal of the dredged material may be a method of disposal. The proponent has committed to the development of a DDSDMP to the requirements of the EPA and has indicated that dredge spoil will be managed in accordance with regulatory requirements.

The shipment of hazardous chemicals is not part of the scope of the present proposal, however, should hazardous chemicals be proposed to be transported through the port at a later date this will require separate referral to the EPA and will be subject to legislation governing the transport of dangerous goods, administered by the Department of Minerals and Energy. The proponent has committed to the development of an Accidental Spillage Management Plan to the requirements of the EPA. The EPA considers, however, that in order to prevent spillages, losses or accidents, a detailed Materials Handling Plan is required, in addition to the Accidental Spillage Management Plan, which will incorporate management aspects such as covered conveyors and loading arrangements to reduce spillages.

Refuelling

The potential for fuel or oil spillage during refuelling is very low. If accidental spillage does occur it is likely to be contained within the breakwater. All ports are required to have an Oil Spill Contingency plan which has been approved by the WA State Committee for Combating Oil Pollution at Sea. This plan would be implemented to minimise the degree and area of impact. The proponent has committed to the development of an Oil Spill Contingency Plan.

There is no plan in the short to medium term for oil tankers to use the port and for associated fuel storage at the port. Should this change it will be referred to the EPA for consideration of the potential environmental impacts.

Storm-water run-off

Hard-stand storage areas of the port will generate run-off during rain periods. The storage area and transport corridor are proposed to cover up to 110 hectares. Any stormwater run-off will be directed to stormwater drains and treated to remove suspended solids or potentially harmful contaminants. Stormwater run-off has the potential to reduce water and sediment quality. The EPA, therefore, considers that a Drainage Design and Treatment Plan is required for the port.

Shipping accidents

All ports create the potential for shipping accidents such as running aground or collisions. With the increase in technology of navigational aids and the requirements for port pilots, the potential for shipping accidents is significantly reduced. Should potentially hazardous cargoes be proposed to be transported through the port they will be subject to separate referral to the EPA.

Shipping movements

The mooring and movement of large numbers of ships in excess of 25 metres can lead to the contamination of sediments with persistent anti-fouling such as TBT, over time. It is expected that the high level of mixing and dispersion in the water column and the high level of sediment suspension and redistribution in and around the approach channels will prevent the build up of high levels of contaminants in the sediments outside of the port structure.

Contamination of marine water and sediments may also occur through the inappropriate disposal of waste from ships. ANZECC has investigated Australian 'Port Reception Facilities for Waste Management' with the objective of ensuring that each port is appropriately provided with facilities to handle the kind of wastes which may be brought into the port. This includes means to handle the collection, storage and treatment of both bulk solid waste and noxious liquid substances. The proposed Oakajee port will be required to comply with the ANZECC Guidelines for Port Reception Facilities (ANZECC, 1996) and hence will reduce dumping and cargo loss that could lead to the reduction in sediment quality.

The proponent has committed to the development of a Waste Management Plan, an Accidental Spillages Management Plan and a DDSDMP.

Water circulation

Water exchange between the ocean and the inner port is an important factor for maintaining water quality within the port. The PER indicates that water circulation and exchange will be relatively rapid based on existing knowledge and a report of wave energy and direction in the Oakajee area (M P Rogers and Associates, 1997a). The proponent has committed to carry out a detailed study of water circulation and water exchange in the harbour at Oakajee, following adoption of a detailed design for the port and if necessary, the port design will be refined to achieve better performance with respect to water exchange.

The EPA notes that the proponent has indicated that the operational objective for the Special Management Area and the Statutory Control Area will be to maintain water and sediment quality to within pre-development levels, that is, within background levels. The EPA endorses this operational objective.

The water quality criteria are based on the Western Australian Guidelines for Fresh and Marine Waters (EPA 1993). Although the EPA has not developed sediment quality criteria as yet, the EPA endorses a similar approach to that developed in the Southern Metropolitan Coastal Waters Study (DEP 1996), which is currently out for review.

The EPA notes that there are two management areas for the purposes of water and sediment quality monitoring - the Port Operations Area and the Special Management Area. The Special Management Area should be extended northward in recognition of the prevailing northward drift. A small area immediately adjacent to and outside of the entrance to the harbour should be included in the port operations area for the purposes of water quality monitoring and management.

The proponent has committed to the development of an Accidental Spillage Management Plan, a Construction Management Plan, a Dredging and Dredge Spoil Disposal Management Plan, a Water Quality Monitoring and Management Program, a Sediment Monitoring and Management Program, a Waste Management Plan and an Oil Spill Contingency Plan. These will all be prepared to the requirements of the EPA and will include management measures for maintenance of water and sediment quality in line with EPA objectives.

Having particular regard to the:

(a) relatively pristine water quality around the project site;
(b) naturally high seasonal turbidity levels;
(c) potential sources of marine water and sediment quality impacts;
(d) proponent's commitment to the preparation of management plans to mitigate potential impacts; and
(e) proponent's commitment to carry out a detailed study of water circulation and water exchange in the harbour at Oakajee, following adoption of a detailed design for the port,

the EPA is of the opinion that the proposal has the potential to compromise it's objectives for this factor unless:

(i) the following plans be prepared to the requirement of the EPA on advice from the DEP and relevant authorities:

- Breakwater Construction Management Plan;
- Dredge and Dredge Spoil Disposal Management Plan;
- Materials Handling Environmental Requirement Specification;
- Accidental Spillage Management Plan;
- Drainage Design and Treatment Specification;
- Oil Spill Contingency Plan;
- Port Waste Management Plan;
- Water and Sediment Quality Monitoring and Management Plan;

(ii) prior to finalisation of detailed design, the proponent prepares a detailed monitoring and management plan for maintenance of environmental values in relevant areas, to the requirements of the EPA on advice from the DEP.

(iii) prior to construction, a baseline survey of water quality and sediments be completed with due account taken of seasonal variation;

(iv) The EMP be made available to the public.

3.10 Dust

Description

Dust may occur as a result of construction and/or operation of port facilities in and around the port area. Dust may result from the use of conveyors to transport bulk materials to or from ships, stockpiling of materials, transport of materials to or from the industrial estate and port, and during the construction of the port and transport corridor.

The nearest residences to the Oakajee port are shown in Figure 8. The nearest residences to the preferred northern port location will be approximately 6.5 km to the south or 3.5 to 4 km to the east, excluding those properties currently being purchased by LandCorp as part of the Oakajee Industrial Estate. The nearest residences to the port if located in the southern location are 2.5 km to the south and about 4.5 km to the east. The suburb of Drummond Cove lies 10.5 km to the south from the northern port location and about 6 km from the southern port location. The direction of prevailing winds (south to south-west) is not to dust sensitive areas, and with stringent dust controls on port operations, materials handling and storage of materials, it is unlikely that dust and particulate fall-out from port operations or construction will impact on near-by residences or agricultural land uses.

The WA Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1992, specifies an ambient dust limit (averaged over 24 hours) for land used predominantly for residential and rural purposes (Area C) of 150 micrograms/m^3 with a standard (a concentration which is desirable not to exceed) of 90 micrograms/m^3. These limits form the basis for the development of dust guidelines that can be applied to development sites through Part V of the *Environmental Protection Act 1986*. The DEP (1995) has also developed Guidelines for the Assessment and Control of Dust and Windborne Material from Land Development Sites.

A public submission raised concerns about northerly winds blowing smoke, dust and gaseous emissions to properties south of Buller River and on Drummond Cove. The scope of the present proposal does not include facilities or operations which generate smoke or gaseous emissions. Any future proposals would be referred to the EPA for consideration of potential impacts.

Assessment

The area considered for assessment of this environmental factor is the port sites between the Buller and Oakajee Rivers and nearby residences.

The EPA's environmental objective in regard to this factor is to protect surrounding land users such that dust emissions will not adversely impact on their welfare and amenity or cause health problems and meet Guidelines for Assessment and Control of Dust and Windborne Material from Land Development Sites (updated 1995), and the Environmental Protection Policy (Atmospheric Wastes) (Kwinana).

Dust management and dust suppression through the use of water trucks or other forms of spray may be utilised to address issues associated with dust generated during earthworks and construction. The proponent has made a commitment that all contractors of the deepwater port comply with DEP Guidelines for the Assessment and Control of Dust and Windborne Material from Land Development Sites, and that port operations will comply with relevant air quality criteria.

The proponent has also committed to prepare an Air Quality Management Plan and indicated that contractors will be required to comply with the DEP Guidelines for the Prevention of Dust and Smoke Pollution from Land Development Sites.

Future industries proposing to establish within the industrial estate and which may have the potential to generate significant quantities of dust (such as the loading of iron-ore) will be subject to separate assessment by the EPA.

Having particular regard to the:

(a) guidelines for dust control;
(b) distance to nearby residences and the prevailing winds;
(c) regulatory controls available to the DEP through the *Environmental Protection Act 1986*, and
(d) proponents commitment to develop and implement an Air Quality Management Plan,

it is the EPA's opinion that construction and operation of the port is capable of being managed to meet the objective for this factor subject to the requirement that the proponent:

(i) implements an Air Quality Management Plan to manage dust to an acceptable level during construction, operation and transport of materials.

3.11 Noise and vibration

Description

Noise and vibration will be generated from the construction and operation of this port facility. The need for blasting hard caprock material prior to dredging of the inner port and shipping channels will be confirmed after detailed engineering and seismic studies have been undertaken although some blasting is likely to be required. The northern port location will require less blasting than the central and southern port locations.

The nearest residences to the Oakajee port are shown in Figure 8. The nearest residences to the preferred northern port location will be approximately 6.5 km to the south or 3.5 to 4 km to the east, excluding those properties currently being purchased by LandCorp as part of the Oakajee Industrial Estate. The nearest residences to the port if located in the southern location is 2.5 km to the south and about 4.5 km to the east. The suburb of Drummond Cove is about 10.5 km south of the northern port location and about 6 km from the southern port location. Coronation Beach is located about 3.5 to 4 km to the north of the northern port location.

The Oakajee port will be located in a rural environment with low background noise levels. The maximum allowable noise levels during the most sensitive time for residences around the port and industrial estate would be in the range 35 to 40 dB(A), dependent on an additional adjustment for tonal component.

The central and southern port location options will require substantial dredging and may require some blasting of limestone pavement and reef to provide sufficient draft for Panamax sized vessels to negotiate the harbour and load and unload cargo. The northern location will require substantially less hard dredging as it will use an existing paleo-drainage channel running from the mouth of the Oakajee River.

Noise and vibration from transport movements of construction materials and product to the port will be further addressed through separate assessment as part of the referral of new proposals. Noise associated with transport infrastructure, rail and bulk conveyors will need to be assessed and adverse environmental impacts mitigated. The EPA notes that rail and bulk conveyors are not part of the scope of the present port proposal.

The EPA endorses best practice noise management for the port.

The levels of acceptable noise are regulated through the EPA's Noise Abatement (Neighbourhood Annoyance) Regulations 1979. Noise regulations are currently under review and have lead to the development of draft Environmental Protection (Noise) Regulations, which are yet to be promulgated. The port operator and proponents will be required to meet the existing noise regulations, and any new regulations in force during the operation of the port.

Assessment

The area considered for assessment of this relevant environmental factor is the port area and nearby residences.

The EPA's environmental objective in regard to this factor is to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.

This proposal does not include the quarrying of construction materials for the breakwaters. These will be subject to separate referral to the EPA (refer to Section 5.2).

The port proponent has committed to regular monitoring of noise, and to ensuring that all contractors and port users comply with relevant noise and vibration criteria in either the Noise Abatement (Neighbourhood Annoyance) Regulations or the proposed new Environmental Protection (Noise) Regulations when promulgated.

The EPA also notes that LandCorp, manager of the Oakajee Industrial Estate, has committed to collect baseline noise date for the Estate (EPA, 1997b).

The DEP can regulate noise emissions levels through Part V of the *Environmental Protection Act 1986*.

Having particular regard to the:

(a) distance to the nearest residents;
(b) transient nature of blasting requirements, if required at all;
(c) commitments by the proponent to develop a Construction Management Plan ;
(d) commitments by the proponent to undertake noise monitoring and meet relevant noise criteria;

it is the EPA's opinion that it is likely that the proposal can be managed to meet its objective for this factor, subject to the requirement for the proponent to:

(i) develop and implement a program of noise monitoring for the port to assess noise impacts, including cumulative noise, and which is integrated with the noise modelling for the industrial estate;

(ii) manage noise from the port to meet statutory requirements.

3.12 Public health and safety

Description

The operation of any industrial facility involves some risk to public health and safety. The loading and unloading of cargo and movement of large vessels in and out of the port presents some element of risk of accidents or equipment failure.

The EPA has developed the following acceptable individual fatality risk levels associated with industry (from EPA Bulletin 611 and 627):

- one in a million per year or less in any nearby residential zones;
- between one half and one in a million per year in any nearby sensitive developments such as hospitals, schools, child care facilities;
- fifty in a million per year target at the boundary for each individual industry;
- one hundred in a million per year cumulative risk on any industry; and
- ten in a million for any non-industrial activity located in buffer areas between industrial facilities and residential areas.

Public areas such as beaches are normally expected to meet an individual fatality risk level of ten in a million per year.

The nearest residences to the Oakajee port are shown in Figure 8. The nearest residences to the preferred northern port location will be approximately 6.5 km to the south or 3.5 to 4 km to the east, excluding those properties currently being purchased by LandCorp as part of the Oakajee Industrial Estate. The nearest residences to the port if located in the southern location is 2.5 km to the south and about 4.5 km to the east. The suburb of Drummond Cove is about 10.5 km south of the northern port location and about 6 km from the southern port location. Coronation Beach is located about 3.5 to 4 km to the north of the northern port location and about 9km from the southern port location.

A number of concerns were raised by the public in relation to public health and safety. These related to hazardous cargoes, increased fire risk and potential health effects from industrial development. As indicated by the proponent, if hazardous cargo is proposed to be transported through the port at a later date it will be subject to separate assessment by the EPA. Risk response measures will be detailed in the Port Safety Plan.

The EPA notes that initial cargoes are likely to be steel product.

Assessment

The area considered for assessment of this environmental factor is the port area and transport corridor to the industrial site and adjacent beach areas.

The EPA's environmental objective in regard to this factor is to ensure that the risk is as low as reasonably achievable and complies with acceptable standards.

The EPA's criteria for the assessment of the fatality risk of proposed hazardous and industrial developments are outlined in Bulletins 611 and 627.

The proponent has committed to prepare a Port Safety Plan which will include a risk assessment and response measures for incidents. The proponent has made a commitment to ensure that all proposals for the handling of hazardous cargoes through the deepwater port are referred to the EPA and the Department of Minerals and Energy for consideration of potential environmental impact.

Having particular regard to:

(a) the distance to the nearest residences;
(b) commitment to comply with the EPA's risk criteria;
(c) initial cargoes will be steel product;
(d) the development of a Port Safety Plan and an Emergency Response Plan; and
(e) any future proposal to transport hazardous cargo will require separate assessment by the EPA,

it is the EPA's opinion that the proposal is capable of being managed to meet its objective for this factor subject to the proponent developing:

(i) a Port Safety Plan and an Emergency Response Plan, to the requirements of the EPA on advice from the DEP, Department of Minerals and Energy and other relevant organisations, prior to finalisation of the detailed design.

3.13 Heritage

Description

During previous ethnographical and archaeological surveys of the region, archaeological sites have been identified along the Oakajee River and a single Aboriginal site has been recorded in the proposed central port location area, in the coastal dunes (Tamora, 1993; Bavin, 1993; Tamora, 1996; Quartermaine, 1996 cited in Alan Tingay and Associates, 1997). Archaeological surveys have indicated that there is potential for further sites to be uncovered in the dunes during construction.

The site identified in the central sector will be managed in accordance with the relevant statutory requirements if the central site is the preferred port option. If further sites are uncovered during construction they will be managed in accordance with relevant legislation and the Heritage Management Plan that the proponent has committed to develop.

No European heritage sites have been identified in the area.

Assessment

The area considered for assessment of this environmental factor is the foreshore area between the Buller and Oakajee Rivers.

The EPA's environmental objective in regard to this factor is to:

- comply with statutory requirements in relation to areas of cultural or historical significance; and
- ensure that changes to the biophysical environment resulting from the project do not adversely affect cultural associations with the area.

The Aboriginal Affairs Department has advised that the proponent should liaise with the local Aboriginal community in the development of the Heritage Management Plan.

The proponent has advised that training of the Oakajee River will be required if the northern location is selected for the port. The impact from the proposed river training on Aboriginal heritage sites is not clear. Further ethnographical and archaeological surveys are required in the vicinity of the Oakajee River training works if the northern port option is developed.

Having particular regard to the:

(a) results of ethnographic and archaeological site surveys already undertaken;
(b) presence of a site and the potential for other sites to be uncovered during construction work;
(c) proponent's commitment to develop a Heritage Management Plan; and
(d) proponent's commitment to comply with the Aboriginal Heritage Act,

it is the EPA's opinion that the proposal is capable of being managed to meet its objective for this factor provided that the proponent develops and implements a Heritage Management Plan, in consultation with local Aboriginal communities, to include but not be limited to:

(i) detailed ethnographic and archaeological surveys;
(ii) ethnographic and archaeological surveys are carried out in the vicinity of the Oakajee River training works prior to finalising detailed design, if the northern port option is developed;
(iii) detailed assessment of the likely effects of the development on any sites, including ground disturbance, chemical emissions and altered surface hydrology;

for Aboriginal sites prior to finalisation of the detailed design, to the satisfaction of the EPA on advice of the Aboriginal Affairs Department.

3.14 Recreation

Description

The Oakajee coastline from Buller River to Coronation Beach attracts visitors for a variety of recreational pursuits. Coronation Beach, "Spot X" (approximately 1 km south of the Oakajee River) and the mouth of the Oakajee and Buller Rivers and surrounds are used for surfing, windsurfing and recreational fishing (Figure 9). There are informal camping facilities at Coronation Beach and the area is a popular coastal recreational location.

The proponent has indicated that the following recreational restrictions may apply to the area:

- a prohibition on the development of formal recreational activities between the Buller and Oakajee Rivers;
- temporary restriction on access to the beaches north and south of the port when hazardous cargoes are handled, depending on the requirements of the Department of Minerals and Energy
- access to the port by the public, in accordance with safety requirements; and
- restriction of access to the public within the Port Location Area (Figures 2 and 3).

A Wavebreak Computer Modelling Study (MP Rogers and Associates 1997b) concluded that development of a deepwater port at the northern location will prevent the use of Spot X for recreation and that there is likely to be a wave shadow 1 km north and south of the port structure. The use of Coronation Beach is not likely to be affected.

The southern port option would not have an effect on Coronation Beach or Spot X (M P Rogers and Associates, 1997b). The area between Oakajee and Buller Rivers is unlikely to be restricted to informal recreational use apart from the reserve mentioned above.

Development of the port in the central port location is likely to result in the restriction of Spot X for recreational use. Coronation Beach is unlikely to be affected (M P Rogers and Associates, 1997b) and the area between Oakajee and Buller Rivers is unlikely to be restricted to informal recreational use apart from the areas mentioned above.

The proponent commissioned a study on the significance of the windsurfing industry for Geraldton and the potential impacts on the windsurfing industry of industrial and port developments at Oakajee (Tourism Coordinates, 1997). In addition a computer modelling study of the potential impacts on the wave breaks at Oakajee from the port development was also conducted (M P Rogers and Associates, 1997b). These reports indicated that Spot X would be lost as a recreational area for windsurfers under the northern port option, however, the wave breaks at Coronation Beach would not be affected. The Report concluded that the windsurfing industry in the region will not be seriously affected providing there is no major negative impact on Coronation Beach (Tourism Coordinates, 1997).

A number of public submissions were received on the potential effects of the port development on windsurfing and on Spot X, in particular. The impact of the port on wave and wind conditions at Coronation Beach and Spot X and the perception of a major industrial port at a popular recreational area were also raised as concerns by the public and local windsurfing groups.

Assessment

The area considered for assessment of this environmental factor is the coastal strip from the Buller River to Oakabella Creek.

The EPA's environmental objective in regard to this factor is that the concept should not compromise recreational usage of the area, as developed by planning agencies.

The proponent has committed to the development of a Coastal Management Plan which will include a Recreation Plan. The proponent has indicated that the Recreational Plan will be developed in consultation with the Ministry for Planning and the Shire of Chapman Valley.

It is envisaged that there will be a demand for access to the outside port breakwaters for recreational fishing. Consideration of access to the port and immediate area should be assessed in relation to public demand and public safety aspects.

The northern port location will have the greatest impact on recreational use and in particular windsurfing and wave jumping at Spot X. The southern port option will have the least impact on recreational use of the area.

The proponent has committed to the preparation of a Coastal Management Plan which would include a Recreation Plan. The proponent will also complete a detailed assessment of the impact of port structures on wave breaks to the north of the proposed port when the final design of the port is selected.

Having particular regard to:

(a) the recreational use between the Oakajee and Buller Rivers;
(b) the importance of the Coronation Beach camping area for recreational use; and
(c) the development of a Coastal Management Plan to formalise recreational areas and access to the beach,

it is the EPA's opinion that the proposal has the potential to compromise its objectives for this factor unless:

(i) prior to finalisation of detailed design, the Recreation Plan is developed in consultation with the public which makes adequate provision for public access to available recreational areas.

3.15 Fishing

Description

The construction of the port will result in the direct loss of up to 170 hectares of benthic marine habitat. Ships are anticipated to moor about 2-3 nautical miles offshore from Oakajee in about 30 m of water. Due to mooring requirements and the movement of shipping through the area, further restrictions on the use of the area for commercial and recreational fishing may occur.

The Western Australian rock lobster fishery extends from Shark Bay to Bunbury. The Oakajee fisheries block extends from Oakabella Creek to the Buller River and contains the Oakajee port location areas (Figure 7). An analysis of the Western Rock Lobster fishery for the Oakajee area is presented in Appendix 2 of the PER. The annual average catch for the years 1991/92-1995/96 from the Oakajee Block is about 51 000 kg along the 17km of coastline. The Block extends from the coast to the line separating the coastal fishery from the Abrolhos Islands fishery, however, most of the catch (about 42 000 kg) is taken from the waters up to 18 m in

depth. The average production of 51 000 kg from the Oakajee Block represents about 0.5% of the annual average catch of the State's Western Rock Lobster fishery.

Part of the fishing habitat which would be lost is the productive in-shore grounds (0-18 m depth) of the Oakajee Block. Assuming that the catch is evenly distributed along the coastline of the Oakajee block, the marine habitat close to the shoreline (and which would be affected by an inshore deepwater port) in the central sector produces approximately 8% (or about 4 000 kg) of the annual average catch for this Block. The northern location for a port would have the least impact on professional fishing because of the lower impact on high reef and shallow limestone pavement, which are the preferred habitat of crayfish (Tingay and Welker 1997a). Tingay and Welker (1997a) estimate that the impact of a port in the northern sector may be reduced by about 50% to 60%.

The seaward side of the port could provide a suitable recreational fishing location if port operations are not unduly affected and the risk to public health and safety are within acceptable guidelines.

The loss of Western Rock Lobster habitat and fishing grounds was raised as a major concern during the public review period for the PER. The Fisheries Department has indicated that a decision to develop a port at Oakajee would affect the profitability of a commercial fishery, and that this should be considered in accordance with the *Fisheries Adjustment Schemes Act.*

Assessment

The area considered for assessment of this environmental factor is the nearshore area of the Oakajee Block (as defined by the Fisheries Department).

The EPA's environmental objective in regard to this factor is to minimise the impact of the port on professional and recreational fishing in the area.

Based on a consideration of habitat types, the northern port location will impact on approximately 3 to 4 % of the annual average catch for the Oakajee block. The central port location will impact on approximately 8 % of the average annual catch and the southern option will be between the two figures (Tingay and Welker 1997a). The construction of the breakwater will provide new habitat for marine fauna. It is likely that species such as the Western Rock Lobster will utilise this new habitat which will mitigate to some extent the loss of natural habitat.

Restriction of access to some deeper areas are likely as a result of the need for mooring areas and shipping channels. However, the majority of the rock lobster catch (78 %) is taken in the nearshore to 18 metre depth zone so the potential impacts on catch numbers from mooring areas is likely to be minimal. It is also noted that the catch in deeper waters is dominated by migratory "white" rock lobsters which are likely to be accessible to fishing when they move out of the restricted areas.

The potential contamination of the marine environment and impact on seafood is addressed through the EPA's assessment of marine fauna (section 3.6), and marine water and sediment quality (Section 3.10).

The potential impact on recreational fishing has been addressed in Sections 3.6, 3.14 and 3.16.

The proponent has committed to the development of a Construction Management Plan to the satisfaction of the EPA that will address the management of incidental damage to rock lobster habitat. The proponent has further committed to liaise with the Fisheries Department and representatives of the rock lobster fishing industry regarding port operations and to provide information on the results of the Water Quality Monitoring Program.

Having particular regard to the:

(a) relatively small loss of rock lobster habitat and the proportion of the annual average catch that this is likely to affect;
(b) restriction of access to some fishing grounds presently used by the rock lobster industry and to recreational fishing areas;
(c) proponent's commitment to develop and implement a Recreation Plan, and Water and Sediment Quality Monitoring and Management Programs,

it is the EPA's opinion that in order for the proposal to meet the EPA's objective there is a need for a Fishing Management Plan, which is to be negotiated between the proponent and fishing interests, to be developed prior to the commencement of construction.

4. Conditions and Procedures

4.1 Conditions

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal, and following discussion with the proponent the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for and commitment to continuous improvement in environmental performance. The commitments then form part of the conditions to which the proposal should be subject if it is to be implemented.

The EPA may, of course, also recommend conditions additional to that relating to the proponent's commitments.

The EPA recommends that the following conditions, which are set out in formal detail in Appendix 4, be imposed if the proposal by the Minister for Resources Development to construct a deepwater port at Oakajee is approved for implementation:

(a) the proponent shall fulfil the commitments in the Summary of Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) in order to manage the relevant factors and EPA objectives contained in this bulletin, and subsequent conditions and procedures authorised by the Minister for the Environment, the proponent shall be required to prepare, prior to implementation of the proposal, environmental management system documentation with components such as those adopted in Australian Standards AS/NZ ISO 14000 series;

(c) prior to finalisation of detailed design (unless otherwise stated), the proponent shall prepare and implement an Environmental Management Plan, to the requirement of the Environmental Protection Authority on advice of the Department of Environmental Protection and other agencies, where relevant.

This Plan should provide strategies and actions to implement the following requirements.

Rare and priority flora and vegetation communities

1. vegetation clearing is kept to a practical minimum;
2. a Dieback Management Plan is formulated as part of the Rehabilitation and Coastal Management Plan;
3. weed control measures are implemented;
4. the Rehabilitation Plan and Coastal Management Plan is formulated to protect, retain or replace identified environmental values of remnant coastal vegetation;

Marine fauna

5. a survey is undertaken of the area for marine mammals prior to any blasting and that blasting is avoided should any marine mammals be present.

Introduced marine organisms

6. a best practice strategy for ballast water management, including the construction and use of a ballast water treatment facility, is developed to the satisfaction of the EPA so as to meet its objective for this factor;
7. prior to commissioning of the port, a marine fauna and flora survey is undertaken to the requirements of the DEP, to identify species present at the site. Bi-annual monitoring is to continue during the life of the project to identify the establishment of exotic marine species and contingency measures implemented if the species is deemed to present an unacceptable risk to the marine environment;
8. compliance with the Australian Quarantine Inspection Service (AQIS) or International Maritime Organisation (IMO) recommendations for ballast water control is achieved by the proponent and compliance with AQIS and IMO guidelines is actively promoted to port users;
9. hull scrubbing in the port and nearby waters is prohibited;

Marine water and sediment quality

10. The following plans are prepared to the requirement of the EPA on advice from the DEP and relevant authorities, prior to finalisation of detailed design:
    - Breakwater Construction Management Plan;
    - Dredge and Dredge Spoil Management Plan;
    - Material Handling Environmental Requirement Specification;
    - Accidental Spillage Management Plan;
    - Drainage Design and Treatment Specification;
    - Oil Spill Contingency Plan;
    - Port Waste Management Plan;
    - Water and Sediment Quality Monitoring and Management Plan;
11. prior to finalisation of detailed design, and as part of the EMP, a detailed monitoring and management plan for maintenance of environmental values in relevant areas is prepared, to the requirements of the EPA on advice from the DEP;
12. prior to construction, a baseline survey of water quality and sediments is completed with due account taken of seasonal variation;

Dust

13. an Air Quality Management Plan is implemented to manage dust to an acceptable level during construction, operation and transport of materials;

Noise

14. a program of noise monitoring for the port to assess noise impacts, including cumulative noise, and which is integrated with the noise monitoring for the industrial estate is developed and implemented;

Heritage

A Heritage Management Plan is prepared including, but not limited to:

15. detailed ethnographic and archaeological surveys, including consultation with local Aboriginal groups;

16. ethnographic and archaeological surveys in the vicinity of the Oakajee River training works prior to finalising detailed design, if the northern port option is developed;

17. a detailed assessment of the likely effects of the development on any sites, including ground disturbance, chemical emissions and altered surface hydrology;

Recreation

18. a Recreation Plan is developed in consultation with the public which makes adequate provision for public access to available recreational areas;

The proponent shall make this Environmental Management Plan publicly available.

4.2 Procedures

In addition to the conditions, the following procedures are to be implemented:

1. The preparation of a Fishing Management Plan, to be negotiated between the proponent and fishing interests, to be developed prior to commencement of construction.

2. Consideration be given to the inclusion of significant coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative sections of vegetation community types.

5. Other advice

5.1 Oakajee River

The proponent has advised that the Oakajee River may be subject to river training to prevent water discharging from the river impacting on the port structure or water quality within the port, should the northern site option be adopted.

The design and scale of the river training has not yet been finalised, however, it is envisaged that the river mouth would be diverted north (approximately 100 to 200 metres) of its present discharge point with a 50 metre wide diversion channel starting approximately 500 metres up river. The proponent has indicated that the final design of the river training works will be based on the results of a hydrological study of the river.

Construction of the river channel will lead to removal of vegetation and may have an impact on sediment redistribution in the nearshore marine environment and on marine habitats.

The Oakajee coastline has exhibited little shoreline movement in the last 40 years, apart from the area in the vicinity of the Oakajee River mouth. In this area, the shoreline has experienced substantial rates of both propagation and retreat (up to about 1.5 m/yr). MP Rogers and Associates (1997) indicate that this is associated with periodic flooding of the Oakajee River and the alluvial sediment load that this would contribute to the system. The river is considered to

contribute relatively small amount of sediment to the littoral system, the main impact of the River being the redistribution of beach sediment (MP Rogers and Associates 1997). This material may be redeposited on the shores, in the years that follow, not necessarily at the river mouth.

The Water and Rivers Commission has advised that any proposed river training will need to ensure that the new channel conforms, as far as possible and practicable, to the natural form of the area and will need designed meander bends to minimise erosion of the outside bank. Revegetation should use local native species, wherever possible, to maintain habitat and landscape. Protective structures to prevent erosion, such as rip rap at the toe of the outside bank of a bend, should be utilised and preferably make use of local stone to maintain landscape features.

The EPA notes that the detailed design of the river training works is yet to occur, that further investigations are occurring in relation to river hydrology, and the proponent's commitment to prepare a Coastal Management Plan and a Rehabilitation Plan.

Having particular regard to the:

(a) potential impacts on the onshore environmental with regard to the loss of vegetation;
(b) a requirement for detailed archaeological and ethnographic surveys of the area where the river training works are proposed to be carried out;
(c) potential impacts on the nearshore marine environment with regard to shoreline stability and marine habitat;

the EPA's advice with regard to Oakajee River training is that, prior to finalisation of the detailed design, the proponent undertake an analysis to determine the impact on the onshore and nearshore environment and that this be referred to the EPA for consideration of the environmental impacts.

5.2 Port design alternatives

The proponent has undertaken a comparison of the potential environmental impacts from alternative port designs options.

The current proposal for a deepwater port at Oakajee is for a inner port design. Of the three sites under consideration the proponent has indicated that the preferred port location is the northern inshore port location and design.

In the consideration of port design alternatives, three port designs were considered for the northern site. They included the inner port option which has been detailed in the preceding sections of this report and the proponent's PER. A northern outer port option with closed causeway and a northern outer port option with a pile-type open causeway.

The inner port option will result in approximately 170 hectares of benthic habitat being impacted which predominantly includes the productive nearshore to 18 metre depth zone. This option also meets the proponent's design and operational criteria.
The northern outer port option with closed causeway would potentially impact on 290 hectares of benthic habitat due to the depth of water at the port, the requirement for land reclamation for storage and the width of the breakwater at the base in up to 20 metres water depth. Port and Harbour Consultants estimated that it would cost at least $42 million more and take 18 months longer to construct with higher operational costs and hence was not considered a viable design option (DRD, 1997b).

The northern outer port with pile-type open causeway would be situated over benthic habitat of lower diversity and would likely affect 120 hectares. The potential environmental impacts from a pile-type causeway are likely to be significantly reduced compared to the other two options as

the impacts on water circulation, direct habitat loss, sediment movement, river training and access restriction would also be reduced. However, the design did not meet the wave mitigation criteria, operation criteria, construction timeframe and is estimated to cost an additional $53 million. This option was discounted by the proponent as not technically or financially viable and hence was not considered further (DRD 1997b).

5.3 Quarry siting and management

The proponent has advised that a proposal for quarrying rock material for breakwaters and other port infrastructure will be referred to the EPA separately. The Oakajee concept plan indicates that one or more quarries may be required to supply material for the construction of the breakwater. The EPA will assess the environmental impacts of the quarrying operation including transport and rehabilitation, when a proposal has been received.

5.4 Services and infrastructure

No infrastructure has been established for the supply of services to the Oakajee deepwater port. Services such as water and electricity will need to be supplied during the construction of the port. It will also be necessary to construct a railway spur to the port and the industrial estate from the existing railway line that connects with Narngulu from Mullewa. The services are likely to be designed and constructed by the relevant government authorities and will require referral to the EPA when specific alignments are determined.

The EPA has previously indicated its preference for multiple-use service corridors (EPA, 1997b). The Shire of Chapman Valley has indicated a preference for services to be located in a single corridor, or minimisation of the number of corridors, in order to reduce the number of impacts on landowners and the environment.

The EPA recommends that the Minister for the Environment and relevant Government agencies note that the EPA will require separate referral of the proposed infrastructure and services to the Oakajee industrial estate and deepwater port, for consideration of environmental impact. Service corridors should be developed to minimise any potential environmental impacts.

5.5 Transport

The City of Geraldton has raised concerns that transport movements in the operational phase of the port have not been addressed in the PER document.

Transport movements to the industrial estate and port have been the subject of various study initiatives including, studies for the steel mill CER and additional studies to be undertaken by An Feng Kingstream Steel, proponent of the Geraldton Steel Plant (Alan Tingay and Associates, 1997). Kingstream is also required to conduct further studies on road upgrading and safety measures. Rail transport to the industrial estate will be subject to separate referral and assessment by the EPA.

As subsequent industries develop at the industrial estate, the cumulative impacts from transport to the port will need to be considered by the government and/or planning agencies in the longer term. It is envisaged that this would be considered through the environmental assessment of new industrial developments proposals as they are referred.

The EPA supports the use of multiple-use transport corridors, where appropriate, to confine any potential environmental impacts. Appropriate setbacks from these transport corridors should be implemented through the planning process to ensure the safety and amenity of future residential development in the vicinity is not compromised and that transport corridors to the industrial estate and port are protected from encroachment, for the long term.

The EPA recommends that the Minister for Resources Development and the Minister for Planning consider the long-term protection of transport corridors to the Oakajee industrial estate and port through planning mechanisms.

5.6 Unexploded ordnance

The Western Australian Police has advised that the Australian Defence Forces conducted extensive training with live high explosive ammunition in the Geraldton region during World War II. As a result of this training, numerous areas within the region are known to be contaminated with unexploded ordnance. They further advise that some forms of unexploded ordnance known to exist in the region are capable of causing damage, injury and death and have a life expectancy of some 600 years.

The EPA notes the Western Australian Police advice concerning unexploded ordnance and brings to the attention of the Government and the proponent the possibility of unexploded ordnance being on the proposed port site.

The proponent has committed to work with the Western Australian Police Unexploded Ordnance Unit to determine the nature, extent and risk associated with the presence of unexploded ordnance in the area of the project and to clear unexploded ordnance before commencement of construction.

5.7 Shipping

The Oakajee deepwater port will be a major export port in the Mid West Region. The EPA is aware that, in general, oil spills from shipping and tankers forms a significant risk to the marine environment. The EPA is of the view that, as a basis for strategic maritime planning, more information is required about oils spill risks from tankers and other shipping on the Western Australian coast.

The EPA is also aware that ANZECC has commissioned a study to identify sensitive marine areas Australia-wide and to identify appropriate measures to make shipping aware of these areas.

The EPA (1997c) has recently recommend in Bulletin 856 that, to complement the ANZECC Study, the State Committee for Combating Marine Oil Pollution, with technical assistance from the Department of Environmental Protection, commission a quantitative risk assessment of current and projected shipping movements along the Western Australian coast. The aim of the risk assessment should be to identify high risk areas for shipping accidents and to make recommendations on appropriate risk reduction measures. This assessment should include the Mid West Region.

6. Conclusions

The EPA has considered the proposal by the Minister for Resources Development to establish a deepwater port at Oakajee, north of Geraldton. This assessment involved consideration of an in-shore design option at three locations within the Oakajee study area. The assessment of the Oakajee deepwater port proposal has been undertaken on the conceptual design of the proposed port.

The work to date has not identified an environmental factor where, with appropriate management, the EPA's objective in relation to that factor cannot be achieved. However, further environmental investigations are required to obtain more detailed information on a number of factors to ensure that environmental requirements can be met and are incorporated into the final design.

Noting that the assessment has been undertaken at the conceptual design stage, the EPA has concluded that an Environmental Management Plan for the proposal will be required and that it will need to be a comprehensive document to be developed in parallel and prior to the finalisation of the project detailed engineering design. It will also need to reflect the outcome of current and proposed environmental studies.

The EPA has provided additional advice on various aspects associated with the proposal including: Oakajee River training; port design alternatives; quarry siting and management; services and infrastructure; transport; unexploded ordnance and shipping.

7. Recommendations

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister for the Environment considers the report on the relevant environmental factors and the EPA objectives set for each factor.
2. The Minister for the Environment notes that the EPA has concluded that:

    - this environmental assessment has been undertaken on the conceptual design of the proposed port;
    - the work to date has not identified an environmental factor where, with appropriate management, the EPA's objective in relation to that factor cannot be achieved;
    - further environmental investigations are required to obtain more detailed information on a number of factors to ensure that environmental requirements can be met and are incorporated into the final design.

3. That the Minister for the Environment imposes the conditions and procedures consistent with Section 3 of this report.
4. The proponent (Minister for Resources Development) gives consideration to the inclusion of significant coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative sections of vegetation community types.
5. Prior to finalisation of the detailed design, the proponent undertake an analysis to determine the impact of training of the Oakajee River on the onshore and nearshore environment and that this be referred to the EPA for consideration of the environmental impacts.
6. The Minister for Resources Development and the Minister for Planning consider the long-term protection of transport corridors to the Oakajee industrial estate and port through planning mechanisms.
7. Minister for the Environment and relevant Government agencies note that the EPA will require separate referral of the proposed infrastructure, services and sources of rock material for the Oakajee industrial estate and deepwater port, for consideration of environmental impact. Service corridors should be developed to minimise any potential environmental impacts.
8. The State Committee for Combating Marine Oil spill Pollution initiate a study of risks associated with tanker and other shipping traffic along the Western Australian coast.

Table 3: Summary of Assessment of Relevant Factors

Factor	Relevant Area	EPA Objectives	Proponent's Commitments	EPA's Opinion
Rare and Priority Flora and vegetation communities.	Primary and secondary dune areas, and areas of remnant vegetation adjoining the Port Location Area. This area lies within the Geraldton Sandplain biogeographical region.	Protect rare and priority flora consistent with the provisions of the Wildlife Conservation Act 1950; and To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	**Declared Rare Flora** - The Proponent will commission a follow-up survey for declared rare flora in any areas of vegetation which might be disturbed by future development. This survey will be conducted in spring 1997. The results of this survey will be provided to CALM and the DEP. **Regionally Significant Vegetation** - The Proponent will prepare and implement a rehabilitation plan (including landscape considerations) for all areas which are disturbed by construction activities but which are not required for port structures and facilities. This plan will be integrated into the Coastal Management Plan and will be prepared in consultation with CALM and the rehabilitation areas will be monitored and the monitoring results will be provided to the DEP.	The EPA's objective for rare and priority flora and vegetation communities is unlikely to be compromised.
Rare and Endangered Fauna	Primary and secondary dune areas, and areas of remnant vegetation adjoining the Port Location Area. This area lies within the Geraldton Sandplain biogeographical region.	Protect rare and endangered fauna consistent with the provisions of the Wildlife Conservation Act 1950.	The Proponent will commission an assessment of the port area to determine the likelihood that threatened and priority fauna is present.	The proposal can be managed to meet the EPA's objective for rare and priority fauna subject to proponent's commitments and recommended conditions.
Marine Habitats	Area from the Buller River to Coronation Beach, out to the 20m depth contour.	To maintain the abundance, species diversity, productivity and geographic distribution of marine habitats.		The proposal can be managed to meet the EPA's objective for marine habitats.

Macroalgae (Beach Cast Seaweed)	Coastal area from the Buller River to Coronation Beach.	To minimise interference with the process of nutrient and carbon cycling from beach cast seaweed.	**Macroalgae** - The Proponent will monitor the accumulation of sea wrack on the shoreline between the Buller and Oakajee Rivers on an ongoing basis and will take appropriate steps to overcome any adverse impacts, as required. - The Proponent will manage any large accumulation of sea wrack against the breakwaters by mechanical or other means of collection and will redistribute the wrack to other sections of the coastline in the Special Management Area or into the littoral stream where there is evidence that the sea wrack accumulation may have been reduced. Any such operations will be subject to approval by the Department of Conservation & Land Management. - The Proponent will ensure that the Water Quality Monitoring Program associated with the port is designed so that it will detect any significant variations in nutrient levels which may be attributable to changes in the distribution of sea wrack in the near-coastal marine environment, and will implement appropriate management practices if the monitoring program identifies any unacceptable impacts on the nutrient levels in the vicinity of the port.	The proposal can be managed to meet the EPA's objective for macroalgae.
Marine Fauna	Coastal waters between Buller River and Coronation Beach, including the port approach channel (s)	To maintain the abundance, species diversity and geographic distribution of marine fauna.	See Commitments under: - Marine Water Quality - The Proponent through a Construction Management Plan will take steps to ensure that construction of the port is managed so as to limit the potential for incidental damage to rock lobster habitat. The Construction Management Plan will be prepared to the requirements of the DEP. - The Proponent will liaise with the Department of Fisheries and rock lobster fishing industry representatives on a continuing basis regarding port operations and their implications for rock lobsters and to provide information on the results of the Water Quality Monitoring Program.	The proposal can be managed to meet the EPA's objective for marine fauna subject to proponent's commitments and recommended conditions.

Introduced Marine Organisms	Coastal waters between Buller River and Coronation Beach, including the port approach channel(s).	Minimise the risk of introduction of unwanted, non-indigenous marine organisms.	**Introduced Marine Organisms** - The Proponent throughout the life of the port will routinely check that the Australian Ballast Water Management Strategy and/or any other management procedure for ballast water recommended by AQIS or any other Commonwealth, State or International agency which may have responsibility for the management of ballast water in the future are compiled with. - The proponent will implement a monitoring program to detect the presence of toxic dinoflagellates in the harbour of the Oakajee port. This program will be initiated prior to the commencement of shipping operations, and will occur on a bi-annual basis thereafter. The results of the monitoring program will be provided to the EPA and to any other agencies nominated by that department.	The proposal can be managed to meet the EPA's objective for introduced marine organisms subject to the proponent's commitments and recommended conditions for a best practice ballast water management strategy.
Shoreline Stability	The foreshore area between Buller River and Oakabella Creek and adjacent marine area.	To maintain stability of beaches.	**The Shoreline** - The Proponent will monitor coastal sand movements between the Buller River and Coronation Beach. The proponent will take appropriate steps to maintain the stability of the beaches in this area, as necessary. The scope and duration of this monitoring program will be determined in association with the EPA and all results will be submitted to the EPA and made available to the general public. - The Proponent will implement a program for the redistribution of sand accumulated against the breakwaters of the port if the coastal sand monitoring program indicates that such redistribution is necessary to minimise the possibility of shoreline erosion.	The proposal has the potential to compromise the EPA's objective unless sand bypassing and management systems are considered and adequate provision made in the detailed design of the port.

Marine Water Quality and Sediment Quality	Coastal waters between Buller River and Coronation Beach, including the port approach channel(s).	To maintain water and sediment quality to accepted criteria to protect the environmental values of recreation, aesthetics, aquatic life for human consumption and maintenance of aquatic ecosystems in agreed areas (DEP, 1996). It should be recognised that the environmental quality objectives for water and sediment within the port may differ from the objectives outside the port.	• a Construction Management Plan in accordance with the requirements of the EPA, upon advice from the DEP. • a Dredging and Dredge Spoil Disposal Management Plan (DDSDMP) in the event that the final port plan involves dredging. This Management Plan will be prepared in accordance with the requirements of the EPA, upon the advice from the DEP, and will include a monitoring program for water quality in and within a relevant distance of the works area. • an Oil Spill Contingency Plan to the satisfaction of the Department of Minerals and Energy, the Environmental Protection Authority, the Department of Environmental Protection, and the WA State Committee for Combating Oil Pollution at Sea. • a Waste Management Plan of port operations prepared in accordance with the requirements of the EPA, upon advice from the DEP. This plan will specify management procedures for the collection and disposal of waste discharges from ships, and will regulate washdown of ships in harbour. • an Accidental Spillage Management Plan to the requirements of the Department of Minerals and Energy. • a Water Quality Monitoring and Management Program in accordance with the requirements of the EPA, upon advice from the DEP. • a Sediment Monitoring and Management Program. This program will involve bi-annual samples following construction. All samples will be analysed for a range of heavy metals and other potential contaminants. The results of the monitoring program will be provided to the EPA. • the Proponent will commission a detailed study of water circulation and water exchange in the harbour at Oakajee following the adoption of a final design for the port. The results of this study will be supplied to the EPA and other relevant government agencies, and will be used to refine the port design if necessary to achieve better performance with respect to water exchange.	The proposal has the potential to compromise the EPA's objective unless, prior to finalisation of detailed design the following plans are prepared: • Breakwater Construction Management Plan; • Dredge and Dredge Spoil Disposal Plan; • Materials Handling Environmental Requirement Specification; • Accidental Spillages Management Plan; • Drainage Design and Treatment Specification; • Oil Spill Contingency Plan; • Port Waste Management Plan; • Water and Sediment Quality Monitoring and Management Plan, to the requirements of the EPA on advice of the DEP.

Dust	Port sites. between the Buller and Oakajee Rivers and nearby residences.	To protect the surrounding land users such that dust emissions will not adversely impact upon their welfare and amenity or cause health problems and meet EPA Guidelines for Assessment and Control of Dust and Windborne Material from Land Development Sites (updated 1995), and the Environmental Protection Policy (Atmospheric Wastes) (Kwinana).	**Dust** - The Proponent will ensure that all contractors associated with the construction of the deepwater port comply with the EPA Guidelines for Assessment and Control of Dust and Windborne Material from Land Development Sites (updated 1995) and the Environmental Protection Policy (Atmospheric Waste) (Kwinana). - The Proponent will ensure that all port operations comply with air quality criteria specified by the EPA. - The Proponent will prepare an Air Quality Management Plan which will detail management and strategies for dust control. The plan will be implemented prior to construction and will incorporate ambient dust monitoring.	The proposal is capable of being managed to meet the EPA's objective for dust subject to the requirement that the proponent implements an Air Quality Management Plan.
Noise and Vibration	Port area and nearby residences.	Protect the amenity of nearby residents from noise impact resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.	- The Proponent will ensure that all contractors and port users, including itself, comply with the relevant noise and vibration criteria in either the Noise Abatement (Neighbourhood Annoyance) Regulations 1979 or the Environmental Protection (Noise) Regulations when promulgated, and will adopt best practise noise attenuation measures as appropriate and defined by industry and government agencies. - The Proponent will conduct regular noise monitoring, as necessary.	It is likely that the proposal can be managed to meet the EPA's objective for noise and vibration subject to proponent's commitments and recommended conditions.
SOCIAL SURROUNDINGS				
Public Health and Safety	Port area and transport corridor to the industrial site and adjacent beach areas..	Risk is as low as reasonably achievable and complies with acceptable standards. The EPA's criteria for the assessment of the fatality risk of proposed hazardous and industrial developments are outlined in Bulletins 611 and 627.	**Public Health and Safety** - The Proponent will ensure that all proposals for the handling of potentially hazardous cargoes through the deepwater port are referred to the DEP and the Department of Minerals and Energy for their consideration. All requirements and procedures for the safe handling of hazardous cargoes will be met. - The Proponent will prepare a Port Safety Plan which will incorporate a risk assessment and response measures for incidents, and will be subject to community consultation.	The proposal is capable of being managed to meet the EPA's objective for public health and safety subject to the proponent's commitments and recommended conditions for a Port Safety Plan and an Emergency Response Plan.

Heritage	Foreshore area between the Buller and Oakajee Rivers.	Comply with statutory requirements in relation to areas of cultural or historical significance.	**Aboriginal and Post-Colonisation Heritage Sites** - The Proponent will prepare a Heritage Management Plan prior to construction to ensure that any sites discovered during construction activities are managed in accordance with statutory requirements.	The proposal is capable of being managed to meet the EPA's objective for heritage subject to the proponent's commitments and recommended conditions for a Heritage Management Plan.
Recreation	Coastal strip from the Buller River to Oakabella Creek.	The concept should not compromise recreational usage of the area, as developed by planning agencies.	**Recreation** - The Proponent will prepare a Coastal Management Plan (CMP) for the coastal area under its control between the Buller and Oakajee Rivers. The CMP, which will include a Recreation Plan, will be prepared prior to the commencement of construction of the port, in accordance with the requirements of the Ministry for Planning, and in consultation with the Shire of Chapman Valley. - The Proponent will complete a detailed assessment of the impact of port structures on wave breaks to the north of the proposed port when the final design of the port is selected. - The Proponent will undertake a study, as part of the Recreation Plan, to determine the significance of the Oakajee area to windsurfing. This study will also consider the potential impact of the construction of the port on the sport.	The proposal has the potential to compromise the EPA's objective for public recreation sunless a Recreation Plan is developed in consultation with the public.
Fishing	Nearshore area of the Oakajee Block (as defined by the Fisheries Department).	Minimise the impact of the port on professional and recreational fishing in the area.	The Proponent, through a Construction Management Plan will take steps to ensure that construction of the port is managed so as to limit the potential incidental damage to rock lobster habitat. The Construction Management plan will be prepared to the requirements of the of the DEP. The Proponent will liaise with the Department of Fisheries and rock lobster fishing industry representatives on a continuing basis regarding port operations and their implications for rock lobsters and to provide information on the results of the Water Quality Monitoring Program.	It is the EPA's opinion that in order for the proposal to meet its objective there is a need for a Fishing Management Plan.

Appendix 1

Figures

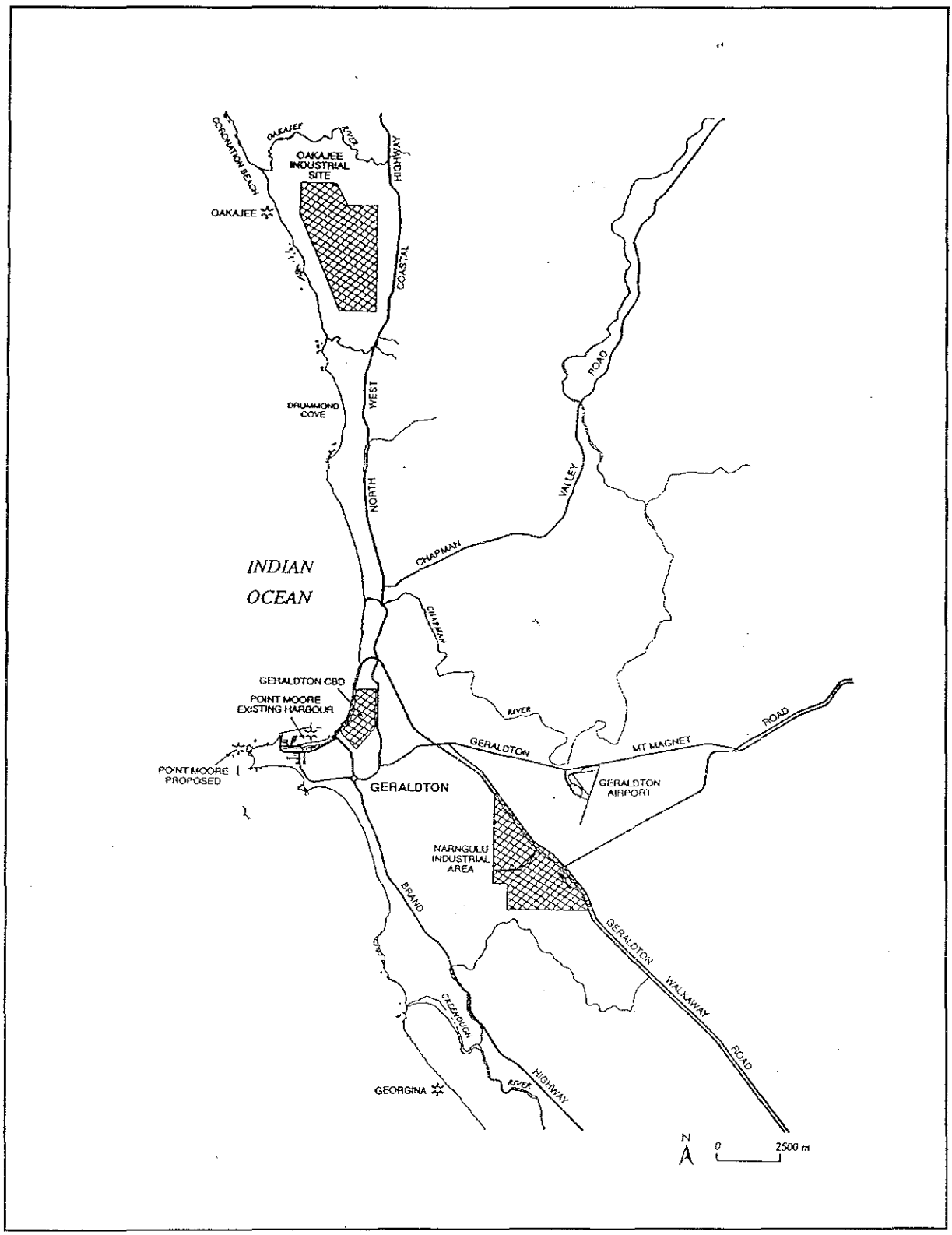


Figure 1: Oakajee Deepwater Port - Regional Location (Source: Geraldton Region Plan, Industry and port Sites Study, 1996)

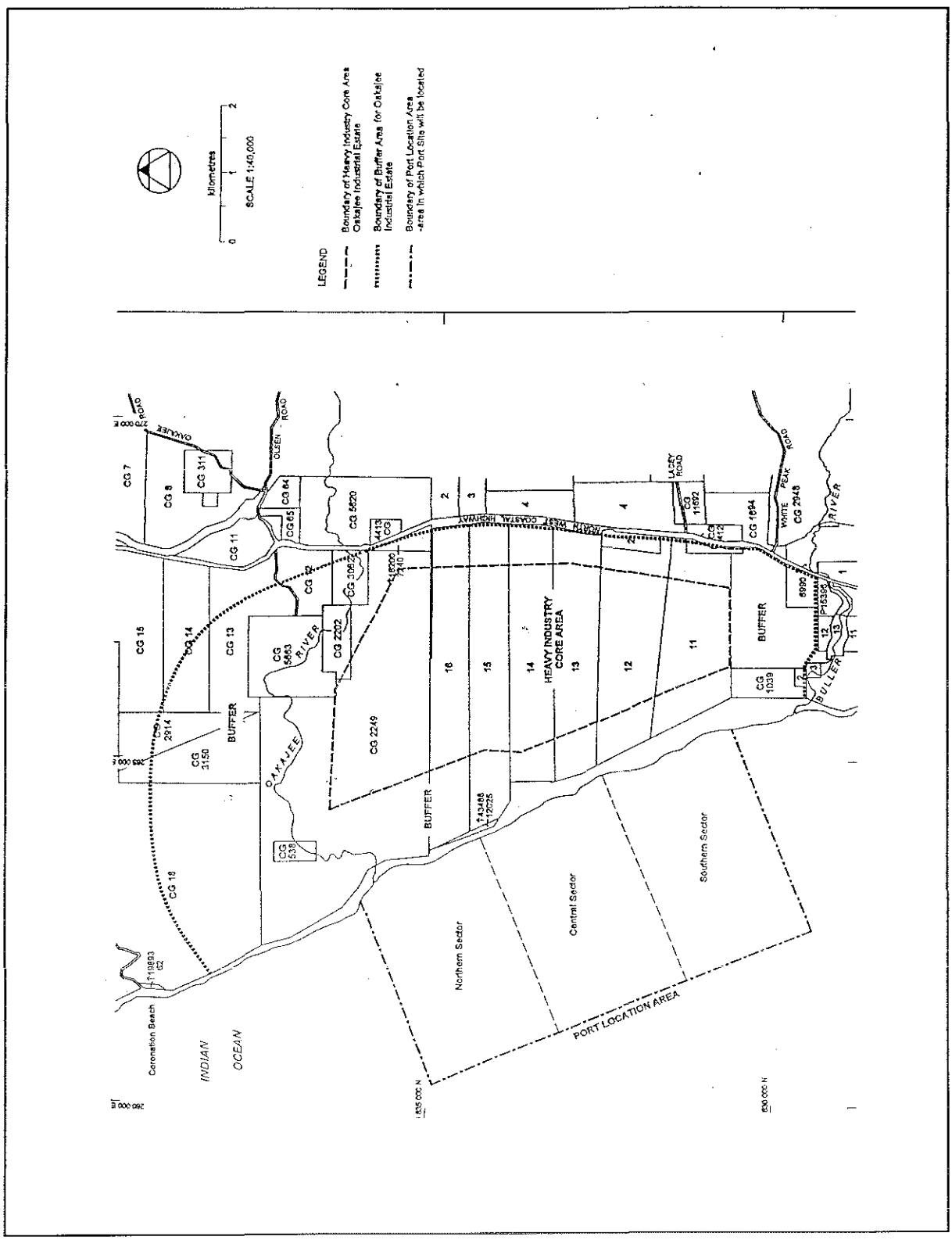


Figure 2: Oakajee Deepwater Port - Proposed Location (Source: Tingay and Welker, 1997a)

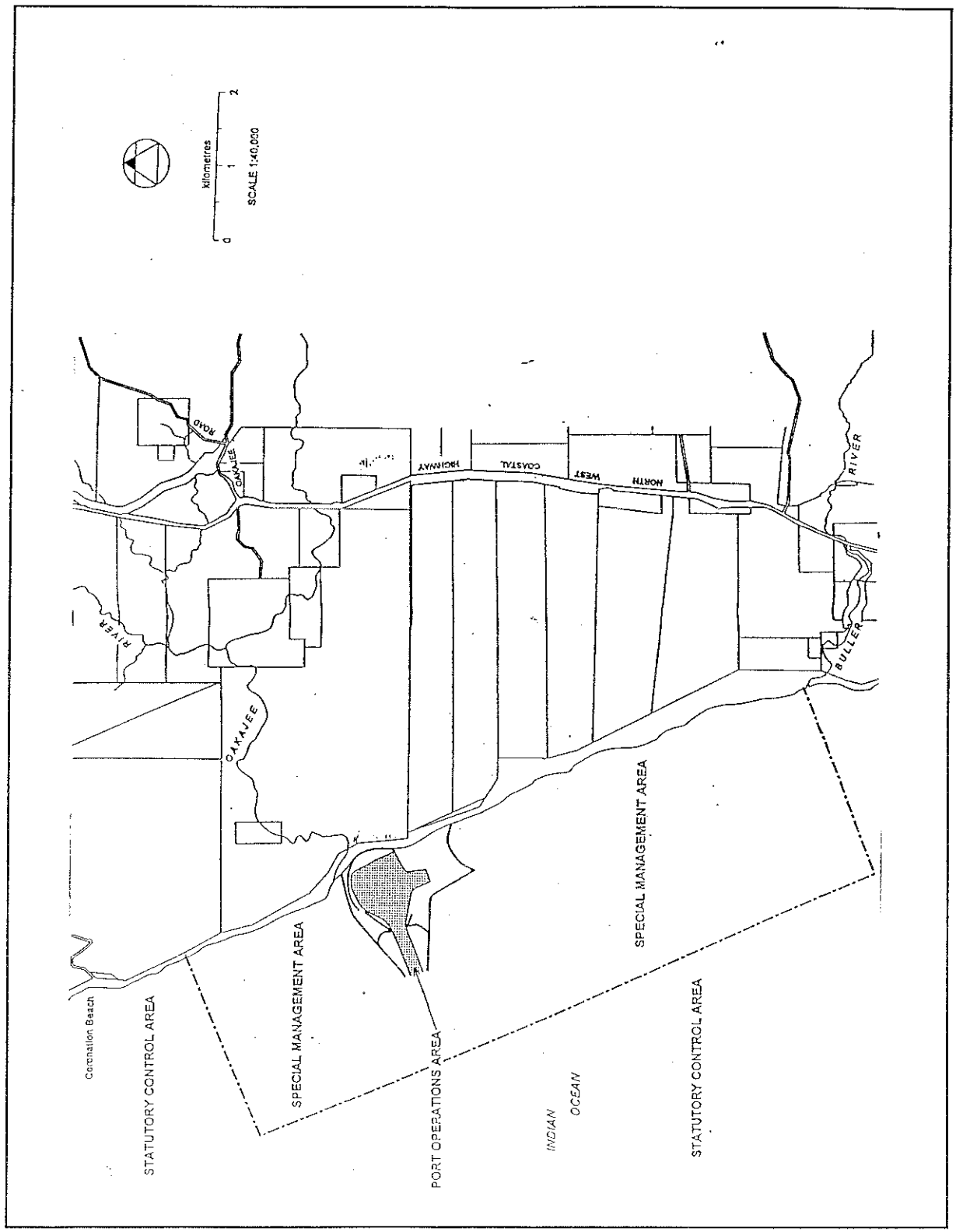
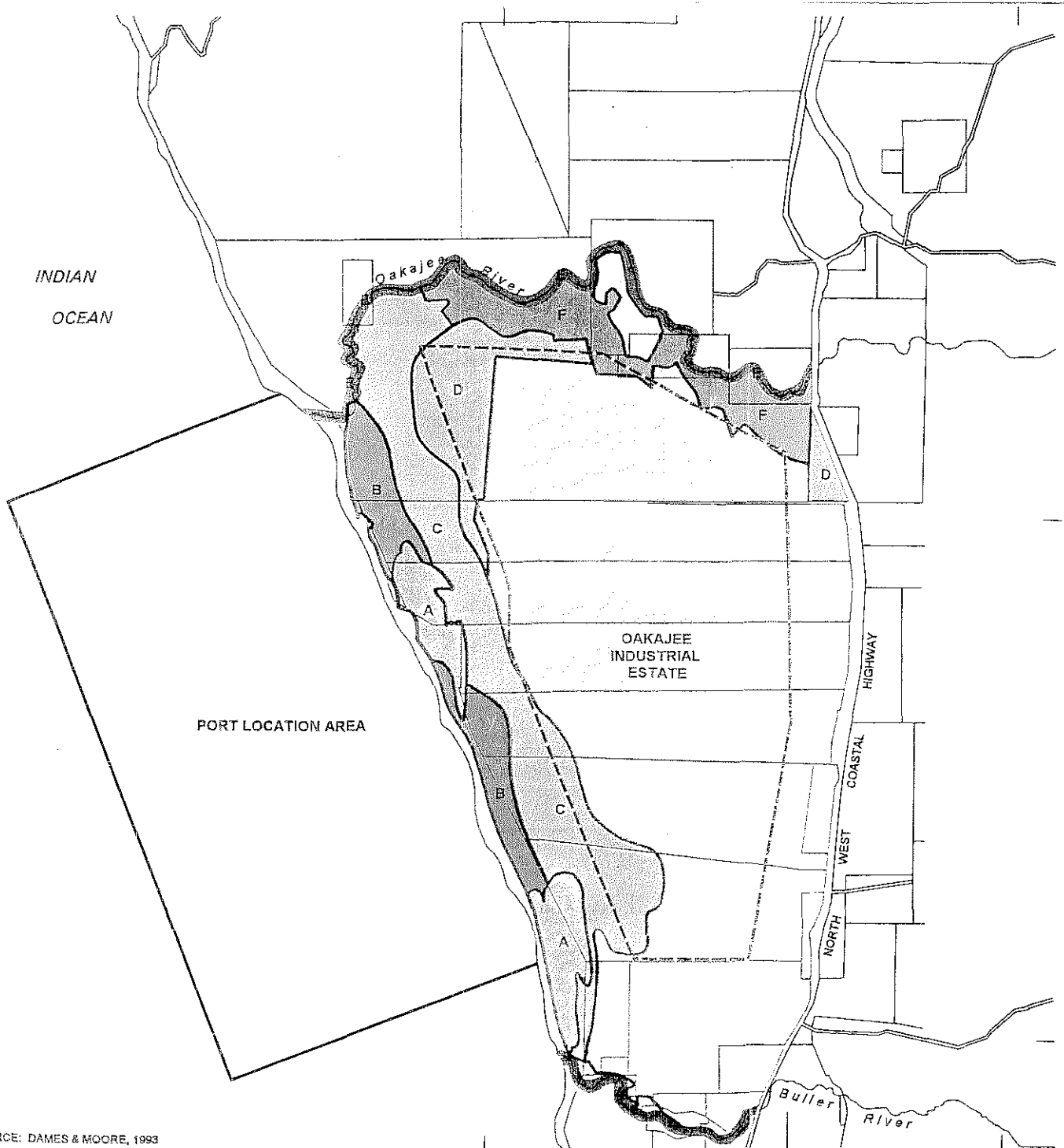


Figure 3: Oakajee Deepwater Port - Proposed Location and Management Areas (Source: Alan Tingay and Associates)



kilometres

0 1 2

SCALE 1:40,000

LEGEND

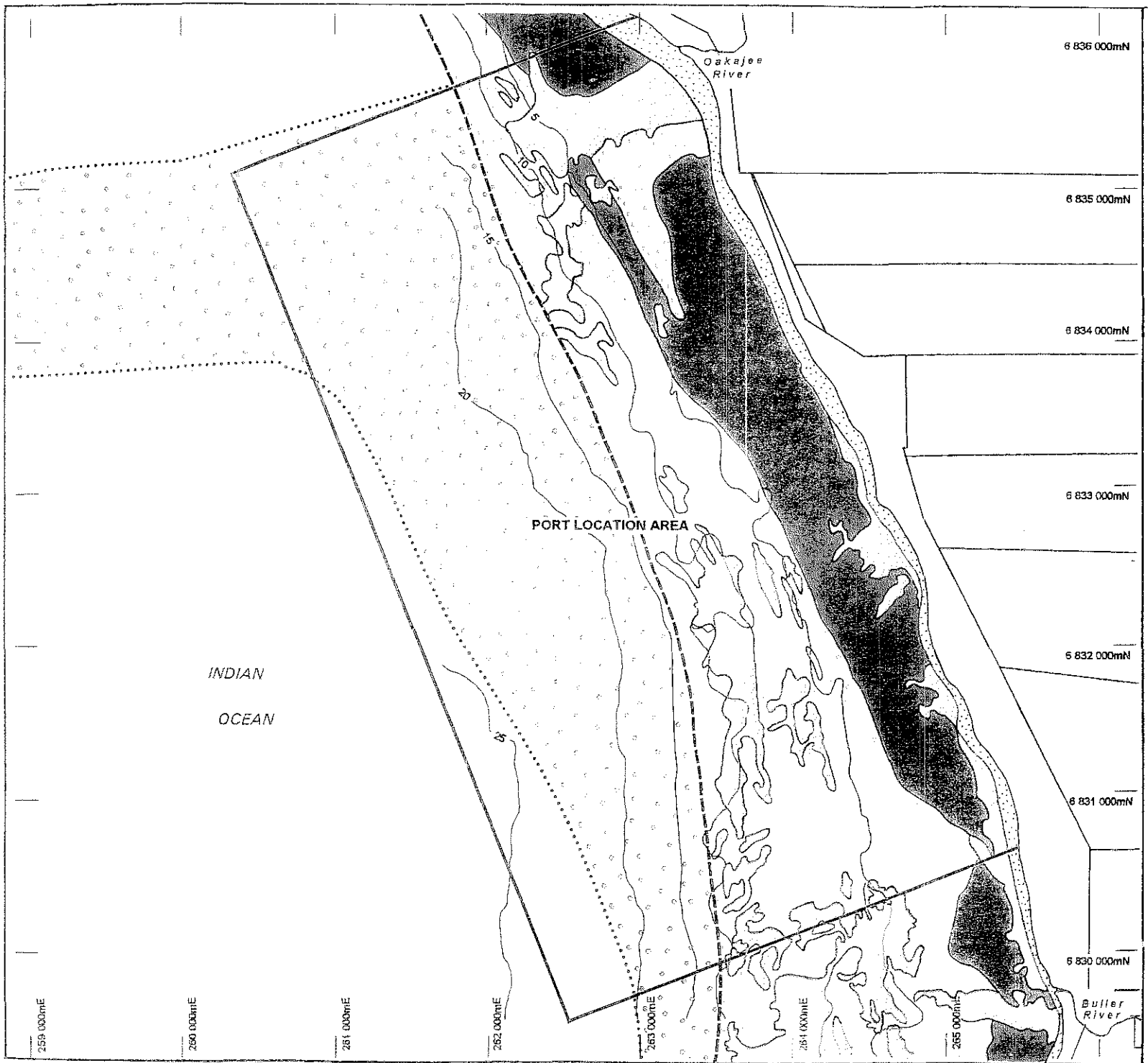
- A — Mobile Dune Heathland *Olearia axillaris/Acacia rostellifera*
- B — Stable Dune Heathland *Olearia axillaris/Acacia rostellifera/ Anthoceris littorea*
- C — Limestone Ridge Heathland & Shrubland *Melaleuca cardiophylla/Acacia xanthina/ A.rostellifera/Eucalyptus eudesmoides/ Hakea obliqua*
- D — Sandplain Shrubland to Low Woodland *Banksia prionotes/Acacia rostellifera/ Acacia cyclops/Acacia saligna/ Casuarina campestris*
- E — River Margin Open Woodland to Woodland *Eucalyptus camaldulensis/ Casuarina obesa/ Melaleuca rhaphiophylla/Acacia saligna/ Acacia acuminata/Tamarix* sp
- F — Valley Slopes of Heathland (*Allocasuarina campestris*) & Woodland (*Acacia saligna*)
- Cleared
- Boundary of Heavy Industry Core Area Oakajee Industrial Estate
- Boundary of Port Location Area -area in which Port Site will be located

OAKAJEE DEEPWATER PORT
REMNANT VEGETATION
FIGURE 4

SOURCE: DAMES & MOORE, 1993

ALAN TINGAY & ASSOCIATES

DRAWN BY: ST 22-4-97 CHECKED BY: TS 23-4-97 AG4127



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SCALE 1: 25,000

LEGEND

- Marine Survey Study Area
- Beach
- Shallow Sand
- High Reef
- Mixture of Shallow Pavement, Low Reef & Shallow Sand
- Mixture of Deep Pavement & Deep Sand
- Limit of Discernible Seafloor
- Boundary of Port Location Area -area in which Port Site will be located

OAKAJEE DEEPWATER PORT
MARINE SUBSTRATES AND HABITATS
FIGURE 5

A96127 DRAWN BY: ST 22-4-97 CHECKED BY: TS 23-4-97

ALAN TINGAY & ASSOCIATES

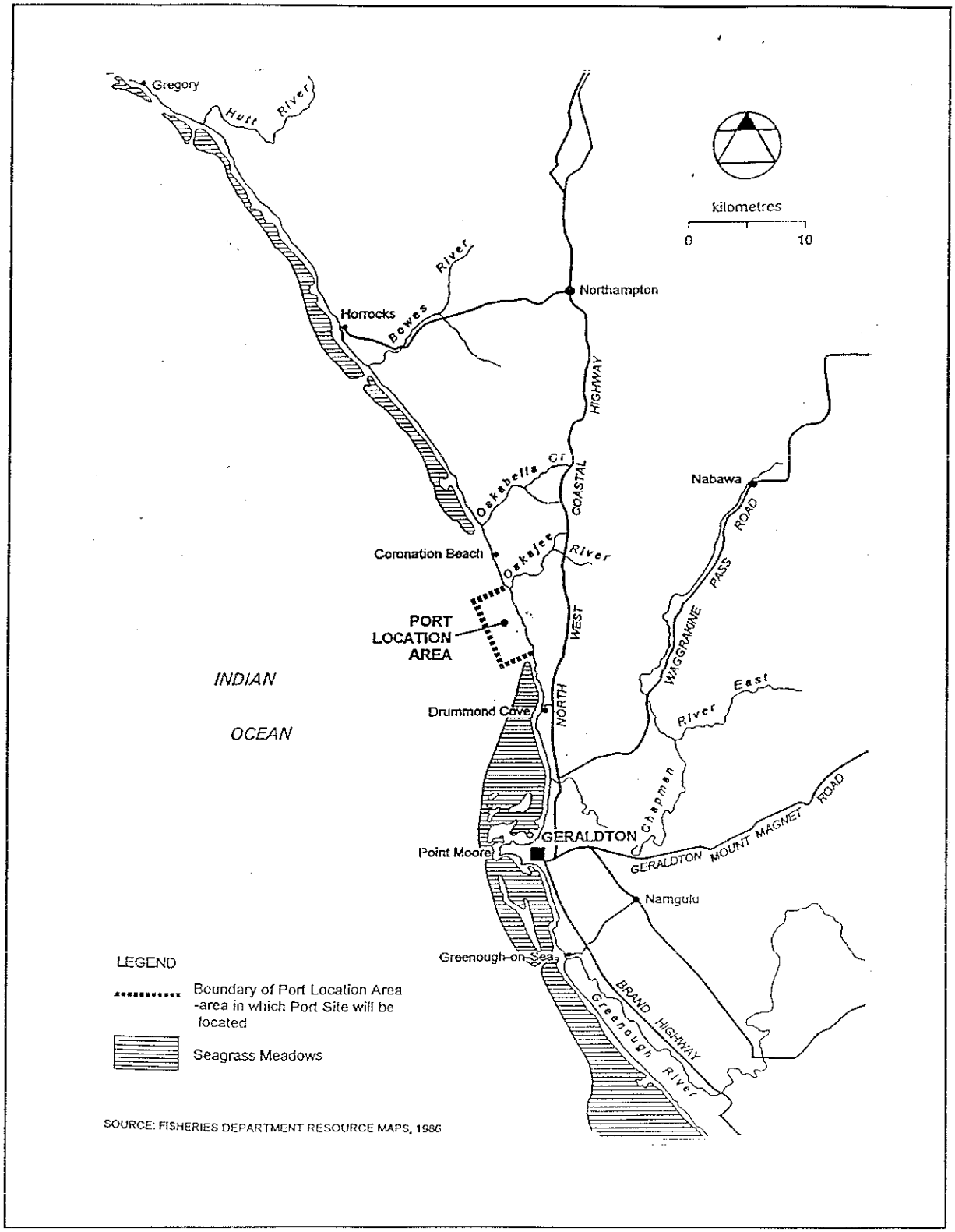


Figure 6: Oakajee Deepwater Port - Geraldton Coast Seagrass Meadows (Source: Tingay and Welker, 1997a)

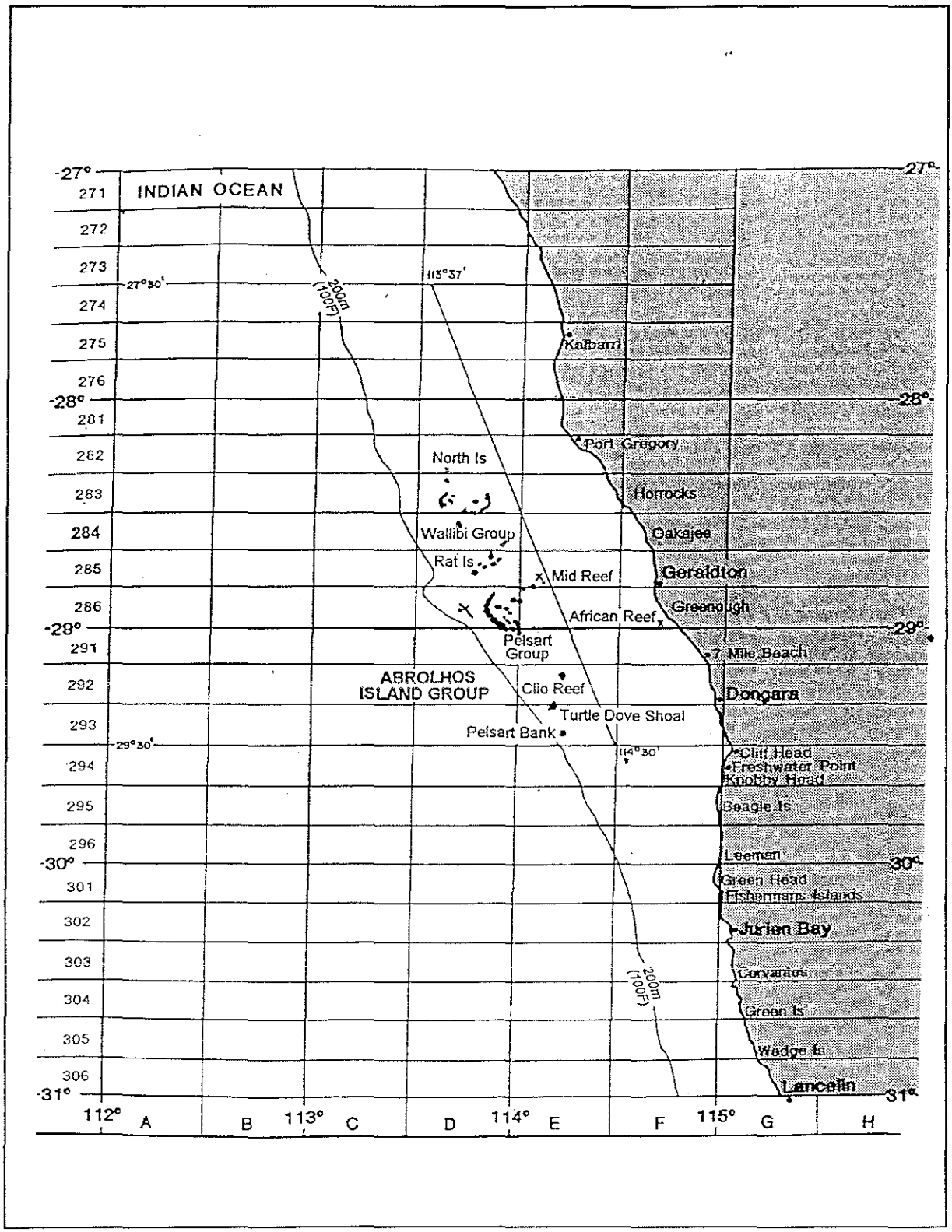


Figure 7: Oakajee Deepwater Port - Rock Lobster Statistical Block 284 (Oakajee) (Source: Alan Tingay and Associates)

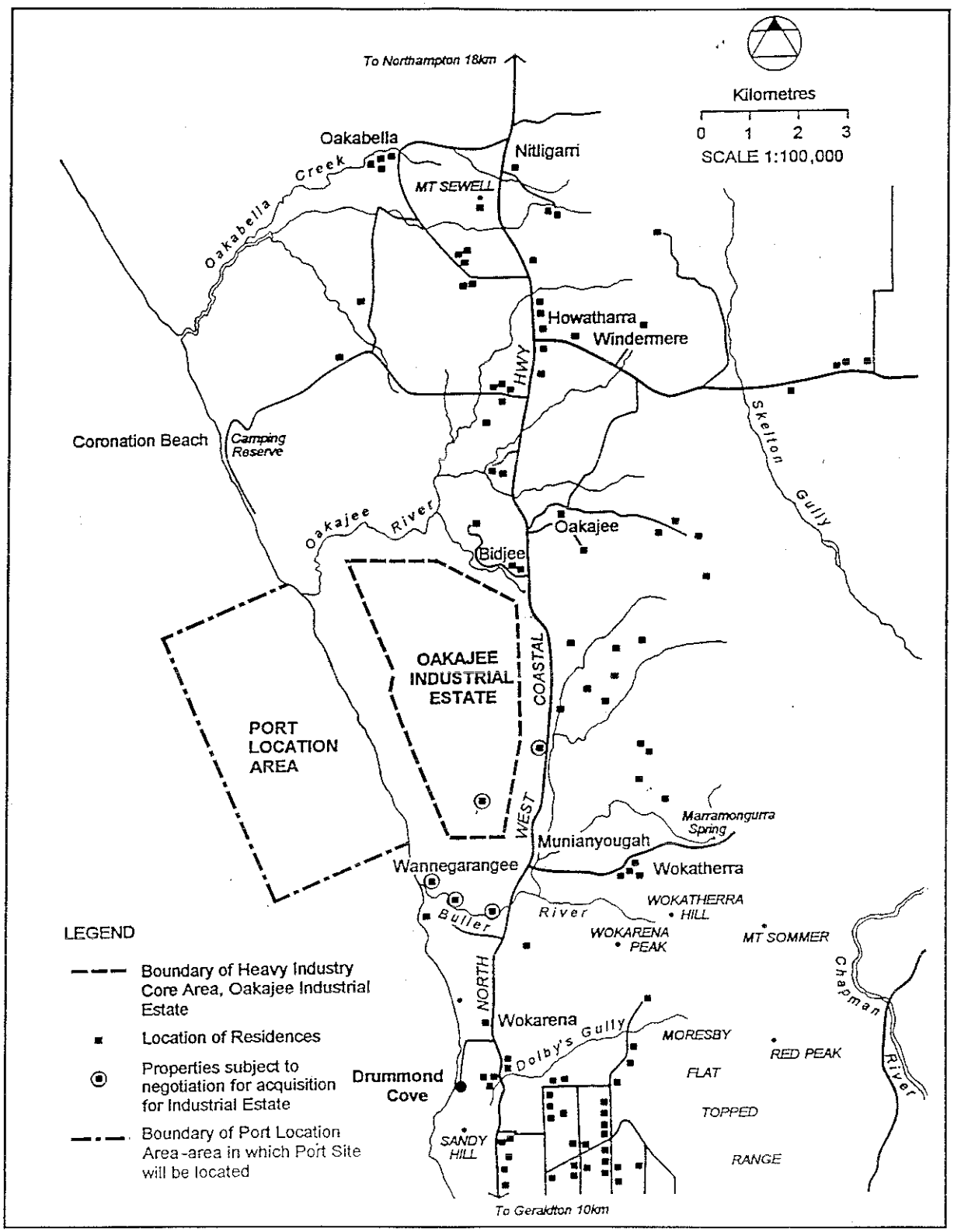
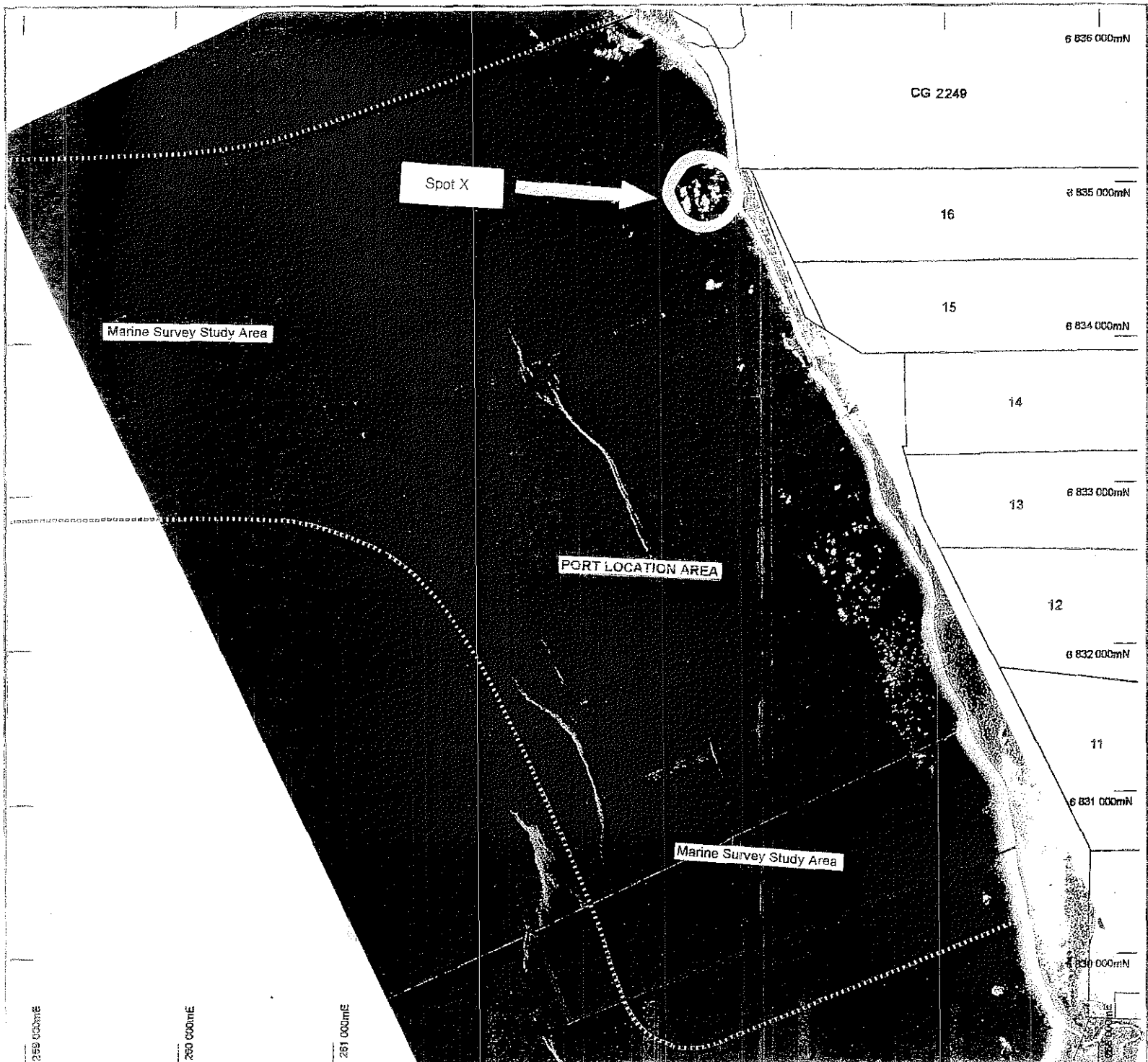


Figure 8: Oakajee Deepwater Port - Location of Nearby Residences (Source: Alan Tingay and Associates)



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SCALE 1:25,000

LEGEND

Boundary of Port Location Area -area in which Port Site will be located

Extent of Marine Survey

OAKAJEE DEEPWATER PORT
LOCATION OF SPOT X
FIGURE 9

Appendix 2

List of Submitters

List of organisations and individuals who made submissions

Organisations:

Environment Australia

Water and Rivers Commission

Western Australian Fishing Industry Council

City Of Geraldton

Geraldton Windsurfing Club

Mr M Criddle
Member for Agricultural Region

Shire of Chapman Valley

Western Australia Police

Conservation Council of Western Australia

Australian Marine Conservation Society

Geraldton Professional Fisherman's Association Inc

Coastal Heritage Association of Western Australia Inc

Department of Transport

Ministry for Planning

Aboriginal Affairs Department

West Australian Wave Sailing Association

Fisheries Department of Western Australia

Department of Minerals And Energy

Mid-West Development Commission

Friends of Geraldton

Individuals:

Mr M Aitkin

D K Tavakoli

Ms G R J Ingham

Ms C S Babbage

Mr D & Mrs J Hancock

Mr P Robb

Mr A Blake

V, R, K & E Casey

Ms J Hill

Mr A Volkerts

Ms L McNamara

Mr A Chapman

R & M Hawkins

J & N Curtin

P & R Kruta

Mr W Travers

Mr V Hillwood

Mr K Mitsuda

Ms S Y Harmer

Mr M Clarke

Ms B Mitsuda

Mr A Sandison

Ms J. Millet

Mr W. Keyser

Mr. H. Wilhan

Mr A. Watson

Appendix 3

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Appendix 4

List of Recommended Ministerial Conditions and Proponent's Consolidated Commitments

RECOMMENDED MINISTERIAL CONDITIONS

OAKAJEE DEEPWATER PORT, SHIRE OF CHAPMAN VALLEY (ASSESSMENT NO. 1074)

MINISTER FOR RESOURCES DEVELOPMENT

This proposal may be implemented subject to the following conditions:

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil the commitments made in the Public Environmental Review and subsequently during the environmental assessment process conducted by the Environmental Protection Authority, provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

In the event of any inconsistency, the conditions and procedures shall prevail to the extent of the inconsistency.

The attached environmental management commitments form the basis for consideration by the Chief Executive Officer of the Department of Environmental Protection for auditing of this proposal in conjunction with the conditions and procedures contained in this statement.

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal.

2-2 Where, in the course of the detailed implementation referred to in condition 2-1, the proponent seeks to change the designs, specifications, plans or other technical material submitted to the Environmental Protection Authority in any way that the Minister for the Environment determines, on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Proponent

These conditions legally apply to the nominated proponent.

3-1 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.

4 Environmental Management System

The proponent should exercise care and diligence in accordance with best practice environmental management principles.

4-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedures in this statement, prior to construction, the proponent shall prepare environmental management system documentation with components such as those adopted in Australian Standards AS/NZS ISO 14000 series, in consultation with the Department of Environmental Protection.

4-2 The proponent shall implement the environmental management system referred to in condition 4-1.

5 Environmental Management Plan

In order to plan for the deepwater port and to maintain environmental impacts at acceptable levels, an Environmental Management Plan is required.

5-1 prior to finalisation of detailed design (unless otherwise stated), the proponent shall prepare and implement Environmental Management Plans, to the requirement of the Environmental Protection Authority on advice of the Department of Environmental Protection and other agencies, where relevant.

This Plan should provide strategies and actions to implement the following requirements.

Rare and priority flora and vegetation communities

1. vegetation clearing is kept to a practical minimum;
2. a Dieback Management Plan is formulated as part of the Rehabilitation and Coastal Management Plan;
3. weed control measures are implemented;
4. the Rehabilitation Plan and Coastal Management Plan is formulated to protect, retain or replace identified environmental values of remnant coastal vegetation;

Marine fauna

5. a survey is undertaken of the area for marine mammals prior to any blasting and that blasting is avoided should any marine mammals be present.

Introduced marine organisms

6. a best practice strategy for ballast water management, including the construction and use of a ballast water treatment facility, is developed to the satisfaction of the EPA so as to meet its objective for this factor;

7. prior to commissioning of the port, a marine fauna and flora survey is undertaken to the requirements of the DEP, to identify species present at the site. Bi-annual monitoring is to continue during the life of the project to identify the establishment of exotic marine species and contingency measures implemented if the species is deemed to present an unacceptable risk to the marine environment;

8. compliance with the Australian Quarantine Inspection Service (AQIS) or International Maritime Organisation (IMO) recommendations for ballast water control is achieved by the proponent and compliance with AQIS and IMO guidelines is actively promoted to port users;

9. hull scrubbing in the port and nearby waters is prohibited;

Marine water and sediment quality

10. The following plans are prepared to the requirement of the EPA on advice from the DEP and relevant authorities, prior to finalisation of detailed design:

- Breakwater Construction Management Plan;
- Dredge and Dredge Spoil Management Plan;
- Material Handling Environmental Requirement Specification;
- Accidental Spillage Management Plan;
- Drainage Design and Treatment Specification;
- Oil Spill Contingency Plan;
- Port Waste Management Plan;
- Water and Sediment Quality Monitoring and Management Plan;

11. prior to finalisation of detailed design, and as part of the EMP, a detailed monitoring and management plan for maintenance of environmental values in relevant areas is prepared, to the requirements of the EPA on advice from the DEP;

12. prior to construction, a baseline survey of water quality and sediments is completed with due account taken of seasonal variation;

Dust

13. an Air Quality Management Plan is implemented to manage dust to an acceptable level during construction, operation and transport of materials;

Noise

14. a program of noise monitoring for the port to assess noise impacts, including cumulative noise, and which is integrated with the noise monitoring for the industrial estate is developed and implemented;

Heritage

A Heritage Management Plan is prepared including, but not limited to:

15. detailed ethnographic and archaeological surveys, including consultation with local Aboriginal groups;
16. ethnographic and archaeological surveys in the vicinity of the Oakajee River training works prior to finalising detailed design, if the northern port option is developed;

17. a detailed assessment of the likely effects of the development on any sites, including ground disturbance, chemical emissions and altered surface hydrology;

Recreation

18. a Recreation Plan is developed in consultation with the public which makes adequate provision for public access to available recreational areas;

The proponent shall make this Environmental Management Plan publicly available.

Results

19. results of monitoring programmes to be submitted annually to the Department of Environmental Protection for audit, and to be made publicly available; and

Performance audit

20. annual performance audit of the environmental objectives, and allowance for continuous improvement as new operational procedures and knowledge are developed.

5-2 The proponent shall implement the Environmental Management Plans required by condition 5-1.

5-3 The proponent shall make the Environmental Management Plans required by condition 5-1 available to the public.

6 Decommissioning

6-1 The proponent shall carry out the decommissioning of the project, removal of the plant and installations and rehabilitation of the site and its environs.

6-2 At least 3 years prior to decommissioning, the proponent shall prepare a decommissioning and rehabilitation plan to achieve the objectives of condition 6-1.

6-3 The proponent shall implement the plan required by condition 6-2.

7 Time Limit on Approval

The environmental approval for the substantial commencement of the proposal is limited.

7-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced.

Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period to the Minister for the Environment.

Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding *five* years for the substantial commencement of the proposal.

8 Performance Review

The proponent should review the environmental performance of the proposal to ensure the environmental management meets the environmental objectives and allows for continuous improvement.

8-1 Each six years following the start of construction, the proponent shall prepare and submit a performance review to evaluate the environmental performance which shall include but not limited to:

1 environmental objectives reported on in Environmental Protection Authority Bulletin XXX;
2 proponent environmental management commitments made in their environmental review document, in response to issues raised following public submissions and those published in Environmental Protection Authority Bulletin XXX as Appendix 1;
3 Environmental Management System environmental management targets;
4 environmental management plan(s); and
5 environmental performance indicators,

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

Note: The Environmental Protection Authority may recommend changes and where significant, recommend actions to the Minister for the Environment following consideration of the performance review.

9 Compliance Auditing

To help determine environmental performance and compliance with the conditions, periodic reports on the implementation of the proposal are required.

9-1 The proponent shall submit periodic Performance and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

1 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

2 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

3 The preparation of a Fishing Management Plan, to be negotiated between the proponent and fishing interests, to be developed prior to commencement of construction.

4 Consideration be given to the inclusion of significant coastal vegetation communities into a Remnant Vegetation Protection Scheme covenant to ensure the protection of representative sections of vegetation community types.

Note

1 The Environmental Protection Authority reported on the proposal in Environmental Protection Authority Bulletin 86X (September 1997).

2 The proponent is required to apply for a Works Approval for this project under the provisions of Part V of the Environmental Protection Act.

Proponent's Environmental Management Commitments

28 August 1997

OAKAJEE DEEPWATER PORT, OAKAJEE, SHIRE OF CHAPMAN VALLEY (1074)

MINISTER FOR RESOURCES DEVELOPMENT

CONSOLIDATED LIST OF COMMITMENTS

The commitments made in the Oakajee Deepwater Port PER are numbered listed below for ease of reference.

Macroalgae

1. The proponent will monitor the accumulation of sea wrack on the shoreline between the Buller and Oakajee Rivers on an ongoing basis and will take appropriate steps to overcome any adverse impacts, as required.

2. The proponent will manage any large accumulation of sea wrack against the breakwaters by mechanical or other means of collection and will redistribute the wrack to other sections of the coastline in the Special Management Area or into the littoral stream where there is evidence that the sea wrack accumulation may have been reduced. Any such operations will be subject to approval by the Department of Conservation & Land Management.

3. The proponent will ensure that the Water Quality Monitoring Program associated with the port is designed so that it will detect any significant variations in nutrient levels which may be attributable to changes in the distribution of sea wrack in the near-coastal marine environment, and will implement appropriate management practices if the monitoring program identifies any unacceptable impacts on the nutrient levels in the vicinity of the port.

Introduced Marine Organisms

4. The proponent throughout the life of the port will routinely check that the Australian Ballast Water Management Strategy and/or any other management procedure for ballast water recommended by AQIS or any other Commonwealth, State or International agency which may have responsibility for the management of ballast water in the future are complied with.

5. The proponent will implement a monitoring program, in accordance with the requirements of the EPA, upon advice from the DEP, to detect the presence of toxic dinoflagellates in the harbour of the Oakajee port. This program will be initiated prior to the commencement of shipping operations, and will occur on a bi-annual basis thereafter. The results of the monitoring program will be provided to the EPA and to any other agencies nominated by that department.

Marine Water Quality and Sediments

6. The proponent will, prior to construction, prepare a Marine Management Plan that will include the following:

   6a. A Construction Management Plan in accordance with the requirements of the EPA, upon advice from the DEP. All contractors will be required to comply with this plan, which will specify measures designed to prevent marine pollution and to limit the impact on the marine environment.

6b. A Dredging and Dredge Spoil Disposal Management Plan (DDSDMP) in the event that the final port plan involves dredging. This Management Plan will be prepared in accordance with the requirements of the EPA, upon the advice of the DEP, and will include a monitoring program for water quality in and within a relevant distance of the works area. The management plan and all results of the monitoring programs will be made available to the general public.

6c. An Oil Spill Contingency Plan to the satisfaction of the Department of Minerals and Energy, the Environmental Protection Authority, the Department of Environmental Protection, and the WA State Committee for Combating Oil Pollution at Sea. This plan will include management processes required to avoid or minimise any impacts to beaches north of the port.

6d. A Waste Management Plan of port operations prepared in accordance with the requirements of the EPA, upon advice from the DEP. This plan will specify management procedures for the collection and disposal of waste discharges from ships, and will regulate wash-down of ships in harbour. This plan will include management processes required to avoid or minimise any impacts to beaches north of the port, and will include treatment of stormwater if appropriate.

6e. An Accidental Spillage Management Plan to the requirements of the Department of Minerals and Energy. This plan will include management processes required to avoid or minimise any impacts to beaches north of the port.

6f. A Water Quality Monitoring and Management Program in accordance with the requirements of the EPA, upon the advice of the DEP. A summary of the scope this monitoring program is provided in Section 6 of the PER document. Should levels of any parameter be above the criteria during the sampling period, more frequent monitoring will occur in order to identify a possible cause for the elevated levels, and also to determine the duration of the levels over time. Provision will be made to implement appropriate management practices if the monitoring program identifies any unacceptable impacts on the quality of marine waters in the vicinity of the port.

6g. A Sediment Monitoring and Management Program. This will be prepared in accordance with the requirements of the EPA, upon the advice of the DEP. The program will involve bi-annual samples following construction. All samples will be analysed for a range of heavy metals and other potential contaminants. The results of the monitoring program will be provided to the EPA. Should levels of any parameter be above the criteria during the sampling period, more frequent monitoring will occur in order to identify a possible cause for the elevated levels, and also to determine the duration of the levels over time. Provision will be made to implement appropriate management practices if the monitoring program identifies any unacceptable impacts on the quality of marine waters in the vicinity of the port.

The marine management plan will address the issue of protection of offshore seal colonies, and any other applicable protection issues.

7. The proponent will commission a detailed study of water circulation and water exchange in the harbour at Oakajee following the adoption of a final design for the port. The results of this study will be supplied to the EPA, and other relevant government agencies, and will be used to refine the port design if necessary to achieve better performance with respect to water exchange.

The Shoreline

8. The proponent will monitor coastal sand movements between the Buller River and Coronation Beach. The proponent will take appropriate steps to maintain the stability of the beaches in this area, as necessary. The scope and duration of this monitoring program will be determined in association with the EPA and all results will be submitted to the EPA and made available to the general public.

9. The proponent will implement a program for the redistribution of sand accumulated against the breakwaters of the port if the coastal sand monitoring program indicates that such redistribution is necessary to minimise the possibility of shoreline erosion.

Regionally Significant Vegetation

10. The proponent will prepare and implement a rehabilitation plan (including landscape considerations) for all areas which are disturbed by construction activities but which are not required for port structures and facilities. This plan will be integrated into the Coastal Management Plan and will be prepared in consultation with CALM and the rehabilitation areas will be monitored and the monitoring results will be provided to the EPA.

Declared Rare Flora and Specially Protected Fauna

11. The proponent will commission a follow-up survey for declared rare flora in any areas of vegetation which might be disturbed by future development. This survey will be made in spring 1997. The results of this survey will be provided to CALM and the EPA. The proponent will also commission an assessment of the port to determine the likelihood that threatened and priority fauna is present.

Dust

12. The proponent will ensure that all contractors associated with the construction of the deepwater port comply with the EPA Guidelines for Assessment and Control of Dust and Windborne Material from Land Development Sites (updated 1995) and the Environmental Protection Policy (Atmospheric Waste) (Kwinana).

13. The proponent will ensure that all port operations comply with air quality criteria specified by the EPA.

14. The proponent will prepare an Air Quality Management Plan which will detail management and strategies for dust control. The plan will be implemented prior to construction, and will incorporate ambient dust monitoring.

Noise and Vibration

15. The proponent will ensure that all contractors and port users, including itself, comply with the relevant noise and vibration criteria in either the Noise Abatement (Neighborhood Annoyance) Regulations 1979 or the Environmental Protection (Noise) Regulations when promulgated, and will adopt best practice noise attenuation measures as appropriate and defined by industry and Government Agencies.

16. The proponent will conduct regular noise monitoring, as necessary.

Public Health and Safety

17. The proponent will ensure that all proposals for the handling of potentially hazardous cargoes through the deepwater port are referred to the DEP and the Department of Minerals and Energy for their consideration. All requirements of these departments with respect to quantitative risk assessments and procedures for the safe handling of hazardous cargoes will be met.

18. The proponent will prepare a Port Safety Plan which will incorporate a risk assessment and response measures for incidents, and will be subject to community consultation. Where appropriate, the measures in this plan will be implemented.

Aboriginal and Post-Colonisation Heritage Sites

19. The proponent will prepare a Heritage Management Plan prior to construction to ensure that any sites discovered during construction activities are managed accordance with statutory requirements.

Recreation

20. The proponent will prepare a Coastal Management Plan (CMP) for the coastal area under its control between the Buller and Oakajee Rivers. The CMP, which will include a Recreation Plan, will be prepared prior to the commencement of construction of the port, in accordance with the requirements of the Ministry for Planning, and in consultation with the Shire of Chapman Valley.

21. The proponent will complete a detailed assessment of the impact of port structures on waves breaks to the north of the proposed port when the final design of the port is selected.

22. The proponent will undertake a study, as part of the Recreation Plan, to determine the significance of the Oakajee area to windsurfing. This study will also consider the potential impact of the construction of the port on the sport.

Professional Fishing

23. The proponent, through a Construction Management Plan, will take steps to ensure that construction of the port is managed so as to limit the potential for

incidental damage to rock lobster habitat. The Construction Management Plan will be prepared to the requirements of the DEP.

24. The proponent will liaise with the Department of Fisheries and rock lobster fishing industry representatives on a continuing basis regarding port operations and their implications for rock lobsters and to provide information on the results of the Water Quality Monitoring Program.

Unexploded Ordnance

25. The proponent commits to work with the Western Australian Police Unexploded Ordnance Unit to determine the nature, extent and risk associated with the presence of any unexploded ordnance in the area of the project and to clear unexploded ordnance before commencement of construction.